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The special provisions contained herein have been prepared by or under the direction of the following Registered Persons.

CIVIL SPECIFICATIONS

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Date 01/20/2016

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Thomas Krakow
No. C48381
Date 01/20/2016

DRAINAGE

Garrett Low
No. C51662
Date 01/20/2016

TRAFFIC

Soroush Khadem
No. 72472
Date 01/20/2016
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CIVIL SPECIFICATIONS

LANDSCAPE

Registered Landscape Architect

01/20/2016

Date

AC TRANSIT
INFRASTRUCTURE AND STATION PLATFORM
IFB # 2016-1354

OCTOBER 2015

PROFESSIONAL LICENSE SEALS

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IDENTIFICATION STAMP
DIVISION OF THE STATE ARCHITECT

FILE #
APP #01-115240
AC FLS SS
Date

ACS: Janet McFarland
TECHNICAL SPECIFICATIONS

The work involved for this project is located within the City of Oakland, Caltrans, and City of San Leandro Right of Way.

Segment A (Caltrans Jurisdiction) is from San Leandro BART Station to 42nd Avenue and is within the City of San Leandro and Caltrans Right of Way.

Segment B (City of Oakland Jurisdiction) is from 42nd Avenue to Downtown Oakland and is within the City of Oakland Right of Way.

In the event of inconsistencies between requirements contained in different components of the Technical Specifications, the precedence of the Technical Specifications must be as follows:

I. SEGMENT B
   A. CONSTRUCTION OF CIVIL WORK (VOLUME 1 PLANS)
      1. DIVISION 1 – GENERAL REQUIREMENTS
      2. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
      3. DIVISION 2.2 - SEGMENT A - CALTRANS SPECIFICATIONS
      4. DIVISION 3.1 – ARCHITECTURAL AND STRUCTURAL SPECIFICATIONS
      5. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
      6. DIVISION 4 – EBMUD SPECIFICATIONS

   B. CONSTRUCTION OF STATION PLATFORM WORK (VOLUME 2 PLANS) FOR ARCHITECTURAL AND STRUCTURAL
      1. DIVISION 1 – GENERAL REQUIREMENTS
      2. DIVISION 3.1 – ARCHITECTURAL AND STRUCTURAL SPECIFICATIONS
      3. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
      4. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
      5. DIVISION 2.2 - SEGMENT A - CALTRANS SPECIFICATIONS
      6. DIVISION 4 – EBMUD SPECIFICATIONS

   C. CONSTRUCTION OF STATION PLATFORM WORK (VOLUME 2 PLANS) FOR COMMUNICATIONS AND ELECTRICAL
      1. DIVISION 1 – GENERAL REQUIREMENTS
      2. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
      3. DIVISION 3.1 – ARCHITECTURAL AND STRUCTURAL SPECIFICATIONS
      4. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
      5. DIVISION 2.2 - SEGMENT A - CALTRANS SPECIFICATIONS
      6. DIVISION 4 – EBMUD SPECIFICATIONS

   D. CONSTRUCTION OF EBMUD WORK (VOLUME 3 PLANS) FOR WATER MAINS
      1. DIVISION 1 – GENERAL REQUIREMENTS
      2. DIVISION 4 – EBMUD SPECIFICATIONS
      3. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
      4. DIVISION 2.2 - SEGMENT A - CALTRANS SPECIFICATIONS
      5. DIVISION 3.1 – ARCHITECTURAL AND STRUCTURAL SPECIFICATIONS
      6. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
II. SEGMENT A

A. CONSTRUCTION OF CIVIL WORK (VOLUME 1 PLANS)
   1. DIVISION 1 – GENERAL REQUIREMENTS
   2. DIVISION 2.2 - SEGMENT A - CALTRANS SPECIFICATIONS
   3. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
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   5. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
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   5. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
   6. DIVISION 4 – EBMUD SPECIFICATIONS

C. CONSTRUCTION OF STATION PLATFORM WORK (VOLUME 2 PLANS) FOR COMMUNICATIONS AND ELECTRICAL
   1. DIVISION 1 – GENERAL REQUIREMENTS
   2. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
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   4. DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS
   5. DIVISION 3.1 – ARCHITECTURAL AND STRUCTURAL SPECIFICATIONS
   6. DIVISION 3.2 – COMMUNICATION SPECIFICATIONS
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Contract description.
B. Definitions.
C. Licenses and Permits.
D. Sequence of the Work.
E. Contractor’s use of site and premises.
F. Holidays and Working Hours

1.2 CONTRACT DESCRIPTION

A. AC TRANSIT intends to deploy a Rapid Bus Transit service in the Cities of Oakland and San Leandro, California. The objective of this deployment is to provide the infrastructure and components necessary to improve traffic operations, minimize congestion, and improve consistency and quality of transit facilities.

The Alameda-Contra Costa Transit District (AC Transit) plans to construct stations, infrastructure and components necessary to improve traffic operations, minimize congestion for the East Bay Bus Rapid Transit (BRT) Project, BRT line along an approximately 9.5-mile arterial corridor through the cities of Oakland and San Leandro in Alameda County, California. The proposed route starts in Downtown Oakland, generally following Broadway, 12th Street and 11th Street in Downtown Oakland, International Boulevard and E 12th Street and 14th Avenue in Oakland, and East 14th Street and Davis Street, San Leandro Boulevard in San Leandro and route ending at San Leandro Bay Area Rapid Transit (BART) station.

The components of this project are as follows:

- Utility relocations at some stations which include waterline and sewer work.
- Dedicated median bus lanes for exclusive use by buses and emergency vehicles in most of the corridor. Side-running bus only transit lanes with permitted right turns and access to driveways.
- Raised median station platforms with level boarding in median running transit ways.
- Raised curbside station platforms with level or near-level boarding in side-running transit ways.
- Proof of payment ticket validation.
- Ticket Vending Machines (TV) and Clipper Card Readers on every station platform.
- Fiber optic communication system.
• Transit signal priority (TSP), new traffic signals, pedestrian signals, and transit only signals.
• Real-time travelers information.
• Shelters that include extended canopies with amenities for the comfort and convenience of passengers.
• Station lighting.
• Security features (e.g., closed circuit television, SCADS, Public Address System).
• Pedestrian access and safety improvements at stations.
• Curb ramps reconstruction, sidewalk and X-walk improvements at locations shown on the plans.
• San Leandro BART Transit Center Improvements (Allowance Item).
• Site Improvements for Northern Layover (Allowance Item).

The proposed BRT service will be supported by the existing local bus network; bus routes along the proposed BRT project alignment serve approximately 25,000 riders per day—10 percent of AC Transit’s total ridership.

1.3 DEFINITIONS

A. Refer to the “Definitions and Terms” in Division 0, Section 00 72 00 “General Conditions”, except as provided herein.

City of Oakland Engineer: City of Oakland Public Works authorized representative.

City of San Leandro Engineer: City of San Leandro Public Works authorized representative.

Caltrans Engineer: State of California Department of Transportation authorized representative.

EBMUD Engineer: East Bay Municipal Utility District authorized representative.

1.4 LICENSES, PERMITS, INSPECTIONS, AND MONUMENT PRESERVATION

A. Licenses

The prime Contractor shall possess a valid Class “A” California General Engineering Contractor License. The prime Contractor or a subcontractor of the prime contractor shall hold a valid:

1. “C10” California Electrical Contractor License
2. “C31” California Construction Zone Traffic Control Contractor License
3. Class “B”

The Contractor will also be required to ensure that all subcontractors working on this project are holding valid licenses suitable for their trade. Subcontractors of the prime contractor working on sanitary sewer systems shall have a Class “A” California General Engineering Contractor License or a “C42” California Sanitation System Contractor License. Subcontractors of the prime contractor working on water mains shall have a Class “A” California General Engineering Contractor License or a “C34” California Pipeline Contractor License. The prime contractor or a subcontractor of the prime contractor working on water mains holding a valid Class “A” California General
Engineering Contractor License or Class “C34” Pipeline Contractor shall have previous experience of not less than one year in installing potable water mains 6” to 20” size.

B. Permits, Inspections and Monument Preservation

The Contractor must be responsible for applying, paying fees required by City of San Leandro and Caltrans, and coordination for obtaining a City of Oakland, City of San Leandro, and Caltrans Encroachment Permits and associated inspection for completion of the work. Corner Record must be recorded with County per Division 1, Section 01 71 23 before the Contractor shall obtain their encroachment permits. The Contractor must maintain records of fees associated with obtaining permits and inspections for the completion of work, and submit them to AC Transit for reimbursement.

1. The Caltrans Encroachment Permits are available online at http://www.dot.ca.gov/hq/traffops/developserv/permits/

District 04
111 Grand Avenue, 6th Floor
P. O. Box 23660
Oakland, CA 94623-0660
(510) 286-4401
(510) 286-4712 FAX

2. City of San Leandro encroachment permits are available at the City of San Leandro Permit Center. http://www.sanleandro.org/depts/cd/bldg/bldgpermitplan.asp

City of San Leandro - Permit Center
Department of Community Development
835 East 14th Street
San Leandro, CA 94577-3767

3. City of Oakland encroachment permits, P-Job (Privately constructed public improvement) permit, Street Excavation permit, Excavation and Obstruction Permit, and Street Obstruction permit, are available at the City of Oakland Permit Center. The Contractor shall not be required to pay any associated fees in securing or obtaining permits from the City of Oakland. http://www2.oaklandnet.com/Government/o/PBN/OurServices/permits/

City of Oakland - Permit Center
Community and Economic Development Agency (CEDE)
250 Frank H. Ogawa Plaza, Rm 2114, 2nd Floor
Oakland, CA 94612-2031

1.5 SEQUENCE OF THE WORK

A. The AC Transit East Bay Bus Rapid Transit project is divided into 16 construction zones. The Contractor will be limited to construction within each of the zones with a maximum of four (4) zones under construction concurrently. Zone 15 and 16 will not count toward the maximum of four (4) zones under construction concurrently. The Contractor will be required to complete all civil, drainage, traffic signal, lighting, and communication system conduit improvements within each zone before moving onto another construction zone. No adjacent zones can be constructed concurrently. Zones 3 and 4 are exempt from the
adjacent Zone restriction because they are on different streets. The construction zones are as follows:

- **Construction Zone 1** – Broadway (between 20th and 11th Streets)
- **Construction Zone 2** – 12th Street (between Broadway and Lake Merritt Blvd.) and 11th Street (between Broadway and Lake Merritt Blvd.)
- **Construction Zone 3** – E. 12th Street (between Lake Merritt Blvd. and 14th Avenue)
- **Construction Zone 4** – International Blvd. (between Lake Merritt Blvd. and 14th Avenue)
- **Construction Zone 5** – 14th Avenue (between 12th and 15th Avenues) and International Blvd. (between 15th and 23rd Avenues)
- **Construction Zone 6** – International Blvd. (between 23rd and 32nd Avenues)
- **Construction Zone 7** – International Blvd. (between 32nd and 41st Avenues)
- **Construction Zone 8** – International Blvd. (between 41st and 52nd Avenues)
- **Construction Zone 9** – International Blvd. (between 52nd and 62nd Avenues)
- **Construction Zone 10** – International Blvd. (between 62nd and 71st Avenues)
- **Construction Zone 11** – International Blvd. (between 71st and 82nd Avenues)
- **Construction Zone 12** – International Blvd. (between 82nd and 94th Avenues)
- **Construction Zone 13** – International Blvd. (between 94th Avenue and Durant Blvd.)
- **Construction Zone 14** – E. 14th St. (between Durant Blvd and Davis Street) and Davis St (between E. 14th Street and San Leandro Blvd)
- **Construction Zone 15** – San Leandro Transit Center at BART Station and San Leandro Blvd (between Davis St and W. Juana Ave) (Allowance Bid Item 433)
- **Construction Zone 16** – Northern Layover at Northgate Ave (between Sycamore St and 24th St) (Allowance Item)

As a minimum requirement, the Contractor shall begin construction of the project as part of Milestone No. 1, which including Phase 1 (construction zones 8, 10, and 12 and 14), and then Phase 2 (construction zones 9, 11, and 13). NTP for Milestone No. 1 is anticipated to be issued March 15, 2016.

As part of Milestone No. 2 of construction, the contractor is to construct Phase 3 (construction zones 2, 5, and 7), and then Phase 4 (construction zones 1, 3, 4, and 6). NTP for Milestone No. 2 is anticipated to be issued March 15, 2016.
The Contractor must complete Milestone No. 3 the final pavement overlay, communication systems, signal testing, installation of structural and architectural components, installation of artistic enhancement components, and permanent striping for all zones. A separate NTP for Milestone No. 3 is anticipated to be issued February 1, 2017 to allow sufficient time for vehicle testing.

As part of Milestone No. 4 of construction, the contractor is to complete the construction zone 15 (Allowance Bid Item 433 - San Leandro Transit Center), which includes all work on San Leandro Blvd and San Leandro BART Station. A separate NTP for Milestone No. 4 is anticipated to be issued between July 1, 2016 and October 1, 2016.

As part of Milestone 5 of construction, the contractor is complete the construction zone 16 (Allowance Item 434 - Northern Layover), which includes all work at the northern layover. A separate NTP for Milestone No. 5 is anticipated to be issued between February 15, 2017 and April 30, 2017.

As part of Milestone No. 6, the contractor shall complete within all construction zones the landscaping all documentation for Contract Closeout. The landscaping cannot start until Milestone No. 2 has been completed.

The AC Transit East Bay Bus Rapid Transit project is divided into 5 Phases 15-16 construction zones. The Contractor will be limited to construction within each of the zones with a maximum of four (4) zones under construction concurrently. Zone 15 and 16 will not count toward the maximum of four (4) zones under construction concurrently. The Contractor will be required to complete all civil, drainage, electrical traffic signal, lighting, and communications system conduit improvements within each zone before moving onto another construction zone. No adjacent zones can be constructed concurrently. Zones 3 and 4 are exempt from the adjacent Zone restriction because they are on different streets. The construction zones are as follows:

- **Construction Zone 1** — Phase 5 — Broadway (between 20th and 11th Streets)
  Includes Northern Layover

- **Construction Zone 2** — Phase 4 — 12th Street (between Broadway and Lake Merritt Blvd.) and 11th Street (between Broadway and Lake Merritt Blvd.)

- **Construction Zone 3** — Phase 5 — E. 12th Street (between Lake Merritt Blvd. and 14th Avenue)

- **Construction Zone 4** — Phase 5 — International Blvd. (between Lake Merritt Blvd. and 14th Avenue)

- **Construction Zone 5** — Phase 4 — 14th Avenue (between 12th and 15th Avenues) and International Blvd. (between 15th and 23rd Avenues)

- **Construction Zone 6** — Phase 5 — International Blvd. (between 23rd and 32nd Avenues)

- **Construction Zone 7** — Phase 4 — International Blvd. (between 32nd and 41st Avenues)

- **Construction Zone 8** — Phase 2 — International Blvd. (between 41st and 52nd Avenues)
Construction Zone 9 – Phase 3 – International Blvd. (between 52nd and 62nd Avenues)

Construction Zone 10 – Phase 2 – International Blvd. (between 62nd and 71st Avenues)

Construction Zone 11 – Phase 3 – International Blvd. (between 71st and 82nd Avenues)

Construction Zone 12 – Phase 2 – International Blvd. (between 82nd and 94th Avenues)

Construction Zone 13 – Phase 3 – International Blvd. (between 94th Avenue and Durant Blvd.)

Construction Zone 14 – Phase 1 – E. 14th St. (between Durant Blvd and Davis Street) and Davis St (between E. 14th Street and San Leandro Blvd) City of San Leandro Downtown

Construction Zone 15 – Phase 1 – San Leandro Transit Center at Transit Center at BART Station and San Leandro Blvd (between Davis St and W. Juana Ave) (Allowance Bid Item 433)

Construction Zone 16 – Northern Layover at Northgate Ave (between Sycamore St and 24th St) (Allowance Item)

As a minimum requirement, the Contractor shall begin construction of the project on as part of Milestone No. 1, which including Phase 1, (Construction Zones 14 & 15 and Phase 2 Zones 8, 10, and 12 and 14), then Phase 3 (Construction Zones 9, 11, and 13), of construction. As part of Milestone No. 2 of construction, the contractor is to construct Phase 4, (Construction Zones 2, 5, and 7), and then Phase 5 Zones 1, 3, 4, and 6).

The Contractor must complete Milestone No. 3 the final pavement overlay (RHMA-G), communication systems, signal testing, installation of structural and architectural components, installation of artistic enhancement components, and permanent striping for all zones. A separate NTP will be issued for Milestone No. 3. As part of Milestone No. 4 of construction, the contractor is to complete the construction zone 15 (Allowance Bid Item 433 – San Leandro Transit Center), which includes all work on San Leandro Blvd and San Leandro BART Station. A separate NTP will be issued for Milestone No. 4. As part of Milestone 5 of construction, the contractor is complete the construction zone 16 (Allowance Item 434 – Northern Layover), which includes at all work at the northern layover. As part of Milestone No. 6, the contractor shall complete within all construction zones the landscaping and project closeout. Milestone No. 6 follows the substantial completion of Milestones 1 through 5.
1.6 CONTRACTOR’S USE OF SITE AND PREMISES

A. Contractor should limit access to work days and work hours.

B. Contractor shall not store material on the Right-of-Way without the approval of the Engineer.

1.7 HOLIDAYS AND WORKING HOURS

A. The following are the designated holidays:

- January 1st (New Years Day - Observed)
- September 10th (Admissions Day)
- 3rd Monday in January (ML King Jr. Day)
- November 12th (Veterans Day)
- February 12th (Lincoln’s birthday)
- 4th Thursday in November (Thanksgiving)
- 3rd Monday in February (President’s Day)
- The Friday after Thanksgiving
- Last Monday in May (Memorial Day)
- December 24th (Christmas Eve)
- July 4th (Independence Day)
- December 25th (Christmas Day)
- 1st Monday in September (Labor Day)

If a designated holiday falls on a Sunday, the following Monday is a designated holiday. If November 11th falls on a Saturday, the preceding Friday is a designated holiday.

B. The Contractor’s working hours must be from 7:00 AM TO 7:00 PM, Monday through Friday in Segment A, and 9:00 AM TO 4:00 PM in Segment B. The Contractor may be allowed to work from 7:00 PM to 7:00 AM on weekdays in Segment B, from 7:00 PM to 7:00 AM on weekends, holidays, and special days only with the Engineer’s written permission and subject to noise ordinance restrictions. The Engineer may shorten the hours to prevent traffic congestion or to prevent unreasonable disturbance in residential areas. Refer to the Traffic Control System requirements in these special provisions. The Contractor must refer to 1 “LANE CLOSURE CHARTS” for mandatory lane requirements and lane closures along the affected streets within the project vicinity. Contractor must refer to the following requirements below:

1. The City of Oakland Holiday Moratorium from October 31st to January 2nd will be waived for any street listed in Attachment 2 “HOLIDAY RESTRICTED STREETS” within the project corridor. The Contractor shall notify the Engineer in writing on first Monday of May, if construction schedule that year will be extending into the City of Oakland Holiday Moratorium for that year.

2. A street in City of Oakland for both Segment A and B designated by the Oakland City Council as a “LIMITED OPERATIONS AREA” (see Attachment 3) shall have the following additional restrictions, unless specifically waived by the Engineer:
   a. No work that will interfere with traffic shall be performed in any public street or roadway during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. (except Sundays and Holidays).
   b. No equipment, construction materials or excavated material that will interfere with traffic shall be stored on any public street or roadway during the hours noted above.
c. All trenches and excavations in any public street or roadway shall be backfilled and opened to traffic, or covered during actual construction operations, or where otherwise permitted in writing by the Engineer.

d. Each work section of work shall be completed or temporarily paved and open to traffic in not more than five days after commencing work unless otherwise permitted in writing by the City Engineer.

In the event the Contractor cannot maintain the minimum number of unobstructed traffic lanes required or the project impacts traffic beyond the limits of these Provisions, the Contractor shall include these lane reductions as part of the traffic control plans and detour plans. This language does not relieve the Contractor of responsibility to maintain traffic as set forth in these specifications, the Provisions, as directed by the Engineer, or a combination thereof.

3. The following are designated special days:

   December 24th through January 2nd in City of San Leandro
   October 31st through January 2nd in City of Oakland

4. Project work hour restrictions are subject to local and state jurisdiction permit requirements. Any requested work to be performed outside project work hours requires written approval by the Engineer and is the sole discretion of the Engineer.

   The City of Oakland Holiday Moratorium from October 31st to January 2nd will be waived for the project. The Contractor shall notify the Engineer in writing on first Monday of May, if construction schedule that year will be extending into the City of Oakland Holiday Moratorium.

5. The Contractor may work at up to 13 Saturdays every 365 calendar days. Saturday work shall be implemented as much as possible next to schools. The Contractor’s Traffic Control Plans and Schedule shall clearly indicate which Saturdays each year the Contractor plans to work and what activities will require Saturday work. The Contractor shall request an exception to lane closure charts by submitting a written request to the Engineer no less than 25 days and no more than 125 days before the anticipated start of any operations that will occur on a Saturday. The Contractor can revise scheduled Saturday work days only with the Engineer’s written permissions. Saturday work is subject to noise ordinance.

6. The Contractor may work up to 261 extra hours every 365 calendar days beyond the Contractor’s work hours. These extra hours shall only occur Monday through Friday. The Contractor’s Traffic Control Plans and Schedule shall clearly indicate which days each year the Contractor plans to work these extra hours and what activities will require extra hours. The Contractor shall request an exception to lane closure charts by submitting a written request to the Engineer no less than 25 days and no more than 125 days before the anticipated start of any operations that will occur on these extra hours. The Contractor can revise their scheduled days for extra hours only with the Engineer’s written permissions. Extra hours are subject to noise ordinance.

PART 2 - PRODUCTS

Not Used.
PART 3 - EXECUTION

Not Used.

END OF SECTION
SECTION 01 14 00

TIME FOR COMPLETION, LIQUIDATED DAMAGES, CONTRACTOR’S LICENSE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Overall Time for Completion.

B. Liquidated Damages and Classification of.

C. Contractor’s License.

1.2 OVERALL TIME FOR COMPLETION AND LIQUIDATED DAMAGES

A. This Section describes the Contract Time for the overall completion of the entire Work and this section describes the Contract Time for the overall completion of the entire Project and Intermediate milestones and their associated liquidated Damages.

B. The Contractor shall achieve substantial Completion of Work in Construction Zones 8, 9, 10, 11, 12, 13 and 14 under the Contract referred to as Milestone No. 1 in 334 calendar days following the date specified in the Notice-to-Proceed Part 1. This work includes the following improvements:

1. Signs
2. Pavement excluding final lift of RHMA-G
3. Sidewalks, Curb Ramps, and Driveways
4. Drainage
5. Concrete work for station platforms
6. Station platform power supplies
7. Traffic signals
8. Temporary signal timing
9. Water line relocations
10. Sewer relocations
11. Irrigation supply lines to landscape areas.

Failure to complete Milestone No. 1 by 334 calendar days will result in the assessment of Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 1 is completed to the satisfaction of the Engineer.

C. The Contractor shall achieve substantial Completion of Work in Construction Zones 1, 2, 3, 4, 5, 6, and 7 under this Contract referred as Milestone No. 2 in 578 calendar days following the date specified in the Notice-to-Proceed Part 1. This work includes the following improvements:
1. Signs and Striping
2. Sidewalk, Curb Ramps, and Driveways
3. Drainage
4. Station platforms and Canopies.
5. Power supply and apparatus for station platforms
6. Traffic signals
7. Temporary signal timing
8. Signal priority devices
9. Fiber optic connections
10. Water line relocations
11. Sewer relocations
12. Irrigation supply lines to the landscape areas

Failure to complete Milestone No. 2 by 578 calendar days will result in the assessment of Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 2 is completed to the satisfaction of the Engineer.

D. The Contractor shall achieve substantial completion of Work for Construction under this Contract referred to as Milestone No. 3 in 270 calendar days following the date specified in the Notice-to-Proceed Part 2. This work includes the following improvements:

1. Final overlay
2. Permanent striping
3. Communication systems
4. Final signal timing
5. Signal testing
6. Installation of structural and Architectural components
7. Installation of artistic enhancements components

Failure to complete Milestone No.3 by 270 calendar days will result in the assessment of Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 3 is completed to the satisfaction of the Engineer.

E. The Contractor shall achieve substantial Completion of Work in Construction Zone 15 under this Contract referred to as Milestone No. 4 in 300 calendar days following the date specified in the Notice-to-Proceed Part 3. This work includes the following improvements:
1. The entire work for the San Leandro Transit Center at the San Leandro BART Station and on San Leandro Blvd between Davis St and W. Juana Ave. (Allowance Bid Item 433)

Failure to complete Milestone No. 4 by 300 calendar days will result in the assessment of Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 4 is completed to the satisfaction of the Engineer.

F. The Contractor shall achieve substantial Completion of Work for Construction in Construction Zone 16 under this Contract referred to as Milestone No. 5 in 90 calendar days following the date specified in the Notice-to-Proceed Part 4. This work includes the following improvements:

1. The entire work for the Northern Layover at Northgate Ave between Sycamore St and 24th St. (Allowance Bid Item 434)

Failure to complete Milestone No. 5 by 90 calendar days will result in the assessment of the Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 5 is completed to the satisfaction of the Engineer.

G. Contractor shall complete the entire Work in all Construction Zones under this Contract referred as Milestone No. 6 in 668 calendar days prior to the date specified in the Notice-to-Proceed Part 1. This includes satisfactory completion of the following:

1. Landscaping including hardscape
2. Final Inspections, tests results
3. Documentation
4. As-built drawings
5. Punchlist
6. Final clean-up and full demobilization.

Failure to complete Milestone No. 6 by 668 days will result in the assessment of Liquidated Damages in the amount of $8,000 per calendar day until the Work covered by Milestone No. 6 is completed to the satisfaction of the Engineer.

Contractor shall complete the entire Work under this Contract in 668 calendar days beginning with the date specified in the Notice-to-Proceed. This includes satisfactory completion of all landscaping including hardscape, inspections, tests, documentation, as-built drawings, punchlist, final clean-up and full demobilization. This will be referred to as Milestone No. 3. Failure to complete by this number of days will result in the assessment of Liquidated Damages in the amount of $8,000 per calendar day until the Work is completed to the satisfaction of the Engineer.

The Contractor shall achieve Substantial Completion Segment A & B of the Work under this Contract in 578 calendar days beginning with the date specified in the Notice-to-Proceed. This includes all roadway improvements including signs and striping, Sidewalk and pedestrian ramps, Station Platforms and Canopies, power supply and Electronic devices, Traffic signals including timing and signal priority devices, Fiber optic connections, waterline relocations, Sewer relocations, water supply lines to the landscaped areas and the Northern Layover. This will be referred to as Milestone No. 2.
Failure to complete by this number of days will result in the assessment of Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 2 is completed to the satisfaction of the Engineer. A separate Notice to proceed will be issued for the Northern Layover. It is anticipated to be issued on January 2, 2017.

The Contractor shall achieve Completion of Segment A of the Work under the Contract in 334 calendar days beginning with the date specified in the Notice-to-proceed. This includes all roadway improvements including signs and striping, sidewalk and pedestrian ramps, station platforms and canopies, power supply, traffic signals with construction timing, waterline relocations and sewer relocations and water line supply lines to landscaped areas. This also includes the work at the Transit Center at the San Leandro BART Station. This shall be referred to as Milestone No. 1. Failure to complete by this number of days will result in the assessment of Liquidated Damages in the amount of $13,000 per calendar day until the Work covered by Milestone No. 1 is completed to the satisfaction of the Engineer. The Notice to Proceed for the work at the Transit Center at the San Leandro BART Station is anticipated to be issued on June 1, 2016 and the Work...

H. Division 1, Section 01 55 26, Part 3.11 for Liquidated Damages associated with Traffic Control.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION
SECTION 01 20 00

PRICE AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Allowances.
B. Unit Prices.
C. Schedule of Values.
D. Stored Material.
E. Applications for Payment.
F. Defect Assessment.

1.2 RELATED SECTIONS

A. Division 1, Section 01 33 00 - Submittal Procedures.

1.3 ALLOWANCES

A. The Allowances that are part of the Grand Total Bid Price (Bid Items 428 through 440) are Owner controlled Allowances. The Contractor must have an Allowance Draw Authorization approved by the Owner prior to requesting payment on any part of these Allowances. The Allowance Items EBMUD Work (bid Item 428), San Leandro Transit Center (Bid Item 433), Northern Layover (Bid Item 434), Design Modifications (Bid Item 439) and Unforeseen Conditions (Bid Item 440) will require a Contract Amendment prior to payment in addition to the Allowance Draw Authorization.

B. The Contractor must submit an estimate with a detail supporting documentation showing how the requested Allowance Draw value was determined to obtain an Allowance Draw Authorization and/or Contract Amendment. The Owner will evaluate this request and advise the Contractor if the value and documentation are acceptable. The owner may require additional documentation or remove unwarranted items from the request.

1.4 ADDITIVE ALTERNATES

A. The District may include any or all of the Additive Alternate items with the Award of Contract. The Additive Alternates are not part of the Grand Total Base Bid Price and will not be considered when determining the lowest responsive and responsible bidder. The Award will be based on the Grand Total Bid Price. The Bidder must hold the price of the Additive Alternates for ninety (90) calendar days after Award of the Contract. (Maximum of 180 calendar days after bid opening.) The Additive Alternates may be added to the Contract as a Contract Modification after the Initial Award.

1.5 UNIT PRICES

A. Unit Price Items and adjustments to the unit price items
1. The unit prices applied to each Unit Price bid Item shall include all direct and indirect costs associated with the work included in the bid item scope.

2. Increases of More Than 25 Percent:
   a. If the total bid item quantity exceeds 125 percent of the quantity shown on the Bid Item List and if no approved Change Order addresses payment for the quantity exceeding 125 percent, the Engineer may adjust the unit price for the excess quantity as specified in these special provisions or the following:
      (1) The adjustment is the difference between the unit price and the unit cost of the total item pay quantity.
      (2) In determining the unit cost, the Engineer excludes the item's fixed costs. The Contractor has recovered the fixed costs in the payment for 125 percent shown on the Bid Item List.
      (3) After excluding fixed costs, the Engineer determines the item unit cost. If the payment for the number of units of a bid item in excess of 125 percent of the Bid Item List is less than $2,000 at the unit price, the Engineer may choose not to adjust the unit price.

3. Decreases of More Than 25 Percent:
   a. If the total item pay quantity is less than 75 percent of the quantity shown on the Bid Item List and if no approved Change Order addresses payment for the quantity less than 75 percent, you may request a unit price adjustment. The Engineer may adjust the unit price for the decreased quantity as specified in these special provisions or the following:
      (1) The adjustment is the difference between the unit price and the unit cost of the total pay quantity.
      (2) In determining the unit cost, the Engineer includes the item's fixed costs.
      (3) After including fixed costs, the Engineer determines the item unit cost.

4. Eliminated Items:
   a. If the Engineer eliminates an item, the Owner will pay your costs incurred before the Engineer's elimination notification date. If you order authorized material for an eliminated item before the notification date and the order cannot be canceled, either of the following occurs:
      (1) If the material is returnable to the vendor, the Engineer orders you to return the material and the Owner pays your handling costs and vendor charges.
      (2) The Owner pays your cost for the material and its handling and becomes the material owner.
B. **Unit Price for the following bid items shall not be adjusted for increase in the quantity of more than 25 percent or decrease in the quantity of more than 25 percent:**

1. Remove Parking Space Meter (Additive Alternate)
2. Remove Parking Pay Station (Additive Alternate)
3. Parking Space Meter Post (Additive Alternate)
4. Traffic Signal Timing and Coordination (Additive Alternate)
5. Pervious Concrete Pavement (Additive Alternate)
6. Precast Architectural Pavers (Additive Alternate)

### 1.6 SCHEDULE OF VALUES

A. Submit Schedule of Values in duplicate within 15 days after date the effected date in the Notice to Proceed.

B. Obtain the Engineer’s approval of the Schedule of Values before any partial payment for lump sum items will be made.

C. Format: Identify each line item with number and title of bid item along with an additional sub-number or letter and description.

D. Breakdown each bid item into unit descriptions of work with quantity, unit price, and subtotal. Determine quantities required to complete the work indicated on the Contract Drawings. Contractor must be responsible for accuracy of quantities and subtotals submitted for approval on the Schedule of Values.

E. No adjustment in will be made in the Contract lump sum prices paid due to any difference between the quantities shown in the Schedule of Values furnished by the Contractor and the quantities required to complete the Work.

F. The sum of the amounts (subtotals) of the units of work listed for each lump sum item must be equal to the Contract lump sum price bid for the work. Include a direct proportional amount of Contractor’s overhead, profit, and all other expenses in each individual unit listed in the Schedule of Values.

G. Approved Schedule of values will be used to determine partial payments during the progress of the Work.

H. Identify bonds and insurance.

I. Include in each line item, the amount of Allowances, if any, specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by the unit cost to achieve the total for the item.

J. Revise schedule to list approved Change Orders, with each Application for Payment.

K. Refer to Section 01 71 13 Mobilization for mobilization requirements.

L. **Revise Schedule of Values to include the awarded Additive Alternates.**
1.7 STORED MATERIAL

A. Invoice for Stored Materials: Partial payments for Contractor-furnished materials not yet installed may be made only after such materials have been furnished and stored for use in the Work, provided they are stored in an area approved by the Engineer. All such material must be covered by insurance. Said invoice may include the amount and value of such acceptable material as has been furnished and delivered to the site and such acceptable material as has been furnished and stored for use in the Work, provided it is stored within the San Francisco Bay Area and is segregated and designated for exclusive use of the Owner.

B. Invoices from suppliers and proof of pavement by Contractor must be furnished to substantiate the cost.

1.8 APPLICATIONS FOR PAYMENT

A. Submit each application on the form provided by the Engineer.

B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.

C. Payment Period: Submit application for payment monthly prior to the tenth day of the subsequent month.

D. Submit with transmittal letter in a form acceptable to the Engineer.

E. Substantiating Data: Submit substantiating information, as required by the Engineer, including the following with the application:

1. Current construction photographs specified in Division 1, Section 01 33 00.

2. Conditional release of liens from major subcontractors and vendors.

3. Submit certification signed by the Contractor and verified by the Engineer that Record Documents, as specified in Division 1, Section 01 70 00, are being kept current with construction activities.

4. Affidavits and invoices attesting to off-site stored products.

5. Construction progress schedules, revised and current as specified in Division 1, Section 01 30 00, Administrative Requirements.

6. Certified payroll records to support compliance with Prevailing Wages requirements.

7. Copies of the following logs: Requests for Information; Quality and Non-Conformances; submittals and shop drawings, and Change Orders.

8. Copies of subcontractor and vendor invoices.


1.9 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements.

B. If, in the opinion of the Engineer, it is not practical to remove and replace the work, the Engineer will direct an appropriate remedy or adjust payment.

C. If the Engineer determines that the defective work may remain or if the Engineer allows defective work to remain and requires that the defective Work be partially repaired, the Contract Price will be adjusted to a new sum at the discretion of the Owner.

D. The individual specification sections may modify these options or may identify a specific formula or percentage sum reduction.

E. The authority of the Owner to assess the defect and identify payment adjustment is final.

F. Non-Payment for Rejected Products: Payment will not be made for rejected products for any of the following. Products are used in this paragraph include materials, products, and completed items of work.

   1. Products wasted or disposed of in a manner that is not acceptable.
   2. Products determined as unacceptable before or after placement.
   3. Products not completely unloaded from the transporting vehicle.
   4. Products placed beyond the lines and levels of the required Work.
   5. Products remaining on hand after completion of the Work.
   7. Work installed and not passing inspections.
   8. Products with incomplete certifications (for which certifications are specified or otherwise required).

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
SECTION 01 30 00
ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Submittals.
B. Coordination and Project Conditions.
C. Preconstruction Meeting.
D. Progress Meetings.
E. Preinstallation Meetings.
F. Construction Progress Documentation.
G. Quality Assurance Plan.

1.2 SUBMITTALS

A. Submit Traffic Control Plan.
B. Submit progress photographs (electronic and hard copies) with application for payment.
C. Submit Baseline Schedule.
D. Submit List and Schedule of Required Project Submittals. Refer to Division 1, Section 01 33 00 for additional Submittal requirements.

1.3 COORDINATION AND PROJECT CONDITIONS

A. Coordinate scheduling, submittals, and Work of the various sections of the specifications to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Verify utility requirements and characteristics of operating equipment are compatible. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
C. Coordinate space requirements, supports, and installation of work that are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with property lines.
D. Coordinate completion and clean-up of work of separate Sections in preparation for Substantial Completion.
E. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
F. Coordinate activities included in various Sections to assure efficient and orderly installation of each component. Coordinate operations included under different Sections that are dependent on each other for proper installation and operation.

G. Coordinate with the City of Oakland’s Concrete Curb Ramp Contractor. The City of Oakland’s Concrete Curb Ramp Contractor will be working on the project site during the construction of the BRT Project. The City of Oakland’s Concrete Curb Ramp Contractor is responsible for construction of the curb ramps labeled on the plans as “47”. These curb ramps are not part of the Scope-of-work for this Contract. As requested by Engineer, stake and locate proposed features and perform relocation or demolition of items that are within the Scope of Work for this Contract. This work may not be within the current or active work zone(s) at the time of the request. This limited work is exempt from the Zone restrictions in Division 1, Section 01 11 00, Part 1.5.

1.4 PRECONSTRUCTION MEETING

A. The Engineer will schedule a meeting after Notice of Award, and after execution Owner-Contractor Agreement, and submission of executed bonds and insurance certificate.

B. Attendance Required: Engineer, Construction Manager, Architect/Engineer of Records, and Contractor.

C. Preconstruction Requirements:
   1. Introduce parties, roles, and responsibilities and review communications protocols.
   3. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
   4. Designation of personnel representing the parties in Contract and the Engineer.
   5. Procedures and processing of field decisions, submittals, substitutions, RFI’s, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling activities of Owner-hired testing laboratory.
   8. Environmental requirements and procedures:
      a. Waste Reduction and Recycling Plan (WRRP)

D. Engineer will prepare meeting report and distribute copies within five days after meeting to participants. Contractor must distribute copies to Contractor’s team members affected by decisions made.

E. Engineer will issue Notice to Proceed.

F. Contractor must not mobilize on site until satisfying the Preconstruction Requirements listed herein.
1.5 PROGRESS MEETINGS

A. Attend progress meetings throughout progress of the Work at minimum weekly intervals or as required by the Engineer.

B. Attendance Required: Job superintendent, major subcontractors and suppliers, as appropriate to agenda topics for each meeting.

C. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of Request for Information Log and Non-conformance Log.
7. Review of off-site fabrication and delivery schedules.
8. Review of Change Order Log and proposed changes.
9. Review of baseline progress schedule.
10. Corrective measures to regain projected schedule.
11. Planned progress during succeeding work period.
12. Coordination of projected progress.
14. Other business relating to Work.

D. Engineer will prepare meeting report and distribute copies within five days after meeting to participants. Contractor must distribute copies to Contractor’s team members affected by decisions made.

1.6 PREINSTALLATION MEETING

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, Work of the specific section.

C. Notify Engineer four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of installation, preparation and installation procedures.

2. Review coordination with related work.

E. Record minutes and distribute copies within five days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

1.7 CONSTRUCTION PROGRESS DOCUMENTATION

A. Progress Photographs:

1. Photographically document site conditions prior to start of construction operations.

2. Take weekly photographs throughout entire project. Photographs must be provided for unrestricted use by Owner. Indicate photographs demonstrating environmental procedures.

3. Submit minimum 20 photographs on CD and 5 by 7 inch hard copies with each application for payment. Organize photographs by date and description. Files are to be named “YYMMDD_Location_Work Description”. Format CD to be compatible with Owner’s computer software.

1.8 QUALITY ASSURANCE PLAN

A. The goal of the Quality Assurance Plan (QAP) is to explicitly plan for the quality related activities needed to ensure that the project meets the FTA and BRT Project requirements. Contractors, Subcontractors and Suppliers shall follow all applicable requirements listed in the QAP to the extent possible.

B. The Contractors QAP shall provide for implementation of administrative and control measures during construction, installation, testing, inspection, and system re-testing. The administrative and control measures shall be prepared and implemented in such a manner as to contribute to and document the attainment of a safe, reliable, economical and convenient public transit system.

C. The objective of the Quality Assurance Plan is to ensure attainment of the expected and acceptable level of quality for the AC Transit BRT Project. Emphasis is placed on activities including adequate and proper control of construction and installation activities, effective and adequate training for project personnel, and documented validation that the project/service meets the contract requirements.

D. It is the Districts intent to enforce rigidly the contract requirements to ensure that the contractors and its subcontractors/suppliers are implementing an effective Quality Control Program. Furthermore, control and verification of the quality of work performed by the construction Contractor, Subcontractors, and Suppliers is ultimately the responsibility of the Contractor.

E. Payment for the QAP is incident to the Work and shall be included in the the unit prices and lump sum amounts for each Bid Item.

F. The Contractor shall submit a Quality Assurance Plan within 30 days of the effective date on the Notice-to-Proceed. The Quality Assurance Plan must be approved by the District prior to commencing any field work except the Monument Survey. All work performed for
this project must be performed in accordance with the approved Contractor’s Quality Assurance Plan. The plan shall address but is not limited to the following topics:

1. Management Responsibility
   1. Documented Quality Management System
2. Document Control
3. Product Identification and Traceability
4. Process Control, Including Special Procedures
5. Inspection and Testing
6. Inspection, Measuring, and Test Equipment
7. Inspection and Test Status
8. Quality Records
9. Quality Audit
10. Training

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Related Sections.
B. References.
C. Definitions.
D. General.
E. Contractor’s Scheduling Personnel and Their Qualifications.
F. Schedules.
G. Contractors Schedule Technical Requirements.
H. Four-Week Work Plan.

1.2 RELATED SECTIONS

A. Division 1, Section 01 11 00 - Summary.
B. Division 1, Section 01 30 00 - Administrative Requirements.
C. Division 1, Section 01 33 00 - Submittal Procedures.

1.3 REFERENCES


1.4 DEFINITIONS

A. Activity: A task, event or other Contract element on a schedule that contributes to completing the Contract. Activities have a description, duration, and one or more logic ties.
B. Activity Duration: The total number of working days or calendar days required to perform that Activity. They may be planned or actual.
C. Actual Dates: The actual start or finish date of an Activity which occurs prior to the Data Date. Dates occurring after the Data Date are not Actual Dates.
D. Contract Schedule: A computer-produced schedule in the Critical Path Method (CPM) format. The Contract Schedule includes all activities necessary to clearly establish the Critical Path and to demonstrate complete and accurate planning and sequencing of the Contract and to permit monitoring and evaluation of progress time impacts. The Interim

E. Critical Path Method (CPM) A network-based planning technique using Activity Durations and the relationships between activities to mathematically calculate a schedule for the entire Contract.

F. Current Schedule: The most recently AC Transit accepted Contract Schedule, (i.e. Interim Contract Schedule, Baseline Contract Schedule, Contract Update Schedule, or Revised Baseline Schedule) shall constitute the “Current Schedule”.

G. Data Date: The work date after the date through which a schedule is current. Everything occurring earlier than the Data Date is “actual” and everything on or after the Data Date is “planned”.

H. Early Completion Date: A Planned Completion Date for a scope of work that is earlier than the contractually required date.

I. Free Float: The amount of time an Activity can be delayed before affecting a successor Activity.

J. Level of Effort: Level of Effort (LOE) Activities represent tasks performed in support of other Work which do not lend themselves to measurement of a discrete accomplishment. Examples of LOE tasks include project accounting, customer liaison, project controls, maintaining traffic control etc. The durations of LOE Activities are defined by the work they support.

K. Milestone: A marker in a network which is typically used to mark a point in time or denote the beginning or end of a sequence of activities. A Milestone has zero duration, but will otherwise function in the network as if it is an Activity, including either a start or finish date.

L. Near Critical Path: A chain of activities with Total Float exceeding that of the Critical path but with Total Float not significantly greater than the Critical Path. The amount of Total Float in a path considered near critical is 14 calendar days or less.

M. Open-Ended Activity: An Activity without at least one predecessor or without at least one successor.

N. Out-of-Sequence Activity: Any activity that actually starts in a sequence other than shown in the Current Schedule. Any type of invalid sequencing will be deemed out-of-sequence.

O. Revision: A change in the schedule that modifies logics, adds or deletes activities, or alters activities, sequences, or durations.

P. Recovery Schedule: A modified Current Schedule prepared to show how delay can be recovered in the event that a delay to a Contract Milestone Date is projected in the Current Schedule.

Q. Total Float: The amount of time that an Activity can be delayed before delaying the Contract Milestone Dates.

R. **Zone and Station Phasing Plan (ZSPP)** - a detailed color-coded graphic depicting the construction phasing plan for the various discrete areas of work by Zone and Station location.
1.5 GENERAL

A. Incorporation of Contract Requirements: Project Progress Schedules shall represent a practical plan to complete the Work within the Contract Milestone Dates, and shall convey the Contractor’s intent in the manner of prosecution and progress of Work. All Project Progress Schedules prepared by the Contractor shall meet the Contract requirements including, but not limited to access, sequencing, construction staging, and Contract Milestone Dates.

B. Contractor’s Representation: The submittal of Project Progress Schedules shall be understood to be the Contractor’s representation that the Project Progress Schedule meets the requirements of the Contract Documents and that the Work will be executed in the sequence and duration indicated.

C. Contractor Responsibility: The execution of the Work in accordance with the Contract Documents is the responsibility of the Contractor. Responsibility for developing the Contract Schedule and monitoring actual progress of the Work. The Contractor shall involve and coordinate all Subcontractors and Material Suppliers in the development and updating of Contract Schedules.

D. Schedule Adjustments: AC Transit reserves the right to require that the Contractor modify, adjust, add to, or clarify any portion of the Project Progress Schedules which may later be discovered to be insufficient or inaccurate for planning, monitoring, or executing the Work. The first of each type of schedule or report submitted by the Contractor will be reviewed for format, as well as content. Once the format has been approved, all subsequent Contract Schedules shall be submitted in the approved format. AC Transit may request format changes as the Contract progresses. No additional compensation shall be provided for such modifications, adjustments, additions, or clarifications.

E. Submittal Format: The Contractor shall submit one original and two additional copies of all Contract Schedule and report submittals described in this Technical Specifications Section; and an electronic copy file, including the Oracle Primavera 6 (P6) .xer file on compact disk or other AC Transit-approved electronic medium in a format acceptable to AC Transit.

F. Withholding Payment: AC Transit may withhold all or part of a monthly progress payment if the contractor does not submit or fails to get approval of a contractual schedule.

1.6 CONTRACTOR’S SCHEDULING PERSONNEL AND THEIR QUALIFICATIONS

A. Schedule must be prepared and maintained by personnel specializing in CPM scheduling.

B. Scheduler: A person specializing in CPM scheduling must possess a five years minimum experience in Primavera P6 scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request. AC Transit must provide formal approval of the Scheduler before the Interim Contract Schedule (ICS) is approved.

1.7 SCHEDULES

A. Interim Contract Schedule

1. Submittal: Within 10 calendar days of the established Notice to Proceed (NTP), the Contractor shall submit an Interim Contract Schedule (ICS).
2. Content:
   a. The ICS shall detail the Contractor’s activities and planned sequence of Work for the first 60 calendar days of the Contract, and summarize the remainder of the Work.
   b. The initial Data Date shall be the NTP date.
   c. The ICS is exempt from resource and cost loading requirements.
   d. The initial ICS shall meet all Contract Milestone Dates.

3. Review, Acceptance, and Implementation:
   a. AC Transit will review the ICS upon submittal by the Contractor.
   b. AC Transit will notify the Contractor of either “No Exceptions Taken” (NET), “Make Corrections Noted” (MCN), or “Amend and Resubmit” (AR) of the ICS.
   c. If notification from AC Transit indicates NET, no additional action by the Contractor is required for the submittal.
   d. If notification from AC Transit indicates MCN or AR, the Contractor will have seven calendar days after the comment(s) are provided in writing to revise and re-submit the package for AC Transit’s review. Contract shall include with the re-submittal a line-by-line response to each AC Transit comment indicating how it has been addressed by the Contractor.
   e. AC Transit will review re-submittals if AC Transit has further comments the Contractor will have an additional seven calendar days from the date the comments are returned by AC Transit to revise and resubmit for AC Transit’s review.
   f. The ICS shall serve as the Current Schedule until the Baseline Contract Schedule is approved.

B. Baseline Contract Schedule

1. Submittal: Within 30 calendar days of the Effective Date, the Contract shall submit a detailed Baseline Contract Schedule (BCS) and report for review and acceptance.

2. Content:
   a. The initial Data Date shall be the NTP date.
   b. The initial version of the BCS shall meet all Contract Milestone Dates.
   c. The sequencing of activities in the BCS may vary from the ICS.

3. Narrative Report: A narrative report shall be submitted with the BCS containing the following information:
a. A narrative report describing the basis (including Activity Duration basis), assumptions, Critical Path analysis, productivity and installation rates, crew sizes, shifts per day, shift hours, construction staging plans, planned sequence of work operations, and constraints used to develop the BCS.

b. Non-manual labor staffing plan shown as general conditions on one activity.

c. Manual labor staffing plan by craft (including Subcontractors) showing start and end date, crew sizes, shifts per day, shift hours, and number of each craft per month.

d. Equipment usage plan for major equipment by equipment type showing start and end date and number of each equipment type per month.

4. Review, Acceptance, and Implementation:

a. AC Transit will review the BCS upon submittal by the Contractor.

b. AC Transit will notify the Contractor of either “No Exceptions Taken” (NET), “Make Corrections Noted” (MCN), or “Amend and Resubmit” (AR) of the ICS.

c. If notification from AC Transit indicates NET, no additional action by the Contractor is required for the submittal.

d. If notification from AC Transit indicates MCN or AR, the Contractor will have seven calendar days after the comment are provided in writing to revise and resubmit the package for AC Transit’s review. Contract shall include with the re-submittal a line-by-line response to each AC Transit comment indicating how it has been addressed by the Contractor.

e. AC Transit will review re-submittals if AC Transit has further comments the Contractor will have an additional seven calendar days from the date the comments are returned by AC Transit to revise and resubmit for AC Transit’s review.

C. Contract Update Schedule

1. Submittal: Following acceptance of the BCS, including acceptance with comments, Contractor shall prepare and submit each month a Contract Update Schedule (CUS) inclusive of the report described below. CUS shall be submitted by the 5th of month following the reporting month.

2. Content: Each CUS shall include all work activities including those already completed.

a. The Data Date shall be the first working day of the month following the reporting month.

b. Completed activities shall incorporate “As-Built” information including when activities were actually started and actually completed.
c. In-progress activities shall be updated with remaining duration/projected finish.

d. Minor schedule revisions shall be incorporated to reflect anticipated changes to planned activities such that the schedule reflects the Contractor’s current forecast of the reporting period cut-off date for the entirety of the Work.

e. All out-of-sequence activities shall be reviewed and their relationships either verified or changed.

f. AC Transit reserves the right to request a recovery schedule. Upon acceptance by AC Transit it shall be incorporated into the CUS including resource and cost loading changes.

3. Narrative Report: A report shall be submitted with the CUS containing the following information:

a. Description of the current Critical Path and Near Critical Paths, including for each:

   (1) Description of change in Critical Path and Near Critical Paths, if any.

   (2) Amount of Float associated with each, and progress made on each during the reporting period, including explanation for lack of progress on Critical Path activities that were planned to be performed.

   (3) Description of critical activities schedule to be performed in the next reporting period.

b. Status of major project components (including percent complete, amount of time ahead or behind schedule).

c. Listing of current and potential delays including cause of delay, actual/estimated impact of delay on Contract Milestones Dates or other Milestone completion dates, and discussion of current/potential corrective/mitigate action(s) to address the issues/delays.

d. Status of major material and equipment procurement.

e. Explanation for any schedule revisions organized by Work grouping, including identification of logic changes, Activity Duration changes, and Activity additions/deletions along with reasons for the changes.

f. List of approved Change Orders incorporated or pending incorporation into the Current Schedule and a report identifying the resultant changes in resource and/or cost loading.

g. Identification of unplanned restriction or conditions regarding labor, equipment or material. Update of manual labor staffing plan, crew sizes, shifts per day, shift hours, and major equipment usage plan showing actual “head count” and major equipment use for the reporting period versus the most recently approved BCS.
4. **Review, Acceptance, and Implementation:**
   
a. AC Transit will review the CUS upon submittal by the Contractor.

b. AC Transit will notify the Contractor of either “No Exceptions Taken” (NET), “Make Corrections Noted” (MCN), or “Amend and Resubmit” (AR) of the ICS.

c. If notification from AC Transit indicates NET, no additional action by the Contractor is required for the submittal.

d. If notification from AC Transit indicates MCN or AR, the Contractor will have seven calendar days after the comment are provided in writing to revise and resubmit the package for AC Transit's review. Contract shall include with the re-submittal a line-by-line response to each AC Transit comment indicating how it has been addressed by the Contractor.

e. AC Transit will review re-submittals if AC Transit has further comments the Contractor will have an additional seven calendar days from the date the comments are returned by AC Transit to revise and resubmit for AC Transit's review. Only one CUS re-submittal per month will be reviewed by AC Transit.

D. **Revised Baseline Contract Schedule**

1. **Submittal:** Revised Baseline Contract Schedule (Revised BCS) shall be prepared by Contractor, and submitted to AC Transit for its acceptance if one or more of the following conditions occur and AC Transit specifically requests, or approves Contractor requires to prepare such a revised schedule:
   
a. A change or delay significantly affects the Critical Path for a Contract Milestone

b. Contractor elects to change any sequence of activities affecting the Critical Path(s) for Contract Milestone Dates or to significantly change the previously approved work plan

c. In the opinion of AC Transit, or at the request of the Contractor with AC Transit approval, the status of the Work is such that the network and supporting analyses no longer demonstrate complete and accurate planning and sequencing of the Work to permit monitoring and evaluation of progress and time impacts.

2. **Content:** Contractor shall submit any Revised BCS, including report, in the same form and detail as the BCS with the following clarifications:
   
a. Revised BCS shall be based upon the actual progress for Work completed and shall reestablish a baseline for the Work yet to be performed.

b. For a Revised BCS necessitated by Change Orders, the Data Date shall be the date mutually agreed by the Contractor and AC Transit, but shall generally be the date of the start of the Revised BCS development effort using the Current Schedule as a starting point for development.
3. Review, Acceptance, and Implementation:
   a. AC Transit will review the Revised BCS upon submittal by the Contractor.
   b. AC Transit will notify the Contractor of either “No Exceptions Taken” (NET), “Make Corrections Noted” (MCN), or “Amend and Resubmit” (AR) of the ICS.
   c. If notification from AC Transit indicates NET, no additional action by the Contractor is required for the submittal.
   d. If notification from AC Transit indicates MCN or AR, the Contractor will have seven calendar days after the comment are provided in writing to revise and resubmit the package for AC Transit's review. Contract shall include with the re-submittal a line-by-line response to each AC Transit comment indicating how it has been addressed by the Contractor.
   e. AC Transit will review re-submittals if AC Transit has further comments the Contractor will have an additional seven calendar days from the date the comments are returned by AC Transit to revise and resubmit for AC Transit’s review.
   f. Prior to AC Transit acceptance of the Revised BCS, the monthly Contract Update Schedule remains the Current Schedule.
   g. After AC Transit acceptance of the Revised Baseline, it shall be used as the basis for the next monthly Contract Update Schedule and is the “Current Schedule”.

E. Contractor’s Zone and Station Phasing Plan (ZSPP)

1. As part of the Contractor’s Contract Scheduling requirements and prior to the submittal of the Contractor’s initial Traffic Control Plan for review, the Contractor must provide a detailed color-coded graphic depicting the construction phasing plan for the various discrete areas of work by Zone and Station location showing at minimum the interim bus and vehicular travel lanes, full and partial lane closures, work areas, temporary signalization, left and right hand turning movements, etc. sufficient to demonstrate a comprehensive and accurate understanding of the construction and protection phasing requirements for the Project and the commitment to meet them. The Contractor shall incorporate any approved ZSPP segments in the Baseline Schedule and the Contractor shall update the ZSPP any time the sequencing within the ZSPP changes and reflect the logic changes in the current Contract Update Schedule or Revised Baseline Schedule.

1.8 CONTRACT SCHEDULE TECHNICAL REQUIREMENTS

A. The Contract Schedules shall comply with the Technical requirements for content and scheduling principles as described below.

B. Content

1. The Schedule shall be comprehensive to include the entire scope of the contract. The Schedule shall include all activities necessary to clearly
establish the Critical Path(s) and to demonstrate complete and accurate planning and sequencing of the Contract and to permit monitoring and evaluation of progress and time impacts.

2. Activity Durations shall not exceed 21 calendar days unless “Level of Effort” (LOE) or unless specifically approved by AC Transit upon Contractor request.

3. Include all Contract Milestone Dates.

4. Depict all internal and external interfaces that could impact Contractor progress, including dependencies.

5. Schedule activities shall be resource and cost loaded as follows:
   a. The budgeted cost loaded in the schedule must be consistent with the Schedule of Values and bid price.
   b. Labor loading shall be consistent with the Contractor’s overall planned workforce.
   c. Actual resources and costs are not required to be incorporated in monthly Contract Update Schedules.

C. Scheduling Principles

1. The Contract Schedule shall be computer-produced utilizing the Critical Path Method (CPM), using the latest AC Transit approved version of Primavera P6 software.

2. Contractor’s Primavera Contract Schedule database shall comply with specific schedule set-up, data inclusion, technical standards, and formats requirements defined by AC Transit to ensure compatibility with the overall AC Transit Program Schedule. The details of these Contractor Schedule Development Requirements will be provided to AC Transit to the Contractor within fifteen calendar days of the NTP date. Requirements will include direction regarding, but not limited to, the following items:
   a. Schedule format/organization
   b. Calendars
   c. Activity Codes
   d. WBS: Includes application of AC Transit WBS to all schedule activities
   e. Resources
   f. Activity Types
   g. Activity Times
   h. Activity ID
   i. Schedule, Cost, and Resource Calculation Rules
3. The schedule shall contain activity coding such that activities can be grouped to correspond directly to the Schedule of Values.

4. Identify all activity to be performed by Subcontractors by name of Subcontractor through use of an activity code.

5. All activities in the Schedule, with the exception of the first and last activities, shall have a minimum of one predecessor and a minimum of one successor.

6. Activity Durations shall be expressed in whole days.

7. For activities in progress that are forecast to have durations different than planned, the remaining durations shall be revised. After acceptance of the BCS by AC Transit, the original durations of activities shall not be changed.

8. Lags shall not be used when the creation of an Activity will perform the same function (e.g., concrete cure time). Use of lag must be minimized and restricted to only those situations where it is not possible to properly define the start or finish of an Activity by the use of a normal relationship. Negative lags will not be permitted. Contractor shall identify any lag proposed and provide an explanation for the purpose of the lag in the narrative report.

9. Include the number of abnormal weather days identified in Division 0, Section 00 72 00, Part 8.01F. These abnormal weather delays shall be shown as the next-to-last activity in the schedule as an allowance. In the event that the project experiences favorable weather for a particular month, the additional float resulting from the favorable weather becomes a project owned float.

10. Include the Holidays listed in Division 1, Section 01 11 00, Part 1.5

1.9 FOUR-WEEK WORK PLAN

A. Submittal: The Contractor shall submit a Four-Week Work Plan (FWWP) due one day prior to the Weekly Progress Meeting. Failure to submit and update an acceptable FWWP will be cause for AC Transit to withhold all or part of a Progress Payment.

B. Content: The FWWP shall show the actual progress for the previous week and planned activities for the upcoming three weeks. It is a more detailed subset of the activities contained within the Contract Schedule. The activities in the FWWP shall be based upon and correlated by Activity ID to the Contract Schedule. The Plan shall provide sufficient detail to address all activities being performed on a daily basis, generally be prepared by work discipline/crew, identify issues requiring AC Transit action or input, highlighted critical work (activities on the critical path and note any pending labor, material, or equipment constraints to performing the Work planned in the next three weeks. The actual progress data incorporated into the Contract Update Schedule shall be consistent with the actual data previously shown in the FWWP.

PART 2 - PRODUCTS

Not Used.
PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Submittal Procedures.
B. Submittal Review.
C. Progress Schedules.
D. Submittal Schedule.
E. Proposed Products List.
F. Product Data.
G. Shop Drawings.
H. Samples.
I. Design data.
J. Test reports.
K. Certificates.
L. Manufacturer’s instructions.
M. Manufacturer’s field reports.

1.2 RELATED SECTIONS

A. Division 1, Section 01 70 00 - Execution and Closeout Requirements.

1.3 SUBMITTAL PROCEDURES

A. Submittals to the Engineer: The Contractor must prepare a list of submittals for the Engineer’s review/approval. Submittals of product data, shop drawings, and samples are for approval unless otherwise noted; submittal of manufacturer’s instructions, qualifications, certifications, and test reports are for the Engineer’s information unless otherwise noted.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit a submittal log that specifies when all transmittals will be provided within 20 working days of the Notice to Proceed and sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, or other submittals and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

   a. The Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Transmit each submittal with form included at the end of this Section.

D. Number the transmittal form in the following format: XXXXX-#A, as follows:

   1. XXXXX: Five or six-digit number reflecting section to which submittal belongs.
   2. #: Numerical sequence number for submittals received in that section. Begin serial order with # 01.
   3. A: Revise submittals with original number and a sequential alphabetic suffix for how many times this submittal has been resubmitted, with “A” indicating the first resubmittal.
   4. Assign individual number to each submittal. Do not combine several items from one trade or subcontractor into one submittal without prior approval of Engineer.

E. Identify Project, Contractor, subcontractor, supplier; manufacturer; pertinent drawing number, detail references, and specification section number, as appropriate.

F. Apply Contractor’s stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, work of other trades, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittals without Contractor’s stamp will be returned without action.

G. Schedule submittals to expedite the Project, and deliver to address indicated in the Preconstruction Meeting. Coordinate submission of related items.

H. For each submittal for review, allow 15 days for initial review excluding delivery time to and from Contractor. Allow additional time if processing must be delayed to permit coordination with subsequent submittals.

I. Identify variations and deviations from Contract Documents and identify product or system limitations which may be detrimental to successful performance of the completed Work.

J. Provide space for Contractor and Engineer review stamps.

K. When revised for resubmission, identify all changes made since previous submission.

L. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
M. Submittals not requested will not be recognized or processed. Duplication of Contract Documents or portions of Contract Documents for purpose of submittals will not be recognized or processed.

N. Where a submittal involves engineering computations or original design work is depicted, show the name, the California state registration number, seal, and signature of the Professional Engineer hired by the Contractor certifying that such computations or design work are correct and in conformance with standards, codes, and acceptable engineering practice.

1.4 SUBMITTAL REVIEW

A. Submittals will be reviewed for conformance with requirements of the Contract Documents. Review of a separate item will not constitute review of an assembly in which the item functions. Review will not relieve the Contractor from Contractor's responsibility for accuracy of submittals; for conformity of submittals to requirements of Contract Documents; for coordinating Work with that of other trades; for compatibility of described product with contiguous products and the rest of the system; for conforming and correlating quantities and dimensions; for selecting fabrication processes and techniques of construction; for performing Work in a safe and satisfactory manner; and for prosecution and completion of the Contract in accordance with the Contract Documents.

B. It must be understood that the provisions herein apply to Engineer's review, A/E's review, Owner review, and review by other Owner representatives.

C. Review is only for the limited purpose of checking for general conformance with the information given and the design concept expressed in the Contract Documents.

1. Review is not conducted for the purpose of determining the accuracy and completeness of details such as dimensions and quantities, or for substantiating instructions of installation or performance. Compliance with specified characteristics is the Contractor's responsibility. Submittals which do not include the Contractor's certification that the information complies with the Contract Documents will be returned without action.

2. Review of submittals does not authorize variation from Contract Documents unless approval of proposed variation has been expressly requested and specifically noted as a variation on the submittal.

3. Review is only for items to be furnished by the submitting supplier and does not constitute approval of any assemblage of which the submitted item is a component nor approval of construction sequence or method.

D. The Engineer will indicate its reviews of submittals and the action taken by means of its review stamp. The review stamp will be affixed by the Engineer, the action block will be marked, and the stamp will be signed and dated. The review-stamp action-block marks will have the following meanings:

1. The mark FURNISH AS SUBMITTED – NO EXCEPTIONS TAKEN is an acceptance, and means that every illustration and description appears to conform to the respective requirements of the Contract Documents; that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed; and that the submittal need not be resubmitted.
2. The mark **FURNISH AS CORRECTED - RESUBMISSION NOT REQUIRED** is an acceptance, and means that every illustration and description appears to conform to the respective requirements of the Contract Documents upon incorporation of the reviewer’s corrections, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed. Submittals so marked need not be resubmitted unless the Contractor challenges the reviewer’s exception.

3. The mark **REVISE AND RESUBMIT - RESUBMISSION REQUIRED WITHIN ____ DAYS** is an acceptance, and means that every illustration and description appears to conform to the respective requirements of the Contract Documents, and that fabrication, assembly, manufacture, installation, application, and erection of the illustrated and described product may proceed after incorporation of the reviewer’s corrections and verification by the Engineer that the reviewer’s corrections have been properly incorporated in the submittal. Resubmission within the time period specified is also required if the Contractor challenges the reviewer’s corrections.

4. The mark **SUBMIT SPECIFIED ITEM or REJECTED** is a disapproval, and means that the submittal does not comply with Contract Documents or is deficient to the degree that the reviewer cannot correct the submittal with a reasonable degree of effort, has not made a thorough review of the submittal, and that the submittal needs revision and is to be corrected and resubmitted. Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Contractor must make a new submittal. Submittals stamped **SUBMIT SPECIFIED ITEM or REJECTED** are not to be used and not permitted on the job site.

### 1.5 PROGRESS SCHEDULE

A. Submit progress schedules in accordance with Division 1, Section 01 32 16, Network Analysis Schedules.

B. Submit Update Schedule monthly with Narrative Report.

### 1.6 SUBMITTAL SCHEDULE

A. In conjunction with the development of the Contractor’s construction schedule, prepare a complete schedule of submittals. The schedule of submittals must be submitted to the Engineer at the pre-construction meeting.

1. Coordinate submittal schedule with the list of subcontracts, and the list of products, as well as the Contractor’s construction schedule.

2. Prepare the schedule in chronological order. Provide the following information:

   a. Scheduled date for the first submittal.
   b. Related Section number.
   c. Submittal category.
d. Name of subcontractor.

e. Description of the part of the Work covered.

f. Scheduled date for resubmittal.

g. Scheduled date the Engineer’s final release or approval.

B. Distribution: Following response to initial submittal, print and distribute copies to the Engineer, subcontractors, and other parties required to comply with submittal dates indicated.

C. Update submittal schedule, if necessary.

D. The contractor must provide a Short Interval Schedule showing the work planned for at least three weeks in advance and the completed activities for the preceding week. The Short Interval Schedule must indicate each working and non-working day for the period shown in the schedule. The Short Interval Schedule will have activity durations not longer than 5 working days and not less than one working day. The short interval schedule must indicate the planned time of performance of the various activities for the period covered by the schedule. It must also have a brief description of the activity. The Short Interval Schedule must indicate the Activity ID of the Progress Schedule Activity that encompasses the Short Interval Schedule activity. The short interval schedule may be in bar chart format.

The Short Interval Schedule must be updated every week and submitted one day prior to the Weekly Progress Meeting. Failure to submit and update an acceptable Short Interval Schedule will be cause for the Engineer to withhold all or part of a Progress Payment.

1.7 PRODUCT DATA

A. Submit for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents. Provide copies and distribute in accordance with Article entitled “Submittal Procedures” herein and for record documents purposes described in Division 1, Section 01 70 00, Execution and Closeout Requirements.

B. Submit the number of copies which Contractor requires, plus four copies which will be retained by Engineer.

C. Mark each copy to identify applicable products, models, options, and other data. Cross out provisions that are not applicable. Supplement manufacturers’ standard data to provide information specific to this Project.

D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

E. When specified in individual specification sections, submit printed instructions (manufacturer’s instructions or installation instructions) for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
F. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Division 1, Section 01 70 00 – Execution and Closeout Requirements.

1.8 SHOP DRAWINGS

A. Submit for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Produce copies and distribute in accordance with Article entitled “Submittal Procedures” herein and for record documents purposes described in Division 1, Section 01 70 00.

B. Submit the number of copies which Contractor requires, plus four copies which will be retained by Engineer.

C. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

D. Submit newly prepared information, drawn to accurate scale. Do not reproduce Contract Documents or copy standard information as the basis for shop drawings. Standard information prepared without specific reference to the Project is not considered shop drawings.

E. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:

1. Shop drawings must be drawn to scale sufficient for clarity and coordination, must show necessary working and erection dimensions and necessary details, section, plans and elevations, must be properly cross-referenced, as necessary, by specific reference to the appropriate Section, paragraphs and pages of the Specifications and Drawings to clearly delineate arrangement, construction and connection with other work and must illustrate work contiguous to and having a bearing on work shown.

2. Identification of products and materials included.

3. Compliance with specified standards.

4. Notation of coordination requirements.

5. Notation of dimensions established by field measurement.

6. Highlight, encircle, or otherwise clearly indicate deviations from the Contract Documents.

7. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2” x 11” but no larger than 30” x 42”.

8. Initial Submittal: Unless otherwise indicated, submit opaque reproductions for the Engineer’s review; if one of the copies is submitted as a reproducible transparency, it will be one of the copies returned to the Contractor.

9. Do not use shop drawings without an appropriate final submittal review stamp indicating action taken in connection with construction.
10. Final Submittal: From the reproducible print returned with the initial or intermediate submittals, make prints for the Final Submittal. Mark the prints “Final Submittal”. Produce copies and distribute in accordance with Article entitled “Submittal Procedures” herein and for record documents purposes described in Division 1, Section 01 70 00.

1.9 SAMPLES

A. Submit for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. Produce duplicates and distribute in accordance with Article entitled “Submittal Procedures” herein and for record documents purposes described in Division 1, Section 01 70 00.

B. Samples for Selection as Specified in Product Sections:
   1. Submit for aesthetic, color, or finish selection.
   2. For Color Selection: Submit samples of finishes from the full range of manufacturers’ standard colors, textures, and patterns for Engineer selection.
   3. For Engineer Approval of Specified Color: Submit samples of finish in selected standard or custom color as specified for Engineer review and approval.
   4. After review, produce duplicates and distribute in accordance with Article entitled “Submittal Procedures” herein and for record documents purposes described in Division 1, Section 01 70 00.

C. Submit samples to illustrate functional and aesthetic characteristics of product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full Project information.

E. Submit number of samples (no fewer than two) specified in individual specification sections; one of which will be retained by Engineer.

F. Reviewed samples which may be used in the Work are indicated in individual specification sections.

G. Samples will not be used for testing purposes unless specifically stated in specification section.

1.10 DESIGN DATA

A. Submit design data for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

1.11 TEST REPORTS

A. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.
1.12 CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.

B. Submit certificates for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

C. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

D. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

1.13 MANUFACTURER’S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.

B. Submit manufacturer’s instructions for information for the limited purpose of assessing conformance with information given and the design concept expressed in the Contract Documents.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 MANUFACTURER’S FIELD REPORTS

A. Submit report in duplicate within 15 days of observation to Engineer for information.

B. Submit manufacturer’s field reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in Contract Documents.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION
SUBMITTAL REVIEW TRANSMITTAL

TO:  
Attn:

RECEIVED BY DISTRICT:  
(stamp here)

SUBMITTAL NO:  
(filled in by Contractor)

PREVIOUS SUB. NO:  
(filled in by Contractor)

PROJECT NUMBER AND NAME:

CONTRACTOR/SUPPLIER:  
(Name/address/phone & fax no.)

REVIEWED BY:  
(CM or designee)

DATE SENT:  

DATE RETURNED:  
(assigned by construction admin dept after review)

ACTION:

1 For Information Only
2 Furnish as Submitted - No Exceptions Noted
3 Furnish as Corrected - Resubmission Not Required
4 Revise and Resubmit - Resubmission Required Within ______ Days
5 Submit Specified Item or Rejected

We are sending you these items via:

SPECIFICATION SECTION NUMBER AND TITLE:

| ITEM NO:  
(based on sub. schedule) | NO. OF COPIES: | DESCRIPTION: | ACTION:  
(assigned by CM) | IDENTIFICATION NO:  
(CM log no.) |
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REMARKS:

Corrections and comments made on the shop drawings during this review do not relieve Contractor from compliance with requirements of the Drawings and Specifications. This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. The Contractor is responsible for: conforming and correlating quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating Work with that of other trades; and performing Work in a safe and satisfactory manner.

Shaded areas reserved for Engineer’s use

OCTOBER 2015
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Quality Control and Control of Installation.

B. Tolerances.

C. Testing and Inspection Services.

D. Manufacturers’ Field Services.

E. Examination.

F. Preparation.

1.2 RELATED SECTIONS

A. Division 1, Section 01 20 00 - Price and Payment Procedures.

B. Division 1, Section 01 33 00 - Submittal Procedures.

1.3 REFERENCED STANDARDS

A. Section 6, “Control of Materials” of the State Standard Specifications must apply to work within the State right of way and City of San Leandro and modifications as provided in Division 2.2.

B. Section 4, “Control of Materials” of the 2009 Edition of the Standard Specifications for Public Works Construction (Greenbook) must apply to work within the City of Oakland and modifications as provided in Division 2.1.

C. ASTM E329 Standard Specifications for Agencies Engaged in the Testing and/or Inspection of Materials used in Construction

1.4 QUALITY CONTROL AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality. Material and equipment to be incorporated into the Work must be new and unused unless otherwise approved and must bear the manufacturer’s stamp or marking. In case a reference is not clear as to which of several grades is desired, the highest quality material must be used.

B. Where articles or materials are specified by brand or trade name, alternate materials or articles equal to those specified may be approved provided the request for approval is in writing accompanied by supporting data, in ample time as determined by the Engineer to permit investigations without delaying the Work. Unless substitutions are approved, no deviation from the standards will be allowed.

C. Comply with manufacturers’ instructions, including each step in sequence.
D. Should manufacturers’ instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

E. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

F. Perform Work by persons qualified to produce required and specified quality, under competent supervision and in a manner to the Engineer’s complete satisfaction as specified in Division 0, Section 00 72 00 - General Conditions, Part 3.07, “Superintendence by the Contractor” in these Specifications and Section 5-1.17, “Character of Workers,” of the State Standard Specifications and modifications as provided in Division 2.2.

G. Verify that field measurements are as indicated on Shop Drawings or as instructed by the manufacturer.

H. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

I. Make arrangements with permitting agencies and special inspections agency for required inspections and tests. Inform Engineer at least 24 hours before event to allow witnessing of inspection or test.

1.5 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers’ tolerances. Should manufacturers’ tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.6 TESTING AND INSPECTION SERVICES – OWNER-HIRED TESTING AGENCY

A. Owner will employ and pay an independent firm to perform testing and inspection services where such testing and inspections are specified to be performed by testing agency under the employ of the Owner.

B. Cooperate with Owner-hired testing agency; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.

1. Notify Engineer and Owner-hired testing agency 48 hours prior to expected time for operations requiring services.

2. Make arrangements with the Owner-hired testing agency.

C. Testing and employment of testing agency or laboratory must not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Payment for re-testing or re-inspection required because of non-conformance to specified requirements by the Owner-hired testing agency will be charged to the Contractor by deducting testing charges from the Contract Price.
1.7 TESTING AND INSPECTION SERVICES – CONTRACTOR-HIRED TESTING AGENCY

A. Contractor must employ and pay for services of an independent testing agency or laboratory acceptable to the Owner to perform all other testing and inspections including inspections and tests which are required as conditions for permits. Wherever testing is required, it must be performed by Contractor-Hired Testing Agency unless specifically specified as performed by Owner-Hired Testing Agency. The Contractor-Hired Testing Agency must be deemed included in the price paid for other items of work, and no additional payment should be made therefor.

1. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names agency contacts.

2. Submit evidence that testing agency complies with the recommended requirements of ASTM E329. Testing agency must be acceptable to Owner and permitting agency.

3. The testing frequency shall be in accordance to the Caltrans Local Assistance Procedures Manual Chapter 16 Exhibit R, Size, Frequency and Location of Sampling and Testing Tables.

B. The independent firm must perform tests, inspections and other services specified in individual specification sections and as required by the Engineer and jurisdictional authority. Tests and special inspections must be paid for by the CONTRACTOR for the associated contract bid items, and no additional payment must be made therefor.

C. Testing, inspections and source quality control may occur on or off the project site. Perform off-site testing as required by the Engineer or the Owner.

D. Four copies of reports must be submitted by the independent firm to the Engineer, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Copies of reports must be wet stamped by authorized representative of testing agency.

E. Testing and employment of testing agency or laboratory must not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

F. Notify the Engineer or notify the Engineer and permitting agency, if applicable, prior to each scheduled test.

G. Re-testing or re-inspection required because of non-conformance to specified requirements must be performed by the same independent firm on instructions by the Engineer.

H. Testing Agency Responsibilities:

1. Test samples of mixes submitted by Contractor.

2. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.

3. Perform specified sampling and testing of products in accordance with specified standards.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.

6. Perform additional tests required by Engineer.

7. Attend pre-construction meetings and progress meetings.

I. Testing Agency Reports: After each test, promptly submit copies of report to Engineer, as specified herein. When requested by Engineer, provide interpretation of test results. At minimum, include the following in reports:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in the Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance or Non-Conformance with Contract Documents.

J. Limits On Testing Agency’s Authority:

1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency or laboratory may not approve or accept any portion of the Work.
3. Agency or laboratory may not assume any duties of Contractor.
4. Agency or laboratory has no authority to stop the Work.

1.8 MANUFACTURERS’ FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, and adjust and balance of equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Engineer 30 days in advance of required observations. Observer subject to approval of Owner.
C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers’ written instructions.

D. Refer to Division 1, Section 01 33 00 - Submittal Procedures, Article entitled “Manufacturers’ Field Reports”.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new Work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Specifications for construction industry standards of industry associations, trade associations, societies, organizations, and regulatory agencies as they are invoked and used in these Specifications.

1.2 REFERENCE STANDARDS

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The effective date of referenced standards is stated in Division 0, Section 00 72 00, Part 1.01C.

C. Contractor must have access to the reference standards. Referenced standards must be made readily available, when requested, for use by the Engineer or designated Owner representative in carrying out the quality assurance and quality control programs specified in the Contract Documents, and to assure compliance with the requirements of the codes, specifications, test methods, practices, and other standards referenced in the Contract Documents.

D. Should specified reference standards conflict with other Contract Document requirements, request clarification from the Engineer before proceeding.

E. References are made to the 2010 State Standard Specifications (STATE), and to the 2009 Edition of the Standard Specifications for Public Works Construction (GREENBOOK) except as noted otherwise, the City of Oakland Standard Details for Public Works Construction and these special provisions. Where the State or Greenbook are referenced, Engineer must be understood to mean the Owner’s Engineer.

1.3 ABBREVIATIONS

A. Wherever in the Contract Documents an organization’s abbreviation or acronym is used, it must be understood to mean the full name of the respective organization, as specified in Section 1-3 Abbreviations of the “Greenbook” and Section 1-1.06 Abbreviations of the State Standard Specifications., and as follows:

   AASHTO American Association of State Highway and Transportation Officials
   ADA Americans with Disability Act
   ABAG Association of Bay Area Governments
   ACI American Concrete Institute
   ACP Asbestos Cement Pipe
   AISC American Institute of Steel Construction
ANSI  | American National Standards Institute  
ASA  | American Standards Association  
ASTM  | American Society for Testing and Materials (Also known as ASTM International)  
AWWA  | American Water Works Association  
BASMAA  | Bay Area Storm Water Management Agencies Association  
BMP  | Best Management Practices  
CEDE  | Community and Economic Development Agency, Department of Development of the City of Oakland  
CSA  | Canadian Testing Association  
C  | Celsius (temperature)  
Caltrans  | State of California, Department of Transportation  
CCRM  | Construction Community Relations Manager  
CPM  | Critical Path Method  
CTC  | Copper Tube Size  
DOHS  | Department of Health Services  
DOT  | United States Department of Transportation  
EBMUD  | East Bay Municipal Utility District  
EDA  | Economic Development Administration  
F  | Fahrenheit (temperature)  
FTA  | Federal Transit Administration  
HR  | Hour  
HUD  | United States Department of Housing and Urban Development  
IEEE  | Institute of Electrical and Electronics’ Engineers  
ISA  | International Society of Arboriculture  
ITE  | Institute of Traffic Engineers  
MSDS  | Material Safety Data Sheets  
NEC  | National Electrical Code  
NEMA  | National Electrical Manufacturers Association  

OCTOBER 2015
OSHA  Occupational Safety and Health Administration
OMC  Oakland Municipal Code
PAV  Pressure Aging Vessel
PCA  Portland Cement Association
PG  Performance Graded
PG&E  Pacific Gas and Electric Company
PS  U. S. Product Standard
PSI  Pounds per Square Inch
PVC  Polyvinyl Chloride
PWA  Public Works Agency of the City of Oakland
QJ  Queue Jump
RTFO  Rolling Thin Film Oven
RWQCB  Regional Water Quality Control Board – State of California
SDR  Standard Dimension Ratio
SFRWQCB  San Francisco Regional Water Quality Control Board
TSP  Transit Signal Priority
UBC  Uniform Building Code of the International Conference of Building Officials
UL  Underwriters Laboratories
USA  Underground Service Alert
VCP  Vitrified Clay Pipe
Zone 7  Alameda County Flood Control and Water Conservation District, Drainage Area 7-1

PART 2 - PRODUCTS
Not Used.

PART 3 - EXECUTION
Not Used.

END OF SECTION
SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Construction Facilities:
   1. Progress cleaning and waste removal; cleaning requirements during construction operations.

B. Temporary Controls:
   1. Water Quality Control Plan
   2. Water Pollution Control
   3. Dust, Erosion, and Sediment Control – Specific Measures
   4. Noise Control
   5. COZEEP
   6. Public Information

C. Removal of temporary facilities, and controls.

D. Bird Protection.

E. Cultural Resources.


1.2 RELATED SECTIONS

A. Division 1, Section 01 55 26 Traffic Control System.

1.3 REGULATORY REQUIREMENTS

A. Refer to the requirements for Water Quality Control Plan and implementation in this Section

B. Refer to requirements for Water Pollution Control and implementation in this Section.

C. Refer to the City of Oakland requirement for waste reduction and recycling. The Contractor is required to prepare a project Waste Reduction and Recycling Plan (WRRP).

1.4 SUBMITTALS

A. Waste Reduction and Recycling Plan (WRRP).
1.5 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Collect and remove waste materials, debris, and rubbish from site daily and dispose off-site and as specified elsewhere in these special provisions.

C. For work within the City of Oakland, the Contractor must comply with the requirements in Section 7-8, Work Site Maintenance of the “Greenbook” and these special provisions.

D. For work within the State right of way, refer to Section 14-10 Solid Waste Disposal and Recycling of the State Standard Specifications and these specification provisions.

E. Excess excavated material from trenches, structures, general excavation and manholes and similar structures must be removed from the site immediately.

1.6 WATER QUALITY CONTROL PLAN

A. The Contractor must comply with all appropriate BMP’s and applicable design recommendations of the State Water Quality Control Board (SWQCB) for preventing and removing pollutants, specifying erosion control measures, including sedimentation basins, infiltration basins, and re-vegetation of graded slopes.

1. The Contractor must submit a Water Quality Control Plan (also referred to as the Stormwater Pollution Prevention Plan (SWPPP)) that identifies the specific facilities and slopes to be protected, BMP’s to be implemented, and meets all NPDES requirements. The cost associated with preparation and submittal of the Water Quality Control Plan, installation, maintenance and removal of WQCP facilities and materials must be included in the price paid for various items of work, and no additional payment will be allowed therefor.

B. Construction water quality control measures must include the following:

1. Existing vegetation must be retained where possible,

2. Grading activities will be limited to the immediate area required for construction,

3. Erosion control measures such as silt fences, staked straw bales, temporary inlet protection and temporary re-vegetation must be employed for disturbed areas to prevent soil, dirt and debris from entering the storm drain system;

4. No disturbed surfaces must be left without erosion control measures in place during the winter and spring months; Sediment must be retained onsite by a system of sediment basins, traps, or other appropriate measures;

5. Measures must be taken to ensure proper collection and disposal of all pollutants handled or produced on the site during construction, including sanitary wastes, cement, and petroleum products;

6. All storm water conveyance and discharge facilities that will be the responsibility of the City of Oakland must be designed and constructed in accordance with City of Oakland Standard Specifications and Details.
7. Inspect earthwork to detect evidence of erosion and sedimentation as directed by the Engineer; promptly apply corrective measures.

C. If groundwater is encountered during construction activity, the Contractor must comply with the provisions of the RWQCB’s General Permit for Dewatering and Other Low Threat Discharges to Surface Waters. Compliance must include preparation of a monitoring and reporting program and implementation of Best Management Practices associated with the dewatering activities.

1.7 WATER POLLUTION CONTROL

A. For the construction work within the City of Oakland, the Contractor must comply with the requirements in Subsection 7-8.6, “Water Pollution Control” of the “Greenbook” and these special provisions.

B. For construction work within the State of California right of way and the City of San Leandro, the contractor must comply with the requirements in Section 13, Water Pollution Control of the State Standard Specifications and the special provisions.

1.8 DUST, EROSION, AND SEDIMENT CONTROL

A. Dust control measures must be implemented in accordance with Bay Area Air Quality Management District (BAAQMD) standards and Section 7-8.2 of the “Greenbook” and these special provisions.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment, as required.

C. Protect site from puddling or running water.

D. Materials must be stockpiled off the jobsite.

AIR QUALITY SPECIFIC MEASURES

Construction contractors must implement the Bay Area Air Quality Management District (BAAQMD) Basic Construction Mitigation Measures listed in Table 4.17-2 of the Final EIS/EIR, and the applicable Additional Construction Mitigation Measures. The following controls should be implemented at all construction sites:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) must be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material off-site must be covered.
- All visible mud or dirt track-out onto adjacent public roads must be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads must be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved must be completed as soon as possible.
- Building pads must be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times must be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]).
- Clear signage must be provided for construction workers at all access points.
- All construction equipment must be maintained and properly tuned in accordance with manufacturer’s specifications. All equipment must be checked by a certified mechanic and determined to be running in proper condition prior to operation.
• Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person must respond and take corrective action within 48 hours. The Air District’s phone number also must be visible to ensure compliance with applicable regulations.

The following measures are recommended for projects with construction emissions above the threshold:

• All exposed surfaces must be watered at a frequency adequate to maintain minimum soil moisture of 12 percent. Moisture content can be verified by lab samples or moisture probe.
• All excavation, grading, and/or demolition activities must be suspended when average wind speeds exceed 20 mph.
• Wind breaks (e.g., trees and fences) must be installed on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
• Vegetative ground cover (e.g., fast-germinating native grass seed) must be planted in disturbed areas as soon as possible and watered appropriately until vegetation is established.
• The simultaneous occurrence of excavation, grading, and ground-disturbing construction activities on the same area at any one time must be limited. Activities must be phased to reduce the amount of disturbed surfaces at any one time.
• All trucks and equipment, including their tires, must be washed off prior to leaving the site.
• Site accesses to a distance of 100 feet from the paved road must be treated with a 6 inch to 12 inch compacted layer of wood chips, mulch, or gravel.
• Sandbags or other erosion control measures must be installed to pre-vent silt runoff to public roadways from sites with a slope greater than 1 percent.
• Minimize the idling time of diesel powered construction equipment to two minutes.
• The project must develop a plan demonstrating that the off-road equipment (more than 50 horse-power) to be used in the construction project (e.g., owned, leased, and subcontractor vehicles) would achieve a project wide fleet-average 20 percent NOX reduction and 45 percent PM reduction compared to the most recent ARB fleet average. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available.
• Use low volatile organic compound (VOC) (i.e., reactive organic gases) coatings beyond the local requirements (i.e., Regulation 8, Rule 3: Architectural Coatings).
• All construction equipment, diesel trucks, and generators must be equipped with best available control technology for emission reductions of NOx and PM. All contractors must use equipment that meets California Air Resources Board’s most recent certification standard for off-road heavy duty diesel engines.

Construction contractors must comply with BAAQMD Regulation 11 (Hazardous Pollutants) Rule 2 (Asbestos Demolition, Renovation, and Manufacturing). The requirements for demolition activities include removal standards, reporting requirements, and mandatory monitoring and record keeping. The following avoidance, minimization and control measures to reduce air emissions associated with project construction:

• All active construction areas must be watered at least twice daily;
• All trucks hauling soil, sand, and other loose materials must be covered and must maintain at least two feet of freeboard.
• All unpaved access roads, parking areas, and staging areas in the construction area must be watered at least three times daily or must be applied with non-toxic soil stabilizers.
• All paved access roads, parking areas, and staging areas in the construction area must
be swept daily with water sweepers.

- Streets must be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Non-toxic soil stabilizers must be applied to inactive construction areas (previously graded areas that are inactive for 10 days or more).
- Exposed stockpiles of dirt, sand, or debris must be enclosed, covered, watered at least twice daily, or applied with non-toxic soil binders.
- Traffic speeds on unpaved roads must be limited to 15 mph.
- Wheel washers must be installed on all trucks or tires/tracks of all trucks, and equipment leaving the construction area must be washed.
- Excavation and grading activities must be suspended when winds exceed 25 mph.
- Construction equipment must use cool exhaust gas recirculation.
- Construction equipment must use aqueous diesel fuel.
- Construction contracts must explicitly stipulate that all construction equipment must be properly tuned and maintained.

1.9 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise from noise produced by construction operations.

1. Conduct noise and vibration testing, and monitor and inspect equipment to ensure they meet noise standards.

2. Place temporary noise barriers for asphalt cutting and other noisy activities.

3. Turn off idling equipment.

4. Choose haul routes and conduct loading and unloading operations to minimize noise in residential and other sensitive areas.

5. Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers’ recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers, shrouding, etc.).

6. Perform all construction in a manner to minimize noise and vibration. Use construction methods or equipment that will provide the lowest level of noise and ground vibration impact.

7. During asphalt cutting, a temporary noise barrier should be placed between the cutting area and noise sensitive sites.

8. Conduct truck loading, unloading and hauling operations so that noise is kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent.

9. Construction lay-down or staging areas should be selected in industrially zoned districts. If industrially zoned areas are not available, commercially zoned areas may be used, or locations that are at least 90 feet from any noise sensitive land use such as residences, hotels, and motels. Ingress and egress to and from the staging areas should be on collector streets or greater (higher street designations are preferred).
10. Turn off idling equipment.

11. Minimize construction activities during evening, nighttime, week-end, and holiday periods.

12. Limit the use of construction equipment that creates high vibration levels, such as vibratory rollers and hammers, operating within 130 feet of residential structures.

13. Require vibration monitoring during vibration-intensive activities.

14. Restrict the hours of vibration-intensive equipment or activities such as vibratory rollers so that impacts to residents are minimal (e.g., weekdays during daytime hours only when as many residents as possible are away from home).

B. Comply with the following noise regulations.

1. In the City of San Leandro, the Contractor shall comply with following noise regulations:
   a. Construction related noise which is adjacent to or across a street or right of way from a residential use shall not be permitted between 7:00 PM to 7:00 AM on weekdays, between 7:00 PM to 8:00 AM on weekends, or on holidays.

2. In the City of Oakland, the Contractor shall comply with following noise regulations:
   a. Maximum allowable receiving noise level standards in residential and civic area shall be 70 dB for five minutes within an one hour period between 7:00 AM to 10:00 PM and shall be 55 Db for five minutes within an one hour period between 10:00 PM to 7:00 AM.
   b. Maximum allowable receiving noise level standards in commercial area shall be 75 dB for five minutes within an one hour period anytime.
   c. Maximum allowable receiving noise level standards for construction operations less than 10 days shall be 80 dB in residential areas and 85 dB in commercial and industrial areas between 7:00 AM to 7:00 PM on weekdays.
   d. Maximum allowable receiving noise level standards for construction operations less than 10 days shall be 65 dB in residential areas and 70 dB in commercial and industrial areas between 9:00 AM to 8:00 PM on weekends.
   e. Maximum allowable receiving noise level standards for construction operations 10 days or more shall be 65 dB in residential areas and 70 dB in commercial and industrial areas between 7:00 AM to 7:00 PM on weekdays.
   f. Maximum allowable receiving noise level standards for construction operations 10 days or more shall be 55 dB in residential areas and 60 dB
in commercial and industrial areas between 9:00 AM to 8:00 PM on weekend.

1.10 COZEEP

A. All law enforcement used within the work zone under the Construction Zone Enhanced Program (COZEEP) must be paid for by the Contractor, and active enforcement will be in place at the start of construction and during active construction as directed by the Engineer. When law enforcement is used, the Contractor must utilize the Oakland Police Department for the work zone on City of Oakland Right of Way; the California Highway Patrol for the work zone on State Right of Way; and City of San Leandro Police Department for the work zone on City of San Leandro Right of Way. COZEEP must be approved by Engineer 48 hours before utilizing law enforcement. The resident engineer will work with the Contractor and the COZEEP Officer of the Day to position the enforcement vehicle. The Contractor must maintain records of COZEEP (specifically times, dates, and locations where used), and submit them to the AC Transit for reimbursement.

Coordination between both law enforcement agencies will be the responsibility of the Contractor where the construction activities overlap jurisdictions.

1.11 PUBLIC INFORMATION

A. General

1. The Contractor must conduct all work necessary to meet the requirements of public information. This must include collecting data and providing it to the AC Transit’s Project Management and Construction Management (PMCM) Team, and all other requirements specified herein.

B. Administrative Requirements

1. The District’s Media Affairs Manager and the Director of Legislative Affairs & Community Relations will lead the development and implementation of the Public Information Plan through the consultant Community Construction Relations Manager (CCRM). The District staff will oversee the preparation of the various components of the plan including:

   a. Brochures and mailers
   b. Public service ads to the general public
   c. Telephone hotline
   d. Management of a dedicated BRT project website to provide public information on the project.

2. The duties of the Outreach Team Manager (OTM) and the CCRM will include assisting the District’s Media Affairs Manager and the Director of Legislative Affairs & Community Relations in managing periodic press releases that will keep the public informed about the status of the construction. Other duties will include announcing and periodically preparing updates of the project status, identifying other modes of transportation, and promoting off-peak travel, working from home, and use of alternate routes. Informing the public can benefit the corridor by reducing travel demand during construction.
3. The Public Information Plan may also include placing public service ads on the air or other media to announce project updates. The ads would remind the users of this corridor to consider alternate means of transportation or alternate routes to the construction zones. The OTM and CCRM, with assistance from the Contractor, will lead pre-construction information meetings in specific neighborhoods to present upcoming construction activity and illustrate methods for minimizing impacts to congestion and parking.

4. A telephone hotline will be set up to receive and manage complaints and input from the public as construction proceeds. The Hotline comments will be logged and appropriate responses will be provided by the OTM or CCRM. The telephone hot line could be publicized in press releases and on the District and Project Website.

5. The District’s website will include a project related icon where current information regarding the project will be posted. Elements that could be included are current segments under construction, special instructions to the residents and businesses regarding lane changes and parking restrictions, and a location for email input from the public that can be monitored and responded to by the District as appropriate.

6. The anticipated responsibilities will be that the PMCM will be responsible for coordination between the CCRM, OTM, the Engineer, the public agencies responsible for responding to the issues of safety and enforcement for the project (City of Oakland Police and Fire, CHP, City of San Leandro Police and Fire), and on call incident response. Outreach meetings and communications will be a joint effort between the District, OTM, and CCRM. The anticipated elements will include the following: Public Meetings and Open Houses, public interface, and investigation of complaints by the public.

C. Contractor Requirements

1. The Contractor must maintain a system to ensure a flow of information from the Contractor to the AC Transit. The Resident Engineer and the CCRM (PMCM) will supervise public information efforts.

2. The Contractor must be accessible 24 hours a day, seven days a week and must respond within two hours of contact to address project issues. The Contractor’s Representative must provide contact information, including home, fax, and mobile phone numbers to the District.

3. The Contractor must provide the CCRM construction schedules, accommodations to businesses and residents to mitigate construction activities, traffic conditions observed in vicinity of the construction zone, accommodations in the vicinity of the construction activity for bike accessibility, pedestrian accessibility, and functional needs access; utility shut-offs, planned night-time or weekend construction activity, planned and potential construction noise impacts, construction information, commercial vehicle restrictions and input regarding upcoming activity to be released to the public.

4. The Contractor must coordinate with the Construction Management Team to utilize the construction notification database of property owners, residents, business owners, merchants, schools, faith based organizations, civic organizations, and other stakeholders within a one block radius (500 foot minimum) of the construction zones.
5. The Contractor, CCRM and PMCM must meet weekly, or as deemed necessary by the PMCM, and must communicate regularly by phone and e-mail.

D. Crisis Communications

1. The Contractor must be available to assist the CCRM and PMCM in addressing issues that may include the following:
   a. Formulating approaches to address specific emergencies
   b. Identifying cause of specific disruptions (i.e., whether construction-related or not)
   c. Providing information on:
      (1) Actions being taken to alleviate the problem
      (2) Impact to the public and notification procedures
      (3) Anticipated duration of the disruption
   d. Notifying the CHP, City of Oakland Police and Fire and City of San Leandro Police and Fire of crises or emergency closures in the Project area

E. Data Collection and Management

1. In order for the AC Transit to provide audiences with reliable, timely information on the construction schedule, closures, detours, and other project information, the Contractor must:
   a. Follow the PMCM’s direction when collecting, compiling, accessing, and providing information regarding the Project
   b. Be prompt and proactive in providing information to the Engineer and CCRM
   c. Coordinate with the CCRM to facilitate distribution of construction notification doorknob hanger notices to give local businesses and residents information about transit stop relocations, route changes, lanes closures, route modification changes in traffic and the availability of alternative routes to mitigate lanes closures,
   d. Review information for accuracy and forward it to the CCRM and PMCM as soon as it becomes available

2. The Contractor must stay in close contact with their staff to provide the PMCM current and accurate information on construction activities, including location, estimated duration, type of work being performed, physical impacts (e.g., lane closures, narrowed lanes, commercial vehicle restrictions), and detours. The Contractor must also collect information about how work activities affect traffic flow and movement. The Contractor must update information as conditions change.
3. The Contractor must keep track of changes in scheduled construction activities, including changes to short-term construction-related closures or emergency closures, and report all unscheduled activities to PMCM as quickly as possible. The Contractor must record, maintain, and make the information available to PMCM for use and dissemination.

4. The Contractor must meet the following requirements for providing information:
   a. Communicate information on planned construction activities no later than 30 days before planned start date and include possible construction noise impacts.
   b. Communicate lane closures 14 days in advance of lane closures.
   c. Communicate temporary parking loss and locations of replacement on-street and off-street parking in vicinity. Including, specific dates and hours of temporary no parking zones.
   d. Monitor construction updates (i.e., a planned closure canceled, nighttime construction noise impacts canceled or completed, lane closure, closure removed, and others that directly affect the public) and immediately notify the CCRM and AC Transit of changes so that CCRM and PMCM can post the information on the Project Website and disseminate it through other technologies.
   e. Maintain basic information, contact names, and phone numbers for other construction projects that may affect traffic conditions on the project or surrounding local street network.
   f. Provide regular reports as requested, summarizing activities and adherence to the contract documents.

5. The Contractor must verify information, the collection process, and dissemination interfaces to demonstrate compliance with the requirements of these contract documents.

F. Construction Schedule

1. The Contractor shall communicate to Engineer and CCRM construction events that must occur at least seven days before beginning in any discrete area and include the following:
   a. Description of the activity
   b. Start of the activity
   c. End of the activity

2. The Contractor must provide current construction information to the Engineer and CCRM as an input to incident management strategies to prevent traffic from being rerouted into areas of construction-related congestion.

G. Traffic Conditions
1. The Contractor must inform the Engineer and CCRM of any unusual traffic conditions, such as road obstructions, and likely duration within 15 minutes of detection.

H. Bicycle, Pedestrian, Handicapped Mobility, and Access

1. The Contractor must clearly define and communicate to Engineer, PMCM and CCRM accommodations for access by bicycles, pedestrians, and handicapped persons, including alternate routes and detours, where access currently exists. The Contractor must make every effort to accommodate and maintain accessibility throughout the duration of the project.

I. Utility Shut-Offs

1. The Contractor must provide start time and duration of utility shut-offs early enough so the AC Transit may provide written notice to the affected parties at least 48 hours in advance of any outages.

2. The Contractor must be responsible for keeping the emergency utility contact list updated on at least a quarterly basis.

3. The Contractor must develop contingency plans in coordination with utility providers to address unanticipated encounters with buried utilities and/or unscheduled interruptions in service.

J. Construction Noise due to Nighttime work Approved by Engineer

1. The Contractor must continually inform PMCM of planned and potential nighttime construction noise impacts to enable the AC Transit to notify affected residents in writing at least seven days in advance. The Contractor must communicate to PMCM any changes in planned noise impacts early enough that residents may be notified one day in advance.

K. Public Contact

1. The AC Transit will be the primary contact with all members of the public, with the Contractor available to assist, as needed. The PMCM will work closely with Contractor to facilitate coordinated and consistent efforts when contacting and disseminating information to the public.

L. Internet

1. The Contractor must provide to the PMCM, at a minimum, construction information, commercial vehicle restrictions, regular input for a community/construction calendar of events and other relevant information to be posted by PMCM on the AC Transit's Website. The Contractor must provide PMCM with updates daily, or more frequently, as needed.

M. Public Meetings and Open Houses

1. The PMCM will conduct public meetings to update affected audiences, resolve complaints, etc. The Contractor must attend meetings at the request of PMCM. The Contractor must meet with PMCM in advance to assist in planning meetings at the PMCM's request.
N. Noise

1. Should any of the Contractor's operations generate complaints by the public about noise, COTM will investigate the complaints and attempt to address the problem. At minimum, Contractor shall explain the necessity, schedule, and duration of the noise generating activities to the CCRM.

O. Portable Changeable Message Signs (PCMS)

1. Above and beyond temporary signs indicating lane closures and other safety and motorist information, the Contractor must provide an additional six portable changeable message signs with horizontal displays to show regularly updated messages provided by CCRM. The Contractor must relocate these PCMS as directed by Engineer to locations designated by the CCRM. The signs will be moved as needed to accommodate changing construction activities and provide advance notifications of these changes.

P. Door Hanger Notifications

1. The Contractor shall print a sufficient number of door hangers for notification to adjacent property owners in multiple languages. The Contractor shall request the CCRM provide the languages required for the door hangers. The door hangers shall be 4"x9.5" in size, two per 8.5"x11" sheet, 38 pound stock, and micro-perforated for easy, clean separation. Door hangers not conforming to these requirements will be rejected. The ink shall be forest green color on cream-colored card stock. Door hanger design will be discussed at the pre-construction meeting. The Contractor shall submit a sample printed door hanger design to the Engineer for approval before use.

2. The Contractor shall indicate on the door hanger, the project name and CCRM contract information. The Contractor shall show a sample of the door hanger to the Engineer before the first batch is distributed to neighborhood buildings. The Contractor's workers shall place the door hangers on the doors of adjacent properties 72 hours before construction begins to alert neighborhood business owners and residents of the upcoming construction work.

Q. Payment for public information coordination is included in the payment for traffic control systems.

1.12 REMOVAL OF TEMPORARY FACILITIES, AND CONTROLS

A. Remove temporary equipment, facilities, and materials, prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing and permanent facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

1.13 BIRD PROTECTION

A. Protect migratory and nongame birds, their occupied nests, and their eggs.
The Owner anticipates nesting or attempted nesting from March 15 to August 15. A nesting survey is required for any tree removals that occur during this time frame. The survey is considered incidental to the tree removal bid item and must be completed no earlier than 72 hours prior to tree removal.

The federal Migratory Bird Treaty Act, 16 USC § 703–711, and 50 CFR Pt 10 and Fish & Game Code §§ 3503, 3513, and 3800 protect migratory and nongame birds, their occupied nests, and their eggs.

The federal Endangered Species Act of 1973, 16 USC § 1531 and § 1543, and the California Endangered Species Act, Fish & Game Code §§ 2050–2115.5, prohibit the take of listed species and protect occupied and unoccupied nests of threatened and endangered bird species.

The Bald and Golden Eagle Protection Act, 16 USC § 668, prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests.

If migratory or nongame bird nests are discovered that may be adversely affected by construction activities or an injured or killed bird is found, immediately:

1. Stop all work within a 100-foot radius of the discovery.

2. Notify the Engineer.

The Owner investigates. Do not resume work within the specified radius of the discovery until authorized.

1.14 CULTURAL RESOURCES

A. An archaeologist must monitor any construction work within the project alignment in sensitive locations identified in the Site Treatment Plan and second addendum archaeological survey report.

B. If buried cultural materials either prehistoric or historic are encountered during construction:

1. Stop all work within a 100-foot radius of the discovery.

2. Notify the Engineer

The Owner investigates. Do not resume work within the specified area of the discovery until authorized.

C. If human remains are encountered:

1. Stop all work within a 100-foot radius of the discovery.

2. Notify the Engineer

The Owner investigates. Do not resume work within the specified area of the discovery until authorized.
1.15 HAZARDS AND HAZARDOUS MATERIALS

A. The Contractor must develop and implement a Worker Health and Safety Plan (WH&SP) to address the handling and storage of hazardous construction materials.

1. Walk-through level site reconnaissance must be conducted at sites where contamination is possible in order to determine if contamination is present or likely.

2. Site evaluation must be made of any known or suspected contaminated sites before soil is removed.

3. The Contractor must conduct preconstruction field surveys of identified environmental risk sites to observe current conditions.

4. The Contractor must conduct regulatory file review of environmental risk sites to determine current status of sites and extent of contamination.

5. The Constructor must conduct subsurface exploration of segments of the project alignment next to or down gradient from any environmental risk site.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section sets forth the minimum requirements for traffic routing and traffic control for AC Transit Easy Bay Bus Rapid Transit Project Infrastructure and Station Platform under Contract Documents.

B. The Contractor’s attention is directed to the East Bay Rapid Transit (BRT) Transportation Management Plan, prepared for Alameda-Contra Costa County Transit District (AC TRANSIT).

C. The Contractor shall submit traffic control plan for all phases and zones to Engineer for Approval.

1.2 SCOPE OF WORK

A. The Contractor must prepare Traffic Control Plans, construct, operate and maintain traffic control in conformance with the requirements in this section and in accordance with Division 2.1 and 2.2. The Stage Construction Plans in the Contract Drawings are provided for the Contractor’s general information only and must be seen as an aid for the Contractor to develop his own traffic control plans. It is the Contractor’s sole responsibility to secure a third-party State of California licensed civil engineer to develop traffic control plans for each of the project work areas and submit to the Engineer for a review of compliance with these specifications, after which, the plans will be forwarded by the Engineer to the agency with jurisdictional authority as applicable for approval. The Contractor must review the traffic control requirements for each jurisdiction including but not limited to the City of Oakland, the State of California Department of Transportation and the City of San Leandro. The required traffic control work must be in place and sufficiently noticed, see Division 1, Section 01 50 00, Part 1.11, prior to the start of the construction work of the Contractor and any of the sub-contractors.

The AC Transit East Bay Bus Rapid Transit project is divided into 16 construction zones. The Contractor will be limited to construction within each of the zones with a maximum of four (4) zones under construction concurrently. Zone 15 and 16 will not count toward the maximum of four (4) zones under construction concurrently. The Contractor will be required to complete all civil, drainage, traffic signal, lighting, and communication system conduit improvements within each zone before moving onto another construction zone. No adjacent zones can be constructed concurrently. Zones 3 and 4 are exempt from the adjacent Zone restriction because they are on different streets. The construction zones are as follows:

• Construction Zone 1 – Broadway (between 20th and 11th Streets)

• Construction Zone 2 – 12th Street (between Broadway and Lake Merritt Blvd.) and 11th Street (between Broadway and Lake Merritt Blvd.)

• Construction Zone 3 – E. 12th Street (between Lake Merritt Blvd. and 14th Avenue)
- Construction Zone 4 – International Blvd. (between Lake Merritt Blvd. and 14th Avenue)

- Construction Zone 5 – 14th Avenue (between 12th and 15th Avenues) and International Blvd. (between 15th and 23rd Avenues)

- Construction Zone 6 – International Blvd. (between 23rd and 32nd Avenues)

- Construction Zone 7 – International Blvd. (between 32nd and 41st Avenues)

- Construction Zone 8 – International Blvd. (between 41st and 52nd Avenues)

- Construction Zone 9 – International Blvd. (between 52nd and 62nd Avenues)

- Construction Zone 10 – International Blvd. (between 62nd and 71st Avenues)

- Construction Zone 11 – International Blvd. (between 71st and 82nd Avenues)

- Construction Zone 12 – International Blvd. (between 82nd and 94th Avenues)

- Construction Zone 13 – International Blvd. (between 94th Avenue and Durant Blvd.)

- Construction Zone 14 – E. 14th St. (between Durant Blvd and Davis Street) and Davis St (between E. 14th Street and San Leandro Blvd)

- Construction Zone 15 – San Leandro Transit Center at BART Station and San Leandro Blvd (between Davis St and W. Juana Ave) (Allowance Bid Item 433)

- Construction Zone 16 – Northern Layover at Northgate Ave (between Sycamore St and 24th St) (Allowance Item)

As a minimum requirement, the Contractor shall begin construction of the project as part of Milestone No. 1, which including Phase 1 (construction zones 8, 10, and 12 and 14), and then Phase 2 (construction zones 9, 11, and 13). NTP for Milestone No. 1 is anticipated to be issued March 15, 2016.

As part of Milestone No. 2 of construction, the contractor is to construct Phase 3 (construction zones 2, 5, and 7), and then Phase 4 (construction zones 1, 3, 4, and 6). NTP for Milestone No. 2 is anticipated to be issued March 15, 2016.

The Contractor must complete Milestone No. 3 the final pavement overlay, communication systems, signal testing, installation of structural and architectural components, installation of artistic enhancement components, and permanent striping for all zones. A separate NTP for Milestone No. 3 is anticipated to be issued February 1, 2017 to allow sufficient time for vehicle testing.

As part of Milestone No. 4 of construction, the contractor is to complete the construction zone 15 (Allowance Bid Item 433 - San Leandro Transit Center), which includes all work on San Leandro Blvd and San Leandro BART Station. A separate NTP for Milestone No. 4 is anticipated to be issued between July 1, 2016 and October 1, 2016.
As part of Milestone 5 of construction, the contractor is complete the construction zone 16 (Allowance Item 434 - Northern Layover), which includes at all work at the northern layover. A separate NTP for Milestone No. 5 is anticipated to be issued between February 15, 2017 and April 30, 2017.

As part of Milestone No. 6, the contractor shall complete within all construction zones the landscaping all documentation for Contract Closeout. The landscaping cannot start until Milestone No. 2 has been completed.

The AC Transit East Bay Bus Rapid Transit project is divided into 14-16 construction zones. The Contractor will be limited to construction within each of the zones with a maximum of four (4) zones under construction concurrently. Zone 15 and 16 will not count toward the maximum of four (4) zones under construction concurrently. The Contractor will be required to complete all civil, drainage, electrical, and communications system conduit improvements within each before moving onto another construction zone. No adjacent zones can be constructed concurrently. Zones 3 and 4 are exempt from the adjacent Zone restriction because they are on difference sheets. The construction zones are as follows:

- Construction Zone 1 — Broadway (between 20th and 11th Streets)
- Construction Zone 2 — 12th Street (between Broadway and Lake Merritt Blvd.) and 11th Street (between Broadway and Lake Merritt Blvd.)
- Construction Zone 3 — E. 12th Street (between Lake Merritt Blvd. and 14th Avenue)
- Construction Zone 4 — International Blvd. (between Lake Merritt Blvd. and 14th Avenue)
- Construction Zone 5 — 14th Avenue (between 12th and 15th Avenues) and International Blvd. (between 15th and 23rd Avenues)
- Construction Zone 6 — International Blvd. (between 23rd and 32nd Avenues)
- Construction Zone 7 — International Blvd. (between 32nd and 41st Avenues)
- Construction Zone 8 — International Blvd. (between 41st and 52nd Avenues)
- Construction Zone 9 — International Blvd. (between 52nd and 62nd Avenues)
- Construction Zone 10 — International Blvd. (between 62nd and 71st Avenues)
- Construction Zone 11 — International Blvd. (between 71st and 82nd Avenues)
- Construction Zone 12 — International Blvd. (between 82nd and 94th Avenues)
- Construction Zone 13 — International Blvd. (between 94th Avenue and Durant Blvd.)
- Construction Zone 14 — E. 14th St (between Durant Blvd and Davis St) and Davis St (between E. 14th St and San Leandro Blvd). City of San Leandro Downtown
As a minimum requirement, the Contractor must begin construction of the project on part of Milestone No. 1, which includes Phase 1 (Construction Zones 8, 10, and 12, and 14), and then Phase 2 (Construction Zones 9, 11, and 13) during the first year of construction. During the second year of construction, As part of Milestone No. 2 of construction, the contractor is to construct Phase 3 (Construction Zones 2, 5, and 7), and then Phase 4 (Construction Zone 1, 3, 4, and 6). In no case shall two adjacent zones be constructed concurrently. The Contractor must complete final overlay, communications/signal testing, and permanent striping all at once when the construction of all zones are completed or as directed by the Engineer.

The Contractor must complete Milestone No. 3 the final pavement overlay (RHMA-G), communication systems, signal testing, installation of structural and architectural components, installation of artistic enhancement components, and permanent striping for all zones. A separate NTP will be issued for Milestone No. 3. As part of Milestone No. 4 of construction, the contractor is to complete the construction zone 15 (Allowance Bid Item 433 - San Leandro Transit Center), which includes all work on San Leandro Blvd and San Leandro BART Station. A separate NTP will be issued for Milestone No. 4. As part of Milestone 5 of construction, the contractor is complete the construction zone 16 (Allowance Item 434 - Northern Layover), which includes all work at the northern layover. As part of Milestone No. 6, the contractor shall complete within all construction zones the landscaping and project closeout. Milestone No. 6 follows the substantial completion of Milestones 1 through 5.

B. During construction of Construction Zone 5, 6, 7, 8, 9, 10, 11, 12 and 13, until commencement of Milestone No. 3, the Contractor shall maintain two lanes of traffic in each direction and existing parking to the maximum extent possible unless approved by the Engineer. The use of temporary paving, signals, striping, signing and other traffic handling elements shall be implemented as needed.

C. The Traffic Control Plans must clearly depict the complete and exact sequence of the construction operations, duration of the construction, the construction to be performed and the traveled way that will be utilized by all movement of traffic (including vehicles, parking, bicycles, and pedestrians) during each phase of construction. Multiple phases of construction will require a separate traffic control plan for each different construction phase or operation. The duration of these phases must be noted on Traffic Control Plans.

D. Traffic Control Plans must indicate where access control is required due to the work zone and access is temporarily limited to right-in and right-out movement from side streets and driveways. Access from side streets may become restricted when median work commences, and alternate routes should be provided. Impacts to transit and rerouting shall be coordinated.

E. Contractor shall coordinate closely the temporary reassignment of non-restrictive parking into restrictive parking, with City approval, when such parking is within 500 feet of the workzone to facilitate customer parking. Including the use of temporary short-term parking control in front of commercial uses up to a max of 200 feet along side streets.

F. The Traffic Control Plans must show the location of existing parking spaces/loading zones to be displaced with the duration associated with the displacement. The Contractor
must provide notices to all businesses on a block where work will begin at least one week prior to parking/loading zone displacement or where work may partially disrupt access to a business. The notice must include the project name and CCRM contract information and duration of the parking displacement.

1. The Contractor must preserve 60% of existing parking within construction zones. If this parking preservation threshold cannot be maintained during the development of the Traffic Control Plans, the resident engineer must be contacted immediately.

2. The Contractor must endeavor to minimize the time in which any parking space/loading zone is displaced in order to reduce the impact on local businesses.

3. The Contractor must preserve each loading zone in the construction zone, when possible. Otherwise the Contractor must provide temporary loading zones as close to existing loading zones as possible.

4. The Contractor must provide temporary and permanent parking wayfinding signage to adjacent parking facilities.

5. The Contractor must provide a schedule of on-street parking disruption at least 30 days in advance of start of construction within each work zone. Impacts to parking along the Project, and up to 200 feet along adjacent side streets shall be included in the schedule of on-street parking disruption.

G. The Contractor must include in the Traffic Control Plans, Construction Strategies inclusive of construction staging, lane width control, lane shifts and lane reduction, reduced speed along the corridor, visual screening of construction, coordination with other projects that potentially affect the traffic on the BRT route, coordination with privately owned utilities for relocation work in or near active, construction zones, temporary signal construction, use and training of flaggers for traffic control with appropriate traffic signs, turning restrictions at intersections, existing bus stop relocation and closures to reduce congestion in the work zone.

1. The Contractor must implement a 25mph reduced speed in construction zones.

2. The Contractor must incorporate visual screening in the barrier design. Screening must not reduce or preclude adequate stopping sight distance or intersection sight distances, visibility of pedestrians or cyclists, transit operations, or traffic control devices.

H. The Contractor (having Contractor’s Type A, C-10, C-34, or C-36 license issued by the State of California Contractors State License Board) may perform the traffic routing work utilizing his/her own forces, or may engage a subcontractor to perform the traffic routing work. If the Contractor intends to engage a subcontractor to perform this work, the subcontractor must possess a C-31 Construction Zone Traffic Control license issued by the State of California Contractors State License Board, and said subcontractor must be listed on the list of Subcontractors to be submitted as part of the sealed bid.

I. The Contractor must provide for the protection of the traveling public, pedestrians, bicyclists, and workers within the area covered by the limits of construction, at all times when the area is affected by his/her construction facilities or activities. The Contractor attention is directed to Section 7-1.04, “Public Safety”, of the State Standard Specifications and Section 7-10 “Public Convenience and Safety” of Greenbook and
these special provisions. Nothing in these Special Provisions must be construed as relieving the Contractor from his responsibility as provided in said Section 7-1.04 of State Standard Specification or Section 7-10 of Greenbook and these special provisions.

J. The Contractor must so conduct his/her operations as to cause the least possible obstruction and inconvenience to the public, resident, and businesses, and must have under construction no greater length or amount of work, than set forth in the approved Traffic Control Plans, and that he can prosecute properly with due regard to the rights of the public, residents, and businesses. The Contractor attention is directed to Section 7-1.03, “Public Convenience”, of the State Standard Specifications and Section 7-10 “Public Convenience and Safety” of Greenbook and these special provisions.

K. The Contractor must furnish, install, and relocate to provide for lane shifting, remove, store, maintain (including covering and uncovering as required), move to new locations, replace when damaged or missing and dispose of all traffic signs, traffic control devices, and features necessary for safety and convenience of the general public, residents, and businesses, and for safeguarding the workers and the work, where, and as required by conditions at the site of the work, and in addition to the requirements specified herein, including but not limited to the following:

1. Traffic signs and parking prohibition signs
2. Barricades with flashers and Crash Cushions
3. High level warning devices
4. Type II flashing arrow signs
5. Pedestrian Barricades
6. Temporary striping and reflective markers, overlay markers, for both construction and interim re-alignments of traffic lanes, cross-walks prior to final striping
7. Providing certified flaggers
8. Responding to requests and complaints from local merchants and residents regarding traffic related complaints.
9. Excavation plating/bridging, including any temporary plating and bridging required by the Contractor’s operations.
10. Temporary BMP required by the SWPPP
11. Portable Changeable Message Signs
12. Temporary Pedestrian Lighting
13. Temporary Street Lighting
15. Temporary GPS Clocks for traffic signal controllers
L. The Contractor attention is directed to Section 12, “Temporary Traffic Control”, of the State Standard Specifications, these special provisions and the latest edition of the California Manual on Uniform Traffic Control Devices (CA MUTCD).

M. The Contractor must provide traffic lanes and routing of vehicular and pedestrian traffic, as specified herein, in a manner that will be safe and will minimize traffic congestion and delays during construction.

N. The Contractor must include temporary traffic signal plans, details, and timing plans in the Traffic Control Plans when construction at signalized intersections result in lane shifts, lane closures, temporary turning restrictions and temporary signal shut downs to allow the reenergizing of modified traffic signals. Temporary traffic signals plans include modification of signal phasing to enable opposing movements to separate and protected phases, span wire type signals that enable the temporary shifting of signal heads to accompany stage construction modifications, semi-permanent installations where a traffic signal is placed with a surface foundation, or where signal heads are temporarily bagged so that its operation is not visible to the approaching vehicle. In some locations, tenon connectors that can be shifted will allow some flexibility for temporary signal head adjustment to allow the signals to like up with the approaching vehicles. The Contractor must notify the Engineer 1 week advance before modifying traffic signals.

O. The Contractor must provide and maintain protection for the station platform areas after the initial phase of construction has been completed in each zone at all times. The material used for protection of each station area must be submitted to the Engineer prior to acceptance for use in the field. The Contractor is responsible for the condition of all project improvements and station platforms until they have been tested, are operational, and have been granted acceptance by the Engineer.

P. The Contractor must provide and maintain protection for the traveling public, pedestrians, bicyclists, and workers within the area covered by the limits of construction, at all times when the area is affected by construction facilities or activities. In the event that truck routes are obstructed by any construction activity the Contractor must submit Traffic Control Plans including a proposed alternate truck route.

1. During the preparation of the Traffic Control Plans, the Contractor shall consult with Bicycle and ADA coordinators for the City of Oakland, Caltrans, and City of San Leandro to plan proper circulation of bicycles through the construction area.

2. Construction staging must address the relocation of existing bicycle routes.

a. The shifted travel lanes should be 14 feet wide where feasible, so that the lane can accommodate both motor vehicles and bicycles.

b. Where existing class II bike lanes will be lost during construction and where lane widths of 14 feet or greater cannot be implemented due to right-of-way constraints, the Contractor must provide bicycle detour routes for bicycles.

c. The Contractor must work with the CCRM to communicate bicycle detour route information to the Bay Area Bicycle Coalition, the City of Oakland, Bicycle Coordinator and the City of San Leandro.

Q. The Contractor must designate on Traffic Control Plans locations where transit stop will be removed or installed.
1. Temporary transit stops shall be installed so that the distance between transit stops is less than 1 mile. The temporary transit stops must be provided so that:
   a. All patrons (including ADA) can exit safely from the bus and access the sidewalk.
   b. Bus stop does restrict the flow of traffic.
   c. Dimensions shall be provided by Engineer upon request.
   d. Local Buses (40’, 45’, 60’ Buses per the Caltrans HDM) can enter and exit the bus stop. Turning template must be provided upon request.

2. Removal of existing or temporary transit stops and installation of The final or temporary transit stops must be coordinated and approved with AC Transit during preparation of Traffic Control Plans.

3. Temporary transit stops replacing an existing or another temporary transit stop must be in place before removing the existing or other temporary transit stop.

4. Any adjustments to temporary transit stops after approval of Traffic Control Plans, must be approved by Engineer.

5. Contractor must notify Engineer 1 week 21 calendar days in advance of approximate date for temporarily moving or closing an existing or temporary local bus stop. The Contractor must notify the Engineer 72 hours in advance of the exact date for temporarily moving or closing an existing or temporary local bus stop.

6. The Contractor must notify Engineer of potential construction conflicts with transit stop relocations 10 21 days ahead of the construction activities. The CCRM will work with Mallory Nestor-Brush, AC Transit Accessible Services Manager, to develop and implement a strategy to communicate the temporary relocation of the transit stops to the disabled community.

R. The Traffic Control Plans shall:
   1. Show the locations of existing, relocated, or closed bus stops. If being closed, the duration of closure shall be shown. See Division 1, Section 01 55 26, Part 3.1.A.11 for coordination requirements.
   2. Show the locations of temporary bus stops and dimensions.
   3. Include bus routes to temporary bus stops.

S. In the event that truck routes are obstructed by any construction activity the Contractor must submit Traffic Control Plans including a proposed alternate truck route.

T. The Contractor must endeavor to minimize the time in which lane closures are required during construction. The lane closures must be in compliance with the lane closure charts in Attachment 1. The Contractor must verify the lane closures do not result in delay 15 minutes or greater. If delay is 15 minutes or greater, the Contractor must receive approval from the agency with jurisdictional authority. The Traffic Control Plans must
show locations of lane closures and estimated duration of the lane closure. The Contractor must notify the Engineer 1 weeks in advance of a lane closure.

U. The Contractor must endeavor to minimize the time in which vehicle turning movements are restricted during construction. The Contractor must verify motorist can make turning movements through the corridor during construction for each phase of construction using current turning templates specified in the State Highway Design Manual and AASHTO Greenbook. Turning templates must be provided upon the Engineer’s request. The traffic Control Plans must show the locations that turning movements will be restricted or closed and the appropriate traffic handling elements. Turning movement restrictions may result in undesirable impacts on traffic. Priority must be given to moving traffic through the construction zones efficiently. The Contractor must provide the Engineer 1 week advance notice before implementing any turn movement restrictions/closures.

V. The Contractor prepare a Motorist Information Plan which may include a number of strategies inclusive of Traffic Radio Announcements, Portable Changeable Message Signs (PCMS), Temporary Motorist Information Signs, Dynamic Speed Message Signs, wayfinding, communication with local radio stations to inform travelers approaching the work zone of potential decision points to divert.

1. The motorist information strategies include placement of "Open for Business" signs. Signs may vary in size and appearance depending on the pre-existing conditions and size of the storefront and signs may be placed on Type 1 barricades, single-pole banners, vinyl banners, or plastic board signs.

2. Wayfinding signs may be used at strategic locations impacted by construction to facilitate safe public access around or through construction zones to reach their intended destination. Signs may be placed on type 1 barricades, and information and direct people to temporary bus stop relocations, driveway shifts/closures, pedestrian and/or bicycle accessibility zones through the construction.

3. The motorist information strategies include the placement of portable changeable message signs and traffic control devices that aid the motorists in directing them around the construction areas as the work progresses and the construction areas change. The placement of the Portable changeable message signs and the proposed messages must be developed by the contractor and approved by the agency that has jurisdiction. This effort will be coordinated by the Resident Engineer.

4. Keeping the motorists aware of the lane configuration during construction will be aided by the portable changeable message signs and the traffic control devices. The portable changeable message signs must indentify preferred routes around the construction project as well as announce lane configuration changes for the approaching vehicles.

5. PCMS must be utilized for advance motorist information and lane closures. The PCMS would be proposed at locations deemed significant by the Contractor and approved by the jurisdictional agency. It is anticipated that a minimum of two PCMS will be deployed at any given time to inform motorists about construction related activities along the BRT corridor. Proposed locations for the PCMS will be identified on the Contractor prepared Traffic Control Plans. As a standard operational procedure, before placing the PCMS, the Contractor must confirm with the agency in responsible charge and the resident engineer the exact location the signs will be placed.
W. The Contractor must provide an Incident Management Plan to reduce potential congestion associated with incidents from the roadway as quickly as possible. An incident may range in severity from a flat tire to a collision with a hazardous waste spill that closes a section of roadway for several hours. A standing protocol must be in place for all traffic incidents as a part of the traffic control plan. The Contractor will also be responsible for providing On-Call Tow service through the duration of the project construction.

X. The Contractor must name a Transportation Management Plan (TMP) Manager who is responsible for the traffic control plan and associated with the construction area. The name, number and 24 hour contact information for the TMP Manager must be provided on the traffic control plan.

Y. The Contractor must maintain access to all businesses, building, parking lots, and parcels including driveway, bicycle and pedestrian access. The Traffic Control Plans must identify how the Contractor will maintain access to each business, building, parking lot, and parcel through each phase of construction including use of Flagger and other means.

Z. The Contractor must provide for routine City and Community service access during construction, including but not limited to USPS, delivery (UPS/FEDEX), trash collection, street sweeping, and utility access services.

AA. Contractor must provide for the temporary timing, operation, and maintenance of the all traffic signal controls during construction. It is the Contractor’s sole responsibility to secure a third-party State of California licensed traffic engineer to develop a Traffic Signal Operation and Maintenance Plan, including the temporary traffic operations, timing plans and signal modification required to maintain traffic control in accordance with the traffic control plans, shutdowns, maintenance during construction, and final traffic signal timing sheets each intersection within the project work area. This must be submitted to the Engineer for a review of compliance with these specifications, after which, the plans will be forwarded to the local agency with jurisdictional authority as applicable for approval.

1.3 APPLICABLE STANDARDS

A. In addition to compliance with this specification, the Contractor and all traffic control devices must comply with all applicable requirements of the latest editions of the following:


2. Division 2.1, Section 7 (where applicable).

3. Division 2.2, Section 7 and Section 12 (where applicable).


7. Section 2; Traffic Control of the Standard Specifications for the City of San Leandro (where applicable) Standard Specifications for Public Works Construction (Greenbook).
8. Division 2.1, Section 10-1.05; Maintaining Existing and Temporary Electrical Systems of the Standard Specifications for the City of Oakland (where applicable).


10. Other Applicable Government Regulations.

1.4 SUBMITTALS

A. The Contractor must make the following submittals, in accordance with typical Stage Construction configurations provided in the project drawings (where applicable) to the Engineer for acceptance prior to submitting the plans to the appropriate jurisdictional agency Engineer who is assigned this responsibility, by the Engineering Department of the City of Oakland, City of San Leandro, or Caltrans:

1. Traffic Control Plans, Detour Plans and Pedestrian Access Plans

2. Motorist Information Plan

3. Incident Management Plan

4. Contractor Storage, Staging, and Parking Plans

5. Schedule of Traffic Diversion and Control

6. Certification of Flaggers

7. Truck Routes

8. Traffic Signal Operation and Maintenance Plan

B. Traffic Control Plans, Detour Plans and Pedestrian Access Plans:

1. The traffic control plans, detour plans and pedestrian access plans must be prepared by a third-party State of California licensed civil engineer and attest that he/she has personal knowledge of the traffic conditions in the work areas, understands the impacts the work will have on vehicular, pedestrian, and other modes of transportation, and that the traffic plans comply fully with all ADA requirements and all requirements related to providing path of travel through construction zones.

2. A separate set of traffic control plans, detour plans and pedestrian access plans must be required for working and non-working hours.

3. The Contractor must depict on the traffic control plans lane closures and specific temporary losses of parking to the appropriate agency in order to receive a permit, and is responsible for implementing traffic control in conformance with each permit.

4. The Traffic Control Plans must include the types of parking loss during construction, requirements for temporary replacement, and directional signage to alternate parking. Penalties will be for exceeding the number of parking spaces lost beyond those approved for deletion and for the delay in restoration of lost parking spaces based upon the temporary parking prohibition permits issued by the agency. The contractor is required to alert
the affected merchants in advance. Arrangements will be made by the contractor to accommodate loading operations that routinely occur for the merchants during construction.

5. The Contractor must complete and submit traffic control plans, detour plans and pedestrian access plans for each phase in Segment B a minimum of 66 days prior to the scheduled start date of construction for each phase within 30 calendar days following Notice to Proceed, in accordance with typical Stage Construction configurations provided in the project drawings (where applicable), Division 2.1, Greenbook and City of Oakland Standard Details to the Engineer and receive acceptance from the Engineer prior to the traffic control plans being submitted to the agencies with jurisdictional authority.

6. The Contractor must complete and submit traffic control plans, detour plans and pedestrian access plans for each phase in Segment A a minimum of 66 days prior to the scheduled start date of construction for each phase within 30 calendar days following Notice to Proceed, in accordance with typical Stage Construction configurations provided in project drawings (where applicable), Division 2.2 and State Standard Specifications and Plans to the Engineer and receive acceptance from the Engineer prior to the traffic control plans being submitted to the agencies with jurisdictional authority.

7. Once the traffic control plans have been approved by the Engineer and agencies with jurisdictional authority, no revisions to plans will be considered included in the Approved Traffic Control Plans unless the revised plans have been approved by Engineer and agencies with jurisdictional of authority.

8. A submittal must consist of four (4) copies on white paper, and one (1) electronic copy. Maximum drawing size must be 24" X 36". The traffic control plans must be drawn to a scale of 1 inch = 40 feet.

9. No work must be allowed on the streets without the approved traffic control plans and an encroachment permit.

10. The Contractor must request from the Engineer base plans to prepare the traffic control plans prior to Notice to Proceed.

11. The Engineer will have 21 days to review the traffic handling plans. The agency with jurisdictional authority will need 45 days to review the traffic handling plans after the Engineer has accepted the traffic handling plans as complete.

12. Each traffic control and pedestrian access plan must show the following minimum applicable information, as required by the Engineer:

a. Street and traffic lane layout (width of sidewalk, street and lanes etc.); outline of the work under construction (i.e., limits of excavation), location of construction barricades, location of trench protection devices, location of major construction equipment and the ingress and egress routes of trucks hauling materials to and from the construction site.

b. Sequence of construction and traffic lane transitions; labeling all taper/transition lengths and widths, delineator spacing and sign spacing.
c. Crosswalk and sidewalk closures; provide at least 5 ft wide safe path of travel for pedestrians on sidewalks and provide at least 10 ft wide safe path of travel for pedestrians on crosswalks, in addition to signs and barricades to direct pedestrians through or around the construction work zone in accordance with CA MUTCD, WATCH Manual, and State Standard Plans.

d. Existing striping, pavement markings and traffic signs, and description of what is to be removed prior to installation of temporary striping and signage, and what will be restored after the construction is completed.

e. Location and spacing of "Tow Away No Stopping" signs.

f. Location and description of temporary striping, pavement markings, signs, and other traffic control devices necessary to provide and maintain the adequate number and width of traffic lanes specified herein, and to provide and maintain passage and protection for cyclist and pedestrians.

g. Location and description of traffic control devices proposed for the protection of the work area, excavation, workers, equipment, pedestrians, vehicles, bicyclists, and property.

h. Other proposed changes and provisions for removal, relocation, or temporary installation of:

(1) Traffic signs

(2) Transit stops

(3) Barricades, chain link fence, plywood fence, temporary K-rail, crash cushions (sand barrels), etc.

(4) Type II flashing arrow signs (required for each lane closure).

(5) Lighting

(6) Traffic Signals

i. Safe path of travel for passengers using public transit, from/to loading platform to/from sidewalk.

j. The Contractor must make their own arrangements to find a location for their office/trailers. AC Transit will not provide a location. The trailer(s) must be located away from intersections in order to not block traffic control devices (STOP signs, signals etc.), hydrants, bus stops, or driveways.

k. Location of detour signs for vehicular, truck, bicycle, and pedestrian traffic.

l. Contractor must submit truck routes for the approval by the Engineer

m. Notification for permanent crosswalk closure. Contractor must satisfy City of Oakland requirements including, but not limited to, a 30 day advance crossing closure notifications for all marked crosswalks to be
permanently removed, and any other City of Oakland requirements for permanent crosswalk removal.

13. The Contractor must determine and submit temporary detour plans and an alternative route plan for any closures on the project to Engineer for approval. The Contractor must obtain acceptance from Engineer prior to submitting the plans to the agencies with jurisdictional authority of the proposed detour route and local emergency service providers for approval. The Contractor must not implement any temporary closures or detours unless Engineer, agencies with jurisdictional authority of the detour route, and local emergency service providers approve the temporary detour plans. Detours that are not approved by the Engineer must not be implemented.

**Detour plans must include hours and state when the detour is required and then when the detour will not be required.**

The Contractor must provide local emergency service providers advance notice of full street closure, lane closures, and alternative detour plans.

14. **The Contractor must provide and station a flagger at each end of the detour to assure that only local traffic attempt to access the roadways closed except for local traffic.**

15. Traffic control plans must index plans that specify each stages and sub-stages. The index must include the following for each stage and sub-stage:

a. Duration in days

b. Contractor parking space allowances and duration of contractor parking space allowances in days

c. Lane Closures and duration of each lane closure in days

d. Order of work

e. Construction notes

   (1) Construction of station platform

   (2) Construction of roadway elements (temporary and permanent)

   (3) Construction of drainage elements (temporary and permanent)

   (4) Construction of traffic signal and lighting elements (temporary and permanent)

   (5) Construction of pedestrian lighting elements (temporary and permanent)

   (6) Construction of utility elements (temporary and permanent)

   (7) Construction continuing from previous stages

f. Traffic Handling Notes (specifying routes)
(1) Lane Closures
(2) Lane Shifts
(3) Flagging Operations
(4) Lane Width Reductions
(5) Detours implemented
(6) Anticipated work outside specified working hours

16. Each traffic control plan, detour plan, and pedestrian access plan submittal must also include a detailed traffic control and construction operations contingency plan to ensure that the Contractor can quickly mobilize to modify lane closures and to open lanes in the event of an emergency/incident or equipment/material delivery breakdown. Contingency Plans must be submitted with any traffic control or handling plan at least 7 days prior to start of work. Each contingency plan must address:

a. The actions that will be taken to restore or minimize the effects on traffic when congestion or delays exceed the original estimates due to unforeseen events, such as, work-zone accidents or delayed lane closure pick-up.

b. All the necessary equipment and secondary material suppliers available to complete the operations in the event of equipment failure, unexpected loss of material, or unexpected rejection of delivered material.

c. A communication tree with clearly defined lines of communication and authority.

d. Be in coordination with utility providers to address unanticipated encounters with buried utilities and/or un-scheduled interruptions in service.

e. Communication in the event of implementation of the Construction Contingency Plan, the Contractor must immediately inform the BRT CM, resident engineer, and the CCRM.

C. Incident Management Plan (IMP)

1. The Contractor must have weekly meetings regarding the IMP, which will include critical roadway lane closures, detours, mitigation measure and strategies. The purpose being to reinforce a communication link between first responders and construction management, so they are prepared to react during emergency calls.

2. The Contractor must prepare and submit a formal Incident Management Plan (IMP) to address and manage these types of events:

a. Construction activities that will result in shifting traffic and lane reductions to create space for construction.

b. Potential for collisions that may increase during construction.
c. Lane reductions
d. Equipment malfunctions
e. Traffic collisions
f. Inclement weather
g. Special events that can make maintaining reasonable traffic flow increasingly difficult.

3. The IMP must identify the key construction safety representatives and hierarchy of designated BRT and AC Transit personnel tasked with carrying out the steps identified in the incident management plan.

4. The IMP must identify:
   a. The respective responsibilities of the construction team
   b. How to conduct the temporary vacating of construction zones
   c. What steps are to be taken to provide access through work areas if the reduction in lanes causes traffic delays that could significantly hamper quick response to an incident.
   d. In the case of roadway closures and detours, how the Contractor plans to open roadway to emergency response.

5. The IMP must state the company name for the Contractor’s On-Call Tow Service. The On-Call Tow Service must be available 24-7.

6. The IMP must provide that each construction zone supervisor must have a first responder monitoring radio. This requirement must be implemented, as first responders must always have access through construction zones. All work must stop temporarily to allow first responders through the construction zone.

7. The IMP must include a communications tree identifying the means of communications from and to the first responder agencies.

8. The IMP must include a schedule of periodic meeting is to review changes in lane configuration and to reinforce a communication link between first responders and construction management that may need to react during an emergency call (whether the incident is related to the construction zone or that access is needed due to congestion in the construction zone).
   a. At the periodic meetings, alternate routes must be identified for first responders based upon the scheduled construction staging. The plan must be distributed at meetings with the representatives of the first responders, as well as with the key jurisdictional agency representatives.

9. The IMP must be reviewed by the stakeholders. The agencies having jurisdiction will be required to sign off on the plan for its initial issuance and any subsequent revision.
D. Contractor Storage, Staging, and Parking Plans.

1. On and off Street Parking improvements must be the first order of work by the Contractor.

2. The Contractor must submit plans for materials storage and equipment parking, for each area of the work, along with the traffic control plans. Each contractor storage, staging, and parking plan must show the following minimum applicable information, as required by the Engineer:
   
a. Street and traffic lane layout (width of sidewalk, street and lanes etc.); outline of the work under construction (i.e., limits of excavation), location of construction barricades, location of trench protection devices, location of major construction equipment, materials to be stored on-site outside of work hours, or a combination thereof.
   
b. Location and spacing of “Tow-Away No Stopping” signs.
   
c. Location and description of temporary striping, pavement markings, signs, and other traffic control devices necessary to provide and maintain the adequate passage and protection for pedestrians, vehicles, and property around stored equipment.

3. Storage, stockpiling or placement must not in any way obstruct any lane or passageway intended for vehicular, pedestrian, or bicycle traffic.

4. Storage, stockpiling, or placement of any equipment, materials or supplies within the area of any public street or alley, including the sidewalks thereof, will be allowed only with approved storage plans by the Engineer.

5. Staging areas are sites where equipment or vehicles needed for incident clearance can be stored and have reasonable and safe access to the construction zone. The staging area can be used for storing additional traffic control devices and parking equipment. The Contractor must have the necessary equipment on site to repair temporary barrier or to set up temporary traffic control until the barrier can be repaired. At a minimum, the staging areas must meet the following requirements:
   
a. Provide areas large enough to store equipment.
   
b. Provide reasonable and safe access to the work zones.
   
c. Locations must be approved by the Engineer prior to construction and must be in accordance with local ordinances and State standards.

6. If the Engineer determines that such storage, stockpiling or placement causes a violation of the foregoing or of any law or order of any regulatory body having jurisdiction, the Contractor must cease or modify the storage, stockpiling or placement as necessary to comply with the specifications, laws and orders.

7. Employees of the Contractor, sub-Contractors, and suppliers must not park their vehicles within the active construction area when they are currently working and where public access is prohibited. The Contractor must provide parking for their employees at a site, which will not impact local public parking.

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and transport employees between the parking area and the work. Carpooling must be used between construction zone and storage yard.

8. Contractor must submit a construction worker parking plan for approval 15 days prior to commencement of construction, which identifies the following:
   a. Parking locations for construction workers
   b. Methods of transportation to and from the project area

9. It is understood that construction is in urban location with limited parking. Contractor must endeavor to secure parking in the surrounding lots, which have excess capacity to meet the needs of the construction worker parking, without disrupting existing transient/commuter parking.

E. Schedule of Traffic Diversion and Control.

1. The Contractor must submit a written schedule of planned Traffic Diversion and Control for each week, defined as Sunday noon through the following Sunday, to the Engineer for review and approval. A written schedule must be submitted not less than 25 days and not more than 125 days before the anticipated start of any operation that will:
   a. Reduce horizontal clearances, traveled way, including shoulders, to two lanes or less due to such operations as temporary barrier placement and paving.
   b. Reduce the vertical clearances available to the public due to such operations as pavement overlay, or overhead sign installation

2. Traffic Diversion and Control Schedule must clearly state the duration and date of lane and roadway closures.

3. Traffic Diversion and Control Schedule amendments, including adding additional closures, must be submitted by noon to the Engineer, in writing, at least 3 business days in advance of a planned closure. Approval of Traffic Diversion and Control Schedule amendments will be at the discretion of the Engineer.

4. The Engineer must be notified of cancelled closures 2 business days before the date of closure.

5. Traffic Diversion and Control that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer.

F. Certificates of Flaggers.

1. The Flag Persons must have a minimum experience of one year of utilizing manual traffic controls on similar construction projects. The Flagger must have passed The Flagger Training Course offered by National Safety Council Western Region Office, (800) 621-7619 or institutions acceptable to the Engineer. The Flag Persons must have valid certification.

G. Truck Routes.
1. The Contractor must submit a copy of the proposed truck routes, for supplying equipment and material to the project work area, to the Engineer for review and approval.

2. Commercial vehicles are specifically routed on certain streets in Oakland by the California Vehicle Code and Oakland Municipal Code. These streets are graphically represented in the Oakland Truck Routes and Prohibited Streets Map (found at: http://www2.oaklandnet.com/w/DOWD008878). Oversized vehicles are permitted on Oakland streets by the Oakland Police Department, Traffic Section. Call (510) 777-8615 for more information.

3. Commercial vehicles are specifically routed on certain streets in San Leandro by the California Vehicle Code and San Leandro Municipal Code. These streets are graphically represented in the City of San Leandro Truck Routes Map (found at: http://www.sanleandro.org/depts/pd/traffic_n_transportation_information/default.asp). If you have any questions, please contact the Traffic Division of the San Leandro Police Department at (510) 577-3271 or PDtranspermit@sanleandro.org.

4. Commercial vehicles are specifically routed for State highways by California Department of Transportation (Caltrans). The on-line color-coded “Caltrans Truck Route Map” is the official government source for truck route information along State highways (found at: http://www.dot.ca.gov/hq/traffops/engineering/trucks/truck-length-routes.htm)

5. In the event that truck routes are obstructed by any construction activity the Contractor must submit traffic control plans including a proposed alternate truck route.


1. The Traffic Signal Operation and Maintenance Plan must be prepared by a third-party State of California licensed traffic engineer and attest that he/she has personal knowledge of the traffic signal conditions in the work areas, understands the impacts the work will have on vehicular, pedestrian, and other modes of transportation, and that the plans comply fully with all ADA requirements and all requirements related to accessible traffic signal design.

2. Traffic Signal Operation and Maintenance of the traffic signal equipment is required of the Contractor for working and non-working hours.

3. Interim Traffic Signal Timing plans must be required for working and non-working hours.

4. The contractor must prepare as part of the Traffic Signal Operation and Maintenance Plan, signal timing plans (with time-based coordination), for installation prior to any lane closure. The timing plans for signalized intersections affected by each construction phase should be developed prior to the start of the construction phase and enabled only when the lane closure is in effect.

5. The signal timing plans must be developed by a registered engineer in State of California, and will be implemented in coordination with the traffic signal
operations manager. Timing plans must be developed in accordance with Division 2.1, Section 307-17.1.1.

6. At completion of the project construction, or as work transitions from active zones of construction, the Contractor must provide final traffic signal timing sheets for the project area intersections.

7. The Contractor must complete traffic signal operation and maintenance plan for changes in operation of existing and proposed signals throughout construction, as the approved Traffic Control Plans dictate changes in operation within active zones of construction.

8. The Contractor must complete and submit the Traffic Signal Operation and Maintenance Plan for the active construction zone within 15 calendar days following Notice to Proceed, in accordance with typical stage construction a submittal must consist of four (4) copies on white paper, and one (1) electronic copy. Maximum drawing size must be 24” X 36”. The traffic control plans must be drawn to a scale of 1 inch = 40 feet.

9. No work must be allowed on the streets without the approved traffic signal operations and maintenance plans.

10. The Contractor must request from the Engineer existing traffic signal timing sheets to prepare the interim and final traffic signal timing sheets prior to Notice to Proceed.

11. The Engineer will have 21 days to review the traffic signal operation and maintenance plans. The agency with jurisdictional authority will need 21 days to review the plans after the Engineer has accepted the traffic signal operation and maintenance plans as complete.

PART 2 - PRODUCTS

2.1 GENERAL

A. All traffic signs, barricades, delineators, flashing arrow signs (arrow board display), channelizers, temporary barrier, and other traffic control devices must conform to the requirements of the CA MUTCD (Part 6, Temporary Traffic Control), State Standard Plans, and State Standard Specifications for traffic control systems, except as specified herein. The CA MUTCD is available on the internet at the following website:

http://www.dot.ca.gov/hq/traffops/engineering/

B. All special construction traffic signs must be reflectorized with black messages/symbols having 6”, 8” high series D letters on orange colored aluminum plate. The message and size of the letters must be determined by the civil engineer responsible for developing the Traffic Control Plans. Any changes on any signs must be made with appropriate decals.

C. All barricades must have flashers. The flashers must be maintained in good operating condition at all times by the Contractor.

D. Temporary Asphalt, Temporary Wood Ramp, minimum 5-foot wide clear walking surface with running slope not to exceed eight (8) percent compliant with applicable Americans with Disabilities Act Accessibility Guidelines (ADAAG) and Americans with Disabilities Act (ADA) regulations.

E. Barricade materials: Delineators, A-Frames, Barrier Caution Tape, Fencing Material
F. Any equipment that does not operate properly or any device that is not in good operating condition must be removed from the job site immediately at the contractor’s expense.

2.2 Delineators

A. Delineators for lane taper areas for the separation of traffic from other work, must be either reflectorized traffic cones minimum 28 inches high, or reflectorized portable tubular delineators minimum 36 inches high, with orange posts and yellow/white reflectors. Reflector units must be 3”x 12” minimum.

2.3 Non-Skid Metal Plating

A. Metal plating and any metal bridging must be coated with non-skid and rust-inhibitive product. Plating must be installed and maintained in such a manner as to provide a non-skid surface with no edges or corners sticking up, and with no bouncing or shifting.

2.4 Channelizers

A. Channelizers must comply with Section 12-3.07 of the State Standard Specifications.

2.5 Barricades Type III

A. Barricades Type III must comply with Section 12-3.02 of the State Standard Specifications.

2.6 Arrow Board Display/Flashing Arrow Signs

A. Arrow Board Display/Flashing Arrow Signs must comply with Section 12-3.02 of the State Standard Specifications for Flashing Arrow Signs (Type II).

2.7 Temporary Barriers

A. In Segment B, the Contractor must use certified TL-2 portable water-filled barriers approved by the Engineer. The Contractor must contact the City of Oakland’s Public Works Department for a list of approved portable water-filled barriers for use in this project. Temporary barriers must be installed per manufacturer’s instructions and the Engineer’s direction.

B. In Segment A, the temporary barrier must comply with Section 12-3.08 of the State Standard Specifications.

2.8 Temporary Crash Cushions

A. Temporary Crash Cushions must comply with Division 2.2, Section 12-3.18.

2.9 Temporary Pavement Delineation

A. General

1. This section includes specifications for placing, applying, maintaining, and removing temporary pavement delineation.

2. Painted traffic stripe used for temporary delineation must comply with section 84-3 of the State Standard Specifications. Apply 1 or 2 coats.

3. Tape for temporary striping must be either of the follow types, or an Engineer - approved equivalent:
a. Advanced Traffic-Marking, ATM Series 200
b. Swarco Industries, “Director 2”

4. Cutting and spacing of the tape for the temporary striping must be as follows:
   a. Crosswalk and STOP line: Three strips, 4-inch wide, to mark 12 inches wide crosswalk or limit lines.
   b. Striping across intersections and lines for left, right turn lanes, or combination thereof: Two strips, 4-inch wide, to mark 8 inch wide guidelines.
   c. Double yellow centerline: Two 4-inch wide strips spaced 3 inches apart.
   d. Other striping: 4-inches wide

5. Temporary Lane Line and Centerline Delineation
   a. Temporary pavement markers must be the same color as the lane line or centerline markers being replaced. Temporary pavement markers must be one of the temporary pavement markers on the Authorized Material List for Caltrans for short-term day or night use, 14 days or less, or long-term day or night use, 180 days or less.

6. Temporary Edge Line Delineation
   a. Temporary, removable, construction-grade striping and pavement marking tape must be one of the types on the Authorized Material List for Caltrans. Apply temporary, removable, construction-grade striping and pavement marking tape under the manufacturer’s instructions.

B. Construction

1. General

   a. Whenever work activities obliterate pavement delineation, temporary or permanent pavement delineation must be placed before opening the traveled way to traffic. Lane line and centerline pavement delineation must be placed for traveled ways open to traffic. On multilane roadways, freeways, and expressways, edge line delineation must be placed for traveled ways open to traffic.

   b. The alignment must be established for temporary pavement delineation, including required lines or markers. Surfaces to receive an application of paint or removable traffic tape must be dry and free of dirt and loose material. Do not apply temporary pavement delineation over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation must be maintained until it is superseded or the Contractor must replace it with a new striping detail of temporary pavement delineation or permanent pavement delineation.

   c. Temporary pavement delineation must be placed on or adjacent to lanes open to traffic for a maximum of 14 days. Before the end of the 14 days, the permanent pavement delineation must be placed. If the permanent
pavement delineation is not placed within the 14 days, the Contractor must replace the temporary pavement markers with additional temporary pavement delineation equivalent to the striping detail specified for the permanent pavement delineation for the area. The Department does not pay for the additional temporary pavement delineation.

d. When the Engineer determines the temporary pavement delineation is no longer required for the direction of traffic, the markers, underlying adhesive, and removable traffic stripe must be removed from the final layer of surfacing and from the existing pavement to remain in place. Remove temporary pavement delineation that conflicts with any subsequent or new traffic pattern for the area.

2. Temporary Lane Line and Centerline Delineation

a. Whenever lane lines or centerlines are obliterated, the minimum lane line and centerline delineation must consist of temporary pavement markers placed longitudinally at intervals not exceeding 24 feet. The temporary pavement markers must be temporary pavement markers on the Authorized Material List for short-term day or night use, 14 days or less, or long-term day or night use, 180 days or less. Place temporary pavement markers under the manufacturer's instructions. Cement the markers to the surfacing with the adhesive recommended by the manufacturer, except do not use epoxy adhesive to place pavement markers in areas where removal of the markers will be required.

b. For temporary lane line or centerline delineation consisting entirely of temporary pavement markers, place the markers longitudinally at intervals not exceeding 24 feet.

3. Temporary Edge Line Delineation

a. Whenever edge lines are obliterated on multilane roadways, place edge line delineation for that area adjacent to lanes open to traffic consisting of (1) solid, 4-inch wide traffic stripe tape of the same color as the stripe being replaced, (2) traffic cones, (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet. The Contractor may apply temporary painted traffic stripe where removal of the 4-inch wide traffic stripe will not be required.

b. The Engineer determines the lateral offset for traffic cones, portable delineators, and channelizers used for temporary edge line delineation. If traffic cones or portable delineators are used for temporary pavement delineation for edge lines, maintain the cones or delineators during hours of the day when the cones or delineators are being used for temporary edge line delineation.

c. Channelizers used for temporary edge line delineation must be an orange surface-mounted type. Contractor must cement channelizer bases to the pavement as specified in Section 85 of State Standard Specifications for cementing pavement markers to pavement except do not use epoxy adhesive to place channelizers on the top layer of the pavement. Channelizers must be one of the 36-inch, surface-mounted types on the Authorized Material List.
d. Temporary edge line delineation must be removed when the Engineer determines it is no longer required for the direction of traffic.

2.10 TEMPORARY FENCES

A. A temporary fence must comply with specifications for a permanent fence of the same type except:

1. You may use used materials if the used materials are good, sound, and suitable for the purpose intended.

2. Materials may be commercial quality if the dimensions and sizes of the materials are equal to or greater than sizes shown on the plans or specified in Section 80 of the State Standard Specifications.

3. Post must be either metal or wood.

4. The Owner does not require:
   a. Galvanizing or painting of steel elements.
   b. Treating wood with a wood preservative.
   c. Concrete footings for metal post.

PART 3 - EXECUTION

3.1 VEHICULAR, BICYCLE, AND PEDESTRIAN TRAFFIC.

A. Traffic Control System for Lane Closure

1. A traffic control system must consist of temporary closures of traffic lanes and driveways in accordance with the details shown on State Standard Plans RSP T-11, RSP T-12, and the provisions of Section 12, “Temporary Traffic Control,” of the State Standard Specifications and these Special Provisions.

2. The provisions in this section will not relieve the Contractor from the responsibility to provide additional devices or take measures as may be necessary to comply with the provisions in Section 7-10, “Public Convenience and Safety,” of the Greenbook, Section 7-1.04, “Public Safety”, of the State Standard Specifications and Section 7-1.03, “Public Convenience”, of the State Standard Specifications and these special provisions.

3. Each vehicle used to place, maintain and remove components of a traffic control system on multilane roads must be equipped with a Type II arrow board display/flashing arrow sign which must be in operation when the vehicle is being used for placing, maintaining, or removing the components. Vehicles equipped with a Type II arrow board display/flashing arrow sign not involved in placing, maintaining, or removing the components when operated within a stationary type lane closure must only display the caution display mode. The sign must be controllable by the operator of the vehicle while the vehicle is in motion.

4. If any component in the traffic control system is displaced, or ceases to operate or function as specified, from any cause, during the progress of the
work, the Contractor must immediately repair the component to its original condition or replace the component, and must restore the component to its original location.

5. When lane closures are made for work periods only, at the end of each work period, all components of the traffic control system, except portable delineators placed along open trenches or excavations adjacent to the traveled way, must be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, approved by the Engineer. If a closure is not reopened to public traffic by the specified time, work must be suspended. No further closures are to be made until the Engineer has accepted a work plan, submitted by the Contractor, that will ensure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 business days to accept or reject the Contractor’s proposed work plan. The Contractor will not be entitled to compensation for the suspension of work resulting from the late reopening of closures. Contractor lane closure allowance and associated liquidated damages are per the requirements in Division 1, Section 01 55 26, Part 3.11.

6. The Contractor must provide the tabulated lanes to satisfactorily accommodate vehicular traffic. Vehicular, bicycle, and pedestrian access to properties along the project site must be maintained at all times. Bicycle lanes must be maintained or detoured by the Contractor at all times during construction. Appropriate warning signs designed for bicyclists must be used by the Contractor, as necessary, so bicyclists can safely traverse the construction zone.

7. No street closure will occur without the permission of the Engineer. In the event a detour is required, delays to motorists on the corridor must be limited to a maximum of 15 minutes.

8. Contractor must maintain minimum 11 feet lane widths for vehicular traveled ways and 10 foot lane widths for left turn bays (pockets) at all times.

9. Contractor must remove all existing striping and cover all existing signage that conflicts with temporary conditions.

10. Contractor must place “Tow-Away No Stopping” signs at 25’ centers at least 72 hours in advance of closure of on-street parking, if required for maintaining traveled lanes.

11. In the event that the work requires transit stops to be relocated or routes to be rerouted, the contractor must contact Mr. Joseph Robinson, AC Transit Superintendent, Transportation/Operation Control Center, (510) 891-4908 at least 10 days in advance of work. The Contractor must notify the Engineer and the AC Transit Representative at least 72 hours prior to the blockage or relocation.

12. Work hours within Segment A (from San Leandro BART Station to 42nd Avenue) are Monday to Friday between 7 a.m. and 7 p.m. Work hours within Segment B (42nd Avenue to Downtown Oakland) are Monday to Friday 9 a.m. to 4 p.m.
13. The following minimum number of lanes, in each direction of travel, must be maintained by the Contractor for the traffic control plan in accordance with the approved lane closure charts shown in Attachment 1.

14. If these requirements cannot be met, the Contractor must notify the Engineer in writing of the reasons therefore and propose modifications to the lane closure requirements for the Engineer’s review. The Engineer will make the final determination on any modified lane closure requirements in writing.

15. No street closure shall interfere with the access of emergency vehicles including those of Police and Fire Departments and ambulances. Local access must be maintained at all times. At locations where the lane requirements allow the contractor to close a street, local access must generally be maintained at all times by providing a 15-foot wide traffic lane.

B. Maintaining Pedestrian Access.

The Contractor must provide a continuous, accessible and safe path of travel around or through construction work zones with a minimum clear width of 5 feet for pedestrians. The Contractor must use temporary asphalt or wood ramps, signs, cones, barricades, flashers, and flaggers to direct and channel pedestrians during construction. Advance warning must be provided to pedestrians of the present sidewalk construction site. Means for temporary access for pedestrians with disabilities, such as temporary ramps, boardwalks, barriers, etc., must be in compliance with applicable Americans with Disabilities Act Accessibility Guidelines (ADAAG) and Americans with Disabilities Act (ADA) regulations.

1. Placement:
   a. Temporary ramps must be constructed so installation and removal will not damage existing pavement, curb, gutter, or combination thereof.
   b. Ramps must have a minimum 4-foot wide walking surface and a running slope not to exceed 8 percent.
   c. Ramps must meet existing surfaces without gaps. When required for drainage, a Schedule 40 PVC pipe minimum 2-inch diameter must be installed under or through ramp in gutter or flow line.
   d. Transitions between ramps and the street or sidewalk surfaces must be smooth.
   e. Sides of the ramp must be protected where drop-offs exceed 6 inches.
   f. Maintenance of a Clear and Accessible Pedestrian Corridor:
   g. The Contractor must maintain an accessible corridor that provides at least one safe path of travel for all pedestrians at all times for the duration of the project. Conversely, if a safe path of travel including crosswalks is not available, after the approval of the Engineer, the Contractor must post the sidewalk as being closed. Signage must be placed at the location of closure as well as the next intersection in both directions.

2. Installation of Barricades and temporary fencing:
a. Barricades, which will provide protection for pedestrians from traffic or construction operations, must be installed in the following locations:

(1) Between the pedestrian access route and any adjacent construction site.

(2) Between the alternate circulation path and any adjacent construction site.

(3) Between the alternate circulation path and the vehicular way, if the alternate circulation path is diverted into the street.

(4) Between the alternate circulation path and any protruding objects, drop-offs, or other hazards to pedestrians.

(5) Temporary fencing must also be placed to separate the pedestrian from the construction work as directed by the Engineer.

(6) At the down curb ramp of an intersection, if opposite up curb ramp is temporarily or completely blocked, and no adjacent alternative circulation path is provided.

b. Temporary fencing must also be placed to separate the pedestrian from the construction work as directed by the Engineer.

3. Surfacing of Pedestrian Corridors:

a. During construction, tripping hazards and barriers for people with mobility impairments must be removed to maintain an accessible pedestrian corridor.

4. Identification of Safe Path of Travel:

a. If alternate circulation routes are provided for pedestrians to bypass the construction site, the route must be clearly defined and advance warning must be provided to clearly delineate the alternate circulation route. Any change of level in a path of travel that is over 1/4 inch (1/2” maximum) height must be beveled a 45 degrees to provide a smooth, non-tripping transition. The Engineer must review and approve any pedestrian access limitations and notification requirements for pedestrians with mobility or vision impairments.

5. Public Convenience and Safety:

a. All trenches must be backfilled at the end of the day or temporary covers must be maintained during non-working hours to avoid any safety issues for pedestrians walking on the project areas.

6. Warning Signs:

a. The Contractor must provide warning signs for temporary pedestrian ramps and barricades. Warning signs must be located at both the near side and the far side of the intersection preceding a temporarily completely blocked pedestrian way.
7. Restoration of Pedestrian Routes:
   a. After construction, the site must be restored to its former condition, or new condition as required.

3.2 SPECIAL INSTRUCTIONS

A. Contractor must comply with all traffic control requirements as specified in the encroachment permit for the City of Oakland, City of San Leandro, and Caltrans.

B. BART emergency vent structures are located in the centerline of Broadway Ave. Contractor must stage all required equipment as to not damage or interfere with BART facilities. Any damage to BART facilities must be immediately repaired at no cost to BART.

C. Contractor must pothole to check for clearance of the BART structure and existing utilities prior to any excavation work.

D. BART station entrances must remain accessible during the construction work.

3.3 NO PARKING SIGNS

A. The Contractor will furnish and post "No Parking" signs, as necessary, not less than 72 hours in advance of scheduled work that will restrict parking. If the work is not performed during the timeframe indicated on the “No Parking” signs, the work will be rescheduled with at least five (5) working days advance notice. The Contractor must leave the streets open to traffic until just prior to starting the work, and will provide all barricades, signs and traffic control necessary to protect the work. The Contractor will perform all re-posting of “No Parking” signs and re-notification occasioned by his failure to meet the posted schedule.

B. “No Parking” signs must indicate time, day, date, and the statement "Violators will be Towed at Owner's Expense - CVC 22651 For info on Towed Vehicles call XXX-XXX-XXXX [Contractor to coordinate with the Engineer for appropriate contact phone number for towed vehicles]"

C. The Contractor must furnish and place “No Parking” signs, spaced every 25 feet, where approved by the Engineer. The Contractor must maintain the signs on a continual basis and must replace damaged or missing signs daily, and must remove the signs immediately after they are no longer needed. The duration of parking closure must be noted on the Traffic Control Plans.

3.4 TEMPORARY CONSTRUCTION AND TRAFFIC SIGNS

A. The Contractor must comply with the CA MUTCD and the Special Provisions of the Contract.

B. The Contractor must furnish, install, and maintain, temporary signs that are mounted on barricades or other suitable supports as necessary, prior to starting any work which will affect the normal flow of traffic.

1. Temporary signs must include a “BUSINESS OPEN” sign at locations specified by the Engineer.
The Contractor must, as a minimum, furnish and make available to the site the following signs and equipment in sufficient quantities to maintain required traffic routing:

1. Barricades, as required by Section 21400 of the State of California Vehicle Code and as specified in the CA MUTCD Part 6 – Temporary Traffic Control, in sufficient amount to safeguard the public and the workers.

2. "TOW-AWAY - NO PARKING" signs as herein specified.

3. Traffic cones, delineators, temporary reflectorized removable tape, or combination thereof to delineate traffic lanes as required to guide and separate traffic movements, as directed by the Engineer.

4. High level warning flag units, in advance of traffic approaching the work, each displaying three (3) flags mounted at a height of 8 feet.

5. Arrow board display/Flashing arrow signs, Type II conforming to Section 12-3.03 of the State Standard Specifications, except as modified herein and placed as shown on the approved traffic control plans. An arrow board display/flashing arrow sign is required for each lane closure.

6. Additional signs as required by the Engineer.
   a. The actual number and type of signs to be placed must be as shown on the approved Traffic Control Plan or as directed by the Engineer.
   b. All the signs and temporary striping must be reflectorized. All the signs must be installed so that the bottom of the sign is at least 7 feet above the sidewalk or pavement, or as directed by the Engineer.
   c. The signs and equipment must conform to the requirements of the latest edition of the CA MUTCD.

3.5 TRAFFIC CONTROL

A. Traffic Coordination with Others

1. The Contractor, in order to maintain a continuous flow of traffic, must coordinate the traffic routing work with his sub-contractors and other contractors, working in the same adjacent area. This includes truck traffic hauling materials, equipment, etc.

2. All proposed traffic routing changes must be subject to approval of the Engineer.

3. Contractor is also advised to coordinate his work with following projects that may be in progress at or near the project site of this Contract:
   a. I-880 Integrated Corridor Management (ICM) Northern Segment Project (Contract No 04-3G9604)
   b. 23rd Avenue and 29th Avenue Operational and Safety Improvement Project
   c. International Boulevard Transit Oriented Development

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d. Lake Merritt Station Area Plan  
e. Fruitvale Avenue Improvements  
f. PG&E IJ2/IJ3 Tie cable replacement Project  
g. E10th Street Improvement Plan (signal improvements at Fruitvale Ave)  
h. City Bicycle and Pedestrian Programs for City of Oakland and City of San Leandro  
i. Construction or Events at Oakland Coliseum and the Oracle Arena Complex  
j. UPRR Pre-Signal on Fruitvale Avenue  
k. East Bay Bus Rapid Transit Project – Advanced Utility Relocations  
l. East Bay Bus Rapid Transit Project – Streets and Parking Lots Improvement  
m. City of Oakland ADA Transition Plan  
n. City of San Leandro Sanitary Sewer point repairs on E14th Street  
o. International Boulevard Pipeline Project (EBMUD)  

4. Contractor is also advised to coordinate his work with following events that may be in progress at or near the project site of this Contract:
   a. Fruitvale Dia del los Muertas Festival  
   b. Oakland Art and Soul Festival  
   c. San Leandro Cherry Blossom Festival  
   d. Fruitvale Cinco de Mayo Festival  

B. Traffic Control Flaggers

5. Flaggers, flagging procedures (signaling), flagger stations and flagger control, must conform to the requirements of the CA MUTCD Part 6 – Temporary Traffic Control.

6. The Contractor must ensure that flaggers are trained in the proper fundamentals of flagging traffic before being assigned as flaggers.

7. The flaggers must be used in each situation when the Contractor’s equipment or vehicle backs up into a travel lane, or occupies intermittently a traffic lane, or enters from the work area into a traffic lane, or where required for traffic control, as directed by the Engineer.
3.6 EXISTING TRAFFIC SIGNAL OPERATION AND MAINTENANCE DURING CONSTRUCTION

A. Where it is necessary to make operational, timing changes, or shut down traffic signals at any intersection during construction, the Contractor must notify the Engineer and City Traffic Engineer forty-eight (48) hours in advance of the start of each such shutdown. Notification must be written and must also include a contact name and number to be used in case of emergency.

B. Two flaggers must be required when the signal(s) is shut down, when the signal(s) is in flash, or when the signal is not fully operational.

C. The Contractor must, with the approval of the Engineer, place the signals on flashing operation for the duration of the shutdown. If flashing operation is not possible, the Contractor must provide a portable flashing unit and must make all necessary, or required, connections to effect flashing operation.

D. The operation, and interconnected functioning, of such existing traffic signals must not be disturbed before 9:00 a.m., and the traffic signals must be returned to normal working conditions before 2:00 p.m. of the same day.

3.7 MAINTENANCE OF TRAFFIC

A. The Contractor must cause the least possible interference with traffic. The Contractor must not obstruct nor close any roadway to vehicular or pedestrian traffic, except in the immediate vicinity of the work.

B. Those parts of public streets, ways and sidewalks that are occupied by the Contractor must be immediately vacated by him and returned to public use when his use thereof is no longer necessary for the prosecution of the work.

C. The Contractor, except as hereinafter provided, must not impede, at any time, free access for vehicles and pedestrians to warehouses, stores, service stations, dwellings, garages and other properties in the vicinity of the work and on adjacent streets, including those properties fronting on streets allowed or stipulated by the Specifications to be closed to through vehicular traffic by Lane Closure Chart included in Attachment 1. The Contractor must provide for such local access by phasing his operations, bridging, or employing other procedures approved by the Engineer.

D. The Contractor must notify the Engineer immediately if their work could prohibit or impede access to any property and receive written authorization from the Engineer prior to starting said work. The Contractor must immediately restore access to any property that the Contractor has not received written authorization from the Engineer.

E. Access to fire hydrants must not be impaired by the Contractor. No debris, materials or equipment must be placed within 15 feet of any fire hydrant.

3.8 DIVERTING OF VEHICULAR TRAFFIC

A. When temporarily closing one or more lanes to vehicular traffic or to otherwise divert such traffic from its normal paths, the Contractor must clearly delineate temporary centerlines separating two-way traffic, and dividing lines for other temporary traffic lanes, by employing cones, barricades, flags, reflectors, or other approved methods or devices, in accordance with the approved Traffic Control Plans.

B. Placing of devices must commence sufficiently in advance of the obstruction or other cause of the diverting of traffic to minimize congestion and must enable traffic to enter, traverse and leave the site of the work without abrupt or unwarranted changes in

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direction. Unless otherwise specified or approved, each temporary traffic lane must be not less than 11 feet clear width.

C. When a temporary detour is necessary and approved by the Traffic Engineer, all detour signs needed for the required traffic routing must be in place before the roadway can be closed for construction.

3.9 RELOCATION AND REMOVAL OF EXISTING PERMANENT TRAFFIC CONTROL AND SIGNS

A. The Contractor must be familiar with all existing permanent traffic signs and other traffic control devices within the project limits.

B. At least 5 working days prior to the time the Contractor’s work will be done to the point that permanent installation of the signs temporarily relocated by him can be inspected, he must notify the Engineer.

C. The Contractor must temporarily relocate all traffic control, street name, and other City signs, as required for the prosecution of the work and to prevent interference with traffic signal installations, and must satisfactorily maintain such signs in place at all times. He must similarly relocate, or remove and salvage as City property, the standards for such signs. The Contractor must salvage standards in their entirety, and must remove any concrete therefrom.

D. The temporary relocation of each arterial “STOP” or other traffic regulatory sign must be done immediately upon its removal, and to a location as close as possible to the original position of such sign, or where directed by the Engineer.

E. The Contractor must permanently relocate traffic control and other signs and standards to the locations shown, as directed in the plans. Signs to be removed and salvaged are to be delivered by the Contractor to the City Corp Yard of the Local Agency,

   City of Oakland – To be provided by Engineer

   City of San Leandro – To be provided by Engineer

   Caltrans - To be provided by Engineer

3.10 CROSSWALKS AND SIDEWALKS

A. All crosswalks must be kept open at all times, unless a substitute temporary cross walk is provided or otherwise approved by the Engineer.

B. R9-3A and R9-3B, “NO PED CROSSING, USE CROSSWALK” and “USE CROSSWALK (L/R)” signs must be placed at each end of a temporarily closed crosswalk.

C. Whenever a temporary crosswalk is provided outside of the existing crosswalk, such temporary crosswalks must be clearly defined by signs, striping, pedestrian bridges or plates. The minimum width of the temporary crosswalk must be 10 feet measured between the outside edges of the striping tape. The Contractor must provide access to mobility and visually impaired persons at all temporary and permanent crosswalks at all times by providing accessible temporary curb ramps.
3.11 MEASUREMENT AND PAYMENT

A. The contract lump sum price paid for Traffic Control System must include full compensation for furnishing all labor, materials (including construction area signs), tools, equipment, and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system including traffic handling equipment and devices shown on the plans, as specified in the Section 12 of State Standard Specifications and these special provisions, and as directed by the Engineer. The preparation of submittals, timing plans, traffic control plans, incident response plans, door hangers, and all costs associated with obtaining approval of prepared plans prepared at each area of excavation, temporary signage, temporary striping and marking, maintenance and operation of the traffic signals, flagging, and flaggers are included in the lump sum price for traffic control system. The implementation of incident management plan and transportation management plan coordination, including on-call services, transportation management plans coordination officer, incident response team staff persons, flaggers, door hangers, PCMS signs for public information are included in the lump sum cost for traffic control systems.

B. The Contractor is to submit a Schedule of Values for Traffic Control System to the Engineer for review and approval.

C. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary.

3.12 LIQUIDATED DAMAGES.

A. Failure to submit the required traffic control plans and schedule must result in the assessment of liquidated damages in the amount of $200 per day for each day beyond the 15 working days after NTP that the traffic control plans and submitted schedule is delayed, as specified in Division 1, Section 01 55 26, Part 1.4. No contracted work must commence in the field without approved traffic control plans. If the contractor commences work on city streets or roadways without having approved Traffic Control Plans on site (emergency work excepted), it must be determined by the Engineer to be sufficient grounds to shut down the work, and a fee of $2000 for each shutdown intervention required must be assessed, in addition to any potential fines/citations levied by the City of Oakland.

B. The Contractor must restore and maintain the traffic lane requirements in accordance with these provisions. Unless authorized and directed by the Engineer in writing to do otherwise, the Contractor must pay liquidated damages in the amount of $1000 per 10 minutes for failure to comply with the lane requirements.

In addition, if the Contractor’s failure to provide the required traffic lanes causes traffic congestion requiring immediate action by the Engineer to provide Parking Control Officers or Police to control the traffic manually, the Contractor must pay these costs. The Officers must be paid at overtime rate for a minimum of two hours, and must be paid an additional one hour travel time.

C. Failure to provide advance notice for signal operational changes during construction, liquidated damages must be assessed at $200 per incident.

D. The Contractor must pay liquidated damages for late relinquishing of parking spaces in the amount of $250 per day per parking space based upon the Approved Traffic Control Plans.
E. The Contractor must pay liquidated damages in the amount of $500 per calendar day for each Type II Arrow Board Display/Flashing Arrow Sign or Changeable Message Sign not furnished and in place in accordance with these special provisions.

F. The Contractor must pay liquidated damages in the amount of $100.00 per calendar day for each traffic sign, required traffic device, non-skid steel plate, or combination thereof when the required sign, traffic device, non-skid steel plate, or combination thereof is not furnished and in place in accordance with these special provisions.

G. The Contractor must pay liquidated damages in the amount of $500 per day per block or portion of a block for every day that no continuous construction activity occurs within 24 hours of the posted effective date and time of the temporary “Tow-Away, No Parking” zone.

H. The Contractor must pay liquidated damages in the amount of $500 per day per Block, for every day when the temporary pavement markings are not furnished and installed in accordance with these specifications.

3.13 REPORTS FOR LIQUIDATED DAMAGES AND DEDUCTION OF LIQUIDATED DAMAGES.

A. The Engineer must furnish the Contractor with the weekly progress report showing the date, period of time of violation, and the assessed liquidated damages. The Contractor must be allowed 15 days from the issuance of the weekly progress report showing the liquidated damages in which to file a written protest setting forth in what respect he differs from the Engineer and any extenuating circumstances; otherwise the decision of the Engineer must be deemed to have been accepted by the Contractor as correct.

B. The amount of liquidated damages and cost of remedial actions must be deducted from the progressive, final payment, or combination thereof to be made to the Contractor.

END OF SECTION
SECTION 01 58 13

PROJECT INFORMATION SIGNS

PART 1 - GENERAL

1.1 SUMMARY

1.2 SUMMARY

A. Section Includes:

1. Furnishing, fabricating, installing, and removing the following Project signs:
   a. Federal Transit Administration signboards with a message describing the federal funding assistance Project.
   b. Agency Project signboards indicating Project and Contract name and description.
   c. Engineer's Field Office signboard listing the Project's Consultants.

B. Related Sections:

1. Division 1, Section 01 33 00 - Submittal Procedures
2. Division 1, Section 01 71 13 - Mobilization

1.3 SUBMITTALS

A. Submittals must be in accordance with the requirements of Division 1, Section 01 33 00, Submittal Procedures, except as modified herein:

1. Shop Drawings of signboard layouts.

PART 2 - PRODUCTS

2.1 SIGN TYPES

A. FTA Signs: Provide two 4-foot by 8 foot multicolored FTA signboards with a message describing the sponsoring agencies providing funding for the Project as shown on Exhibit A. The Engineer will provide Agency Logo information and phone number for the FTA Signs. Furnish and install a sign overlay for the Agency Logo information and phone number within 10 working days of notification.

B. Agency Construction Project Signs: Provide two 4-foot by 8-foot multicolored supplemental signboards, indicating AC Transit construction project name and description, and listing the names of the Consultants and the General Contractor as shown on Exhibit B. The Engineer will provide phone number for the Agency Construction Project Signs. Furnish and install a sign overlay for the phone number and General Contractor's name within 10 working days of notification.

C. Engineer's Field Office Sign: Provide one 4-foot by 8-foot multicolored sign indicating the Engineer's field office and listing the Consultant as shown on Exhibit C. The Engineer will provide phone number for the Engineer's Field Office Sign. Furnish and install a sign overlay for the phone number within 10 working days of notification.

D. Artwork will be provided by the Agency upon Contractor's request.

OCTOBER 2015
EXHIBIT A
FTA SIGNS

BUS RAPID TRANSIT PROJECT

Funded by:

Building a Better Ride for the East Bay!

Information: (XXX) xxx-xxxx or brt.actransit.org
EXHIBIT B

AGENCY CONSTRUCTION PROJECT SIGN

BUS RAPID TRANSIT PROJECT

TBD

JACOBS

PARSONS

BUILDING A BETTER RIDE FOR THE EAST BAY!

CONTACT: FREEWAY xx-xxxx or brt.actransit.org

OCTOBER 2015
EXHIBIT C
ENGINEER’S FIELD OFFICE SIGN

BUS RAPID TRANSIT PROJECT
FIELD OFFICE
Building a Better Ride for the East Bay!
Information: (XXX) XXX-XXXX or brt.actransit.org
2.2 SIGN CONSTRUCTION

A. Submit the final layouts of two (2) FTA signs, two (2) Agency construction project signs, and Engineer's field office sign for approval by the Engineer.


C. Frame and Cleats: New construction-grade lumber.


E. Hardware:
   1. Material: Brass, aluminum, or galvanized steel.
   2. Provide sizes and types capable of resisting a wind velocity of 85 mph when signs are assembled and erected.
   3. Removable Number Tags: Either aluminum or galvanized steel with 3-inch high blue numerals.
   4. Tag Hooks: Steel.

F. Paint: Primer-sealer and exterior semi-gloss alkyd enamel.

PART 3 - EXECUTION

3.1 GENERAL

A. Submit Shop Drawings of signboard layouts showing the FTA Signs, the Agency's Project signboards, and the Engineer's field office signboard to the Engineer for final approval.

B. Fabricate, furnish, and install the project signs at each end of the active phase of work.
   1. Erect project signs in prominent locations as directed by the Engineer within 30 days after the effective date of the Notice to Proceed.

C. Maintain project signs in good condition until completion of this Contract. The Contractor must be aware the signs must be relocated throughout construction to locations and at intervals as directed by the Engineer. No additional compensation will be provided for relocation of Project Information Signs. The Contractor must be aware that graffiti, theft, and/or vandalism of signs and traffic control devices will occur while in use. Contractor must replace and/or repair all vandalized items, as a result of graffiti, theft, or any other actions, within 24 hours of detection, as directed by the Engineer, and no additional compensation will be provided.

D. Remove project signs at project completion as specified herein.

E. Do not allow commercial or advertising signs on the Work Site.
3.2 SIGN MAINTENANCE

A. Maintain the signs in a neat and clean condition.
   1. Repaint painted sign surfaces that exhibit flaking, cracking, or fading.
   2. Either repaint or remove and replace damaged signs with new signs.
   3. Clean graffiti from signs within a 24 hour period.

B. Remove signs and post when ordered by the Engineer.
   1. Fill empty signpost holes with earth.
   2. Properly dispose of signs as directed by the Engineer.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

A. Project information sign must be measured by each unit.

4.2 PAYMENT

A. Project information sign will be paid by each unit in place.

B. The contract unit price for each Project Information Sign must include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing, erecting and maintaining Project Information Sign, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, or as directed by the Engineer.
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Products.
B. Product Delivery Requirements.
C. Product Storage and Handling Requirements.
D. Product Warranties.
E. Product Options.
F. Product Substitution Procedures.

1.2 PRODUCTS

A. Provide products of qualified manufacturers suitable for intended use. Provide products of each type by a single manufacturer unless specified otherwise.
B. Provide items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects will not be considered new products.

1.3 PRODUCT DELIVERY REQUIREMENTS

A. Transport and handle products in accordance with manufacturer’s instructions.
B. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect products in accordance with manufacturers’ instructions.
B. Store with seals and labels intact and legible.
C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
D. For exterior storage of fabricated products, place on sloped supports above ground.
E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT WARRANTIES

A. Warranties specified in other Sections must be in addition to, and run concurrent with, other warranties required by Contract Documents. Manufacturer’s disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of Contract Documents.

1. Manufacturer’s Warranty: Preprinted written warranty published by individual manufacturer for particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by or incorporated into Contract Documents, either to extend time limit provided by manufacturer’s warranty or to provide more rights for Owner.

B. Special Warranties: Prepare written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer’s Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with Specifications, prepare written document using appropriate form properly executed.

3. Refer to Divisions 2 through 16 for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 1, Section 01 70 00, Execution and Closeout Requirements.

1.6 PRODUCT OPTIONS

A. Products specified by reference standards or by description only: Any product meeting those standards or description, by any manufacturer.

B. Products specified by naming one or more trade names of products or the names of manufacturer with catalog information and not qualified by the words “Designated Matching Product”: One of the products named which meets the specifications or an equal approved under the Product Substitution Procedures specified herein.

C. Products specified by naming one product or manufacturer followed by the words “Designated Matching Product”. There is no option.
1.7 PRODUCT SUBSTITUTION PROCEDURES

A. Comply with the following procedures to obtain approval of a proposed “equal” product and under other circumstances such as when a product becomes unavailable through no fault of the Contractor.

B. The Engineer will consider requests for Substitutions only within 30 days after date of Notice to Proceed. Substitutions may be considered later than 30 days after the date of the Notice to Proceed when a product becomes unavailable through no fault of the Contractor.

C. Failure to propose the substitution of any article or service within 30 days after date of Notice to Proceed will be deemed sufficient cause for denial of request for substitution.

D. A Request for Substitution constitutes a representation that the Contractor:

   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

   2. Has determined that proposed product has proof of operation in similar application.

   3. Will provide the same warranty for the Substitution as for the specified product.

   4. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

   5. Waives claims for additional costs or time extension which may subsequently become apparent.

   6. Will reimburse Owner for review or redesign services associated with re-approval by authorities.

E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

F. Approval of any substitute indicates only that the product apparently meets the requirements of the Drawings and Specifications on the basis of the information or samples submitted. The Contractor must assume full responsibility for the performance of any substitutions.

G. Substitution Submittal Procedure:

   1. Submit five copies of Request for Substitution included at the end of this Section. Limit each Request form to one proposed Substitution.

   2. Submit Shop Drawings, Product Data, and certified test results attesting to the proposed product equivalence.

   3. Engineer will notify Contractor in writing of decision to accept or reject request.
PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used

END OF SECTION
REQUEST FOR SUBSTITUTION FORM FOLLOWS
# REQUEST FOR SUBSTITUTION

<table>
<thead>
<tr>
<th>Project: ____________________________</th>
<th>Substitution Request Number: ____________________________</th>
</tr>
</thead>
<tbody>
<tr>
<td>To: ________________________________</td>
<td>From: ________________________________</td>
</tr>
<tr>
<td>Re: ________________________________</td>
<td>Date: ________________________________</td>
</tr>
<tr>
<td>CM Project Number: __________________</td>
<td>Contract For: ________________________</td>
</tr>
</tbody>
</table>

**Specification Title:** ____________________________  
**Description:** ____________________________  

**Section:** ________  
**Page:** ________  
**Article/Paragraph:** ____________________________

**Proposed Substitution:** ____________________________  
**Manufacturer:** ____________  
**Address:** ____________  
**Phone:** ____________  
**Trade Name:** ____________________________  
**Model No.:** ____________  
**Installer:** ____________  
**Address:** ____________  
**Phone:** ____________  

**History:**  
- □ New Product  
- □ 2-5 years old  
- □ 5-10 years old  
- □ More than 10 years old

**Differences between proposed substitution and specified product:** ____________________________

- □ Point-by-point comparative data attached - REQUIRED BY ENGINEER

**Reason for not providing specified item:** ____________________________

**Similar Installation:**  
**Project:** ____________________________  
**Architect:** ____________________________  
**Address:** ____________________________  
**Owner:** ____________________________  
**Date Installed:** ____________________________

**Proposed substitution affects other parts of Work:**  
- □ No  
- □ Yes; explain ____________________________

**Savings to Owner for accepting substitution:** ____________________________ ($__________)

**Proposed substitution changes Contract Time:**  
- □ No  
- □ Yes  
  - [Add] [Deduct] ____ days

**Supporting Data Attached:**  
- □ Drawings  
- □ Product Data  
- □ Samples  
- □ Tests  
- □ Reports  
- □ Evidence of Proven Operation

OCTOBER 2015
The Undersigned certifies:
Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.

Same warranty will be furnished for proposed substitution as for specified product.

Same maintenance service and source of replacement parts, as applicable, is available.

Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.

Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.

Proposed substitution does not affect dimensions and functional clearances.

Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: ____________________________
Signed by: ________________________________
Firm: ____________________________
Address: ________________________________
Telephone: ________________________________
Attachments: ________________________________

ENGINEER REVIEW AND ACTION
□ Substitution approved - Make submittals in accordance with Division 1, Section 01 33 00.
□ Substitution approved as noted - Make submittals in accordance with Division 1, Section 01 33 00.
□ Substitution rejected - Use specified materials.
□ Substitution Request received too late - Use specified materials.
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cutting and patching.
B. Final cleaning prior to turning project over to Owner.
C. Starting of systems.
D. Demonstration and instructions.
E. Protecting installed construction.
F. Closeout procedures.
G. Maintenance service.
H. Operations and Maintenance Manual and Data.
I. Product warranties and product bonds.
J. Record Documents.
K. Spare parts and maintenance products.

1.2 CUTTING AND PATCHING

A. Coordinate work through shop drawings and through proper sequencing of installation to ensure that cutting and patching specified herein is prevented. In case cutting and patching is required, submit written request in advance of cutting or altering any element.
B. Employ skilled and experienced installer to perform cutting and patching.
C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:

1. Fit the several parts together, to integrate with other Work.
2. Uncover Work to install or correct ill-timed Work.
3. Remove and replace defective and non-conforming Work.
4. Remove samples of installed Work for testing.
5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.

D. Execute work by methods to avoid damage to other Work, and which will provide proper surfaces to receive patching and finishing.
E. Cut masonry and concrete materials using masonry saw or core drill.

F. Restore Work with new products in accordance with requirements of Contract Documents.

G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. Maintain integrity of construction; completely seal voids.

I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

1.3 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. At completion of Work, remove remaining waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean exposed surfaces; leave Project clean and ready for occupancy.

C. Clean surfaces exposed to view; remove temporary labels, stains and foreign substances, and polish transparent and glossy surfaces.

D. Clean debris from drainage systems.

E. Clean site; sweep paved areas, rake clean landscaped surfaces.

F. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.4 STARTING OF SYSTEMS

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Engineer seven days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, if applicable, and for conditions that may cause damage.

D. Verify that wiring and support components for equipment are complete and tested.

1.5 DEMONSTRATION AND INSTRUCTIONS

A. Demonstrate operation and maintenance of products to Owner’s personnel no later than 30 days prior to Final Completion at an agreed upon time.

B. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner’s personnel in detail to explain all aspects of operation and maintenance.

C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment.
1.6 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Prohibit traffic from landscaped areas.

1.7 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer’s review.

B. Provide submittals that are required by governing or other authorities to Engineer.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.8 MAINTENANCE SERVICE

A. Maintenance service, if applicable, must not be assigned or transferred to any agent or Subcontractor without prior written consent of the Owner.

1.9 OPERATION AND MAINTENANCE DATA

A. Submit data bound in 8-1/2 by 11 inch (A4) text pages, three D side ring binders with durable plastic covers.

B. Prepare binder cover with printed title “OPERATION AND MAINTENANCE INSTRUCTIONS”, title of project, and subject matter of binder when multiple binders are required.

C. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.

D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

E. Contents: Prepare a Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:

1. Part 1: Directory, listing names, addresses, and telephone numbers of A/E, Contractor, Subcontractors, and major equipment suppliers.

2. Part 2: Operation and maintenance instructions. Identify the following:

   a. List of equipment.
   b. Parts list for each component.
   c. Operating instructions.
   d. Maintenance instructions for equipment and systems.
e. Maintenance instructions for special finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following, as applicable:
   a. Shop drawings and product data.
   b. Certificates.
   c. Photocopies of warranties and bonds.

F. Submit draft copy of completed volumes 30 days prior to Final Inspection. This copy will be reviewed and returned after Final Inspection, with Engineer comments. Revise content of all document sets as required prior to final submission.

G. Submit two sets of revised final volumes, within 15 days after Final Inspection.

1.10 PRODUCT WARRANTIES AND PRODUCT BONDS

A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work.

B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.

C. Verify that documents are in proper form, contain full information, and are notarized.

D. Co-execute submittals when required.

E. Provide Table of Contents and assemble in three D-side ring binder with durable plastic cover.

F. Submit prior to final Application for Payment.

G. Time Of Submittals:
   1. For equipment or component parts of equipment put into service during construction with Owner’s permission, submit documents within 15 days after acceptance.
   2. Make other submittals within 15 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 15 days after acceptance, listing the date of acceptance as the beginning of the warranty or bond period.
1.11 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer’s instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress, not less than weekly.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer’s name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to permanent surface improvements.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

G. Submit all aforementioned documents to Engineer, two (2) copies, with request for final Application for Payment.

1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products in quantities specified in individual specification sections prior to Substantial Completion.

B. Deliver to and place in location as directed by the Engineer; obtain receipt prior to final payment.
PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work under this Bid Item consists of preparatory work including, but not limited to, work necessary for the mobilizing and furnishing at the site, equipment, materials, supplies and incidentals; for the establishment of all offices, buildings and other temporary facilities necessary for work on the project; cost for pre-paid bonds and insurances; and for all other work and operations which must be performed or costs incurred to begin work on the various Bid Items at the project site. Compensation for mobilization includes, but is not limited to, the following principal items:

1. Moving onto the site of all Contractor’s equipment required for operations.
2. Installing temporary construction power and wiring.
3. Developing and installing construction water supply.
4. Providing all on-site communication devices, as necessary.
5. Providing on-site sanitary facilities and potable water facilities
6. Arranging for the erection of Contractor’s work and storage yard(s).
7. Obtaining and paying for all required bonds and insurances including the bond required by Article 2.4 of the Public Works Code.
8. Posting all OSHA-required notices and establishing safety programs.
9. Having the Contractor’s superintendent at the job site full time, whenever construction is in progress.
10. Preparing, updating, and submitting preconstruction submittals, including
   a. Construction Schedule as specified in Division 1, Section 01 32 16, Network Analysis Schedules.

B. Owner will not approve a Schedule of Bid Prices that indicates a value for Mobilization (Bid Item 427) that exceeds 10% of the Bid Item Subtotal (Bid Items 1 through 426), after correcting arithmetic errors. In the event that the submitted value for Mobilization exceeds this threshold the bid item for Mobilization (Bid Item 427) will be reduced to 10% of the Bid Item Subtotal (Bid Items 1 through 426), the Grand Total Bid Price will be recalculated, and no additional compensation will be provided therefor.

1.2 RELATED SECTIONS

A. Division 0, Section 00 72 00 – General Conditions
B. Division 0, Section 00 73 00 – Supplemental General Conditions
C. Division 1, Section 01 33 00 – Submittals
D. Division 1, Section 01 50 00 – Temporary Facilities and Controls

1.3 PAYMENT PROCEDURES

A. The Bid Item “Mobilization” will be paid as a Lump Sum over the course of the project based on percent completion of the work, less the mobilization bid price.

<table>
<thead>
<tr>
<th>% Bid Item Mobilization Payment</th>
<th>% Project Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>2%</td>
</tr>
<tr>
<td>50%</td>
<td>5%</td>
</tr>
<tr>
<td>75%</td>
<td>10%</td>
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<tr>
<td>100%</td>
<td>20%</td>
</tr>
</tbody>
</table>

B. Any extension of the contract time that may be granted will not of itself constitute grounds for a claim for additional payment under the Bid Item “Mobilization.”

C. Additive Alternates shall not be included in the calculation of Mobilization.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION
PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work under this bid item consists of survey work including, but not limited to, work necessary corner record, construction staking, and construction survey.

1.2 REQUIREMENTS

A. Contractor must perform all corner record, construction staking, and construction survey and the corner record survey using a land surveyor licensed in the State of California.

B. Corner Records must be developed and approved by the County Surveyor before requesting construction encroachment permits from the City of Oakland, City of San Leandro, and State of California Department of Transportation. The Contractor must be aware that corner record and record of survey will take 6 weeks or more to record.

C. Contractor must provide a staking plan prior to commencement of work for Owner's review.

D. Contractor must maintain monuments, stakes, and marks, and must update the plan as necessary.

1.3 CORNER RECORD

A. A corner record must be filed for every public land survey corner or accessory within the project site, except a "lost corner", which is found, set, reset or used as control in any survey by a Land Surveyor. (8773(a))

   1. After the establishment of a lost corner, as defined by the Manual of Instructions for the Survey of the Public Lands of the United States, a record of survey must be filed as set forth in Section 8764. (8773(c))

B. The filing of a corner record with the County Surveyor does not relieve the Land Surveyor of the responsibility to file a record of survey if required by Section 8762 of the Professional Land Surveyors Act.

C. A record of survey may be filed in lieu of a corner record.

D. A corner record must be filed in cases where a Record of Survey is not required per 8765(d) when the survey is a retracement of lines shown on a subdivision map, official map or record of survey, where no material discrepancies with such record are found and sufficient monumentation is recovered to accurately locate the record corner positions and any property corners set, reset or found to be of a different character than indicated by prior records are shown thereon. (8765(d))

E. No corner record needs to be filed (8773.4) when:

   1. A corner record is on file and the corner is found as described in the existing corner record.
2. All conditions of Section 8773 are complied with by proper notation on a record of survey or subdivision map filed in compliance with the Land Surveyor's Act or Subdivision Map Act.

3. Section 8773.4 must not apply to maps filed prior to January 1, 1974.

4. When the survey is a survey of a mobile home park interior lot as defined in Section 18210 of the Health and Safety Code, provided that no subdivision map, official map, or record of survey has been previously filed for the interior lot or no conversion to residential ownership has occurred pursuant to Section 66428.1 of the Government Code.

F. Corner record requirements

1. The corner record must be legible, clear and dark enough for archival and reproduction purposes. All signatures to be in ink.

2. A Corner Record must be a single 8.5 x 11 inch sheet which may consist of a front and back page.

3. When monuments are recovered, their record, status and description must be identified. “No record” monuments must be identified as such.

4. The corner record must clearly indicate the method used to determine the location of all monuments set.

5. A corner record may be used when monuments are set at points previously shown on a subdivision map, official map or record of survey.

6. More than one monument can be shown on a corner record provided the sketch is adequate to indicate how each monument was set and its relationship to other monuments of record.

7. The survey of a parcel described by a “metes and bounds” description and not shown on a previously filed or recorded subdivision map, official map or record of survey requires that a record of survey be filed.

8. Unless a Record of Survey is filed, a corner record must be filed on property corners within a subdivision where no original monuments are shown to have been set, provided there is no material discrepancy with record and sufficient monumentation is found to establish the precise location of property corners thereon. (8765(d))

9. Sections 8762 (b) and 8765 (d) of the Professional Land Surveyor's Act limits "material discrepancy" to the material discrepancy in the position of points, lines, or in dimensions.

10. A reference to the California Coordinate System is optional at the discretion of the submitting surveyor. However, if a reference to the California Coordinate System is shown, field measured ties to CCS83 points must be shown. Refer to Sections 8813 and 8817 of the Public Resources Code.

11. Any survey based upon the metric system must be clearly identified as such. It is recommended that a bold note and/or metric logo be placed on the page with the drawing.
12. A Corner Record or Record of Survey must be filed to perpetuate existing monuments as referenced in Section 8771(b) of the Professional Land Surveyors Act.

G. Responsibility of the Surveyor for Corner Record

1. The surveyor is responsible to recognize the conditions permitting the use of a corner record in compliance with the Professional Land Surveyors Act.

2. The surveyor must complete, sign, date and stamp with his/her seal, enter expiration date of license or registration, and file with the County Surveyor of the County in which the corner is located, a corner record when required. (411(h))

3. The sketch prepared as part of the corner record must be sufficiently complete and in accordance with Board Rule 464 to allow another surveyor to determine the method used to establish the corner. The drawing must show measurements which relate the corner to other identifiable monuments. (Board Rule 464 (a)(6))

4. The surveyor must reconstruct or rehabilitate the corner monuments shown on a corner record and accessories to such corners, so that the same must be left by him/her in such physical condition that it remains a permanent monument. (8773.3)

5. The surveyor must file the corner record within 90 days from the date a corner was found, set, reset or used as control on any survey, when required. (Board Rule 464(10)(c), 8762 LS Act)

1.4 LINE AND GRADE

Three consecutive points shown on the same rate of slope must be used in common, in order to detect any variation from a straight grade, and in case any such discrepancy exists, it must be reported to the Engineer. If such a discrepancy is not reported to the Engineer, the Contractor must be responsible for any error in the finished work.

The Owner’s Designated Representative may verify the field condition. Errors or inconsistencies in the contract documents discovered by the Contractor must be reported to the Owner’s Designated Representative within 24 hours and prior to constructing forms or related improvements. Any work installed with this requirement must be subject to removal and replacement at the Contractor’s expense.

1.5 PAYMENT

The price paid for lump sum bid item Construction Surveying, must include full compensation for furnishing all labor materials, tools, equipment, and incidentals required for performing all corner record, record of survey, corner record and record of survey filing, filing cost with County, and construction staking and surveying by a land surveyor, preparing all staking plans, maintaining all monuments, stakes and marks, and updating the plans as necessary, as specified in these special provisions or as directed by the Engineer.

PART 1 - PRODUCTS

Not Used
PART 2 - EXECUTION

Not Used

END OF SECTION
SECTION 01 71 25

UTILITY POTHOLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. The work under this bid item consists of utility pothole as shown on the plans and at
locations where traffic signal and lighting equipment is shown on the plans to be installed
and positively identify high risk utilities as shown on the plans.

1.2 REQUIREMENTS

A. Contractor is advised that potholing has not been performed in the vicinity of the traffic
signal equipment. Therefore, the Contractor shall be responsible for identifying potential
conflicts between traffic signal and lighting equipment installation and existing subsurface
utilities prior to ordering traffic signal poles and mast arms.

Contractor is advised that potholing to positively identifying high risk utilities was not
completed. Therefore, the Contractor shall be responsible for identifying all in area high risk
utility-utilities is within the area that may conflict with the Contractor’s activities.

The Engineer will notify the Contractor of additional potholes required by EBMUD.

As a first order of work, the contractor shall request utility markouts by calling USAalert at
the following phone number 1-800-227-2600.

Contractor shall provide the Engineer the locations of all the potholes. Contractor shall
receive written permission to pothole from the Engineer prior to starting pothole
operations. If the Contractor chooses to use another acceptable method other than
potholing he shall provide Engineer the locations and methods to be used in lieu of
potholing. Contractor shall receive written permission to use the other acceptable method
and locations for these other methods from the Engineer prior to starting any these
operations.

Contractor shall identify all underground conflicts prior to the start of construction, and
shall resolve all conflicts prior to installation of traffic signal and lighting equipment, as
identified elsewhere in these special provisions.

Contractor shall identify when planned clearances to high risk utilities are less the
following:

1. 18 inches below the grade plane
2. 12 inches below disturbed ground, and in areas of unsuitable material
3. 12 inches below the grading plane of drainage structures
4. 18 inches below flow line of unlined ditches
5. 24 inches horizontally from face of pile or from side of excavation.
1.3 POTHOLING

A. Contractor shall identify all locations that signal and lighting equipment require the installation of foundations. Contractor shall identify where existing utility conflicts may interfere with the installation of the traffic signal equipment and foundations. Contractor shall pothole at the direction of the Engineer and as identified elsewhere in these special provisions on pothole for each of these locations confirmed by the Engineer. Based upon an inspection, verified by the Engineer, the contractor shall identify each potential utility conflict. Potholing shall be performed and the location of the utility in three planes shall be identified in size, material type and location recorded. Potholing should be performed to a depth of one foot below the bottom of the equipment’s foundation. The engineer shall determine the course of action for potential conflicts.

B. Plan notes specify that the traffic signal pole locations are approximate. Field adjustments approved by the Engineer shall be made with no additional cost to the contract as long as there are no substantive changes in signal equipment pole or mast arm. If there is a utility conflict that cannot be avoided, the utility shall be relocated on a force account basis.

C. Restoration of the pothole shall be made on a temporary hard surface pavement, unless the area of the pothole results in a relocation of the traffic signal equipment and no additional construction is proposed for the pothole location. In that case, the restoration shall be in like kind to the surface that prevailed prior to the potholing. If the area is concrete sidewalk, then the contractor shall remove pavement surface to the nearest score line and dowel #4 bars with 4-inch penetration 18-inches on center to the nearest undisturbed concrete for the perimeter of the restoration. Replacement concrete shall conform in thickness and material design strength as the City of Oakland standard.

D. The Contractor shall positively identify high risk utilities as shown on the plans per the following requirements:

1. Location determination for transverse utilities shall be done:
   a. One each side of an undivided highway
   b. On each side and in the median of a divided highway.
   c. In no event shall there be spacing greater than 100 feet between location determinations.

2. Location determination for longitudinal utilities shall be done at intervals sufficient to establish the location of the line, but in no even greater than 100-foot intervals.

Positive location of all high risk utilities shall be accomplished by potholing or other acceptable methods. Combinations of method may be more effective than a single method.

E. The Contractor shall positively identify EBMUD water lines at the locations directed by the Engineer.

1.4 PAYMENT

Utility Potholing shall occur at the locations that signal and lighting equipment require the installation of foundations, and the full limits of each foundation is to be explored. Potholing shall also occur at locations required to positively identify high risk utilities,
these locations shall be approved and marked in the field by the Engineer. Potholing for EBMUD water lines shall occur at the locations directed by the Engineer.

The lump sum price paid for each utility potholing, shall include full compensation for furnishing all labor, material, tools, equipment and incidentals required for doing all work involved in identifying the utility pothole locations, potholing or other acceptable methods, indentifying utility, restoration of the surface and suitable disposal of the excess excavation, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, or as directed by the Engineer.

PART 2 - PRODUCTS
Not Used

PART 3 - EXECUTION
Not Used

END OF SECTION
DIVISION 2 – CIVIL SPECIFICATIONS

DIVISION 2.1 - SEGMENT B - CITY OF OAKLAND SPECIFICATIONS

PUBLIC WORKS AGENCY (PWA)

SPECIFICATIONS

*******

GENERAL

The work embraced herein must be done in accordance with the “Standard Specifications for the Public Works Construction, 2009 Edition” (GREEN BOOK) adopted by City Council Ordinance No. 13039 C.M.S. on October 5, 2010, all referred to hereinafter as the “Standard Specification,” insofar as the same may apply, and in accordance with the 2002 “City of Oakland Standard Details” and these Special Provisions. In addition, the latest State of California, Department of Transportation, Standard Specifications and Standard Plans, dated 2010, must apply for certain applicable State Standard drawings that are specified herein.

Copies of the 2002 “City of Oakland Standard Details” are available online at http://www2.oaklandnet.com/Government/o/PWA/o/EC/s/DGP/OAK025902


PAYMENT

Full compensation for furnishing all labor, materials, water, tools, and equipment, and for performing all work shown on the plans, covered in the Specifications, or a combination thereof, including excavation for form work and removal and disposal of all waste surplus materials, must be considered as included in the unit and lump sum prices bid for the various items of work covered in the estimate, complete in place. Payment for the work will be made in accordance with Section 9, “MEASUREMENT AND PAYMENT” of the Standard Specifications.

DESCRIPTION OF WORK

The work to be done under the contract is described in general terms in the Division 0 and Division 1. The work includes all items listed in the proposal and other such work as specifically shown on the plans or included in the specifications.

SPECIAL PROVISIONS

In the following Special Provisions, the numbers in the prefix, as well as the title, used for each section or subsection (e.g., “1-2 DEFINITIONS”) are the same as the number in the prefix of the section or subsection of the Standard Specifications affected by that portion of the Special Provisions. When the text refers to the Specifications it is intended that this mean both the Standard Specifications and these Special Provisions.
PART 1 - GENERAL PROVISIONS

CITY OF OAKLAND

PUBLIC WORKS AGENCY (PWA)

SPECIAL PROVISIONS

SECTION 1 - TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE, AND SYMBOLS

Section 1 of the Special Provisions shall conform to Section 1 of the Greenbook except as modified herein.

1-2 DEFINITIONS.

CHANGE THE DEFINITIONS OF THE FOLLOWING WORDS OF SUBSECTION 1-2:

Addendum: Written interpretations or revisions to any of the Contract Documents issued by the Owner before the bid opening.

Agency: The City of Oakland, California, a municipal corporation.

Board: The Board of Directors of the Alameda-Contra Costa Transit District, the Owner.

Contract: The written agreement covering the performance of the Work and the furnishing of labor, materials, tools and equipment in the construction of the Work. The Contract is a part of the Contract Documents and will include all approved change orders issued after the Contract is executed by the parties.

Engineer: The Engineer of the owner (AC Transit) acting directly or through authorized agents, such agents acting within the scope of particular duties entrusted to them. He is also the Owner's designated representative (ODR).

ADD THE FOLLOWING NEW DEFINITIONS TO SUBSECTION 1-2:

Acceptance: The Engineer's formal written acceptance of an entire contract that has been completed in all respects in accordance with the plans and specifications and any modifications thereof previously approved.

Architect: Professional architect or engineer designated for a particular project responsible for signing and sealing the permit drawings, interpretation of the drawings where ambiguities exist, review of requests for information, design change requests and shop drawings, resolution of errors and omission, and finalization of as-built drawings.

Building Sewer: The 4-inch, 5-inch, 6-inch, or 8-inch sewer pipe, also known as "lateral", within both the public right-of-way and the private property connecting the building or house to, and including, the connection at the public sewer in the right-of-way or easement. Includes both the "house sewer" and the "house connection sewer."

Building Sewer Connection: (House Connection) The connection at the public sewer in the public right-of-way or easement, to the 4-inch, 5-inch, 6-inch, or 8-inch building sewer.

City: Same as "Agency."

Inspector: A representative of the permitting agency responsible for verification of the construction activities on site.

Laboratory: The official materials testing laboratory of the City of Oakland or other laboratories authorized by the Engineer to provide quality assurance.
Local Public Agency: The City of Oakland

Lower Lateral: (House Connection Sewer) That portion of the building sewer existing from the building sewer connection to the Two-Way cleanout.

Owner: The City of Oakland

State: State of California and its agencies, including Department of Transportation (Caltrans)


Two-way Cleanout: (Also known House Connection Cleanout or 2-Way Cleanout.) A 4-inch or 6-inch two-way fitting, no hub, cast iron cleanout installed on the building sewer within the public right-of-way.

Upper Lateral: (House Sewer) That portion of the building sewer existing from the Two-Way Cleanout to the building connection.

1-3 ABBREVIATIONS.
ADD THE FOLLOWING NEW ABBREVIATIONS TO SUBSECTION 1-3:

ABAG: Association of Bay Area Governments

ADA: Americans with Disability Act

CAL-OSHA: California Occupational Safety and Health Administration

CALTRANS: California Department of Transportation

CEDE: Community and Economic Development Agency, Department of Development of the City of Oakland

EBMUD: East Bay Municipal Utility District

EDA: Economic Development Administration

HR: Hour

HUD: United States Department of Housing and Urban Development

OMC: Oakland Municipal Code

ISA: International Society of Arboriculture

PAV: Pressure Aging Vessel

PWA: Public Works Agency of the City of Oakland

RTFO: Rolling Thin Film Oven

PG: Performance Graded

SFRWQCB: San Francisco Regional Water Quality Control Board
SECTION 2 - SCOPE AND CONTROL OF WORK

Section 2 of the Special Provisions shall conform to Section 2 of the Greenbook except as modified herein.

2-1 AWARD AND EXECUTION OF THE CONTRACT.
REPLACE SUBSECTION 2-1 WITH THE FOLLOWING:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

2-2 ASSIGNMENT.
REPLACE SUBSECTION 2-2 WITH THE FOLLOWING:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

2-3 SUBCONTRACTS.
REPLACE SUBSECTION 2-3 WITH THE FOLLOWING:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

2-4 CONTRACT BONDS.
REPLACE SUBSECTION 2-4 WITH THE FOLLOWING:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

2-5 PLANS AND SPECIFICATIONS.
2-5.1 General.
ADD THE FOLLOWING TO THE END OF SUBSECTION 2-5.1:
All work shall be performed in compliance with all applicable (most recent editions) federal, state and local codes, code amendments, and ordinances such as, but not limited to, the following:

- California Manual of Uniform Traffic Control Devices (MUTCD);
- Uniform Building Code, State Building Code,
- Uniform Plumbing Code,
- Uniform Mechanical Code,
- Uniform Fire Code,
- Uniform Electrical Code,
- "Work Area Traffic Control Handbook."

Unless otherwise noted in the contract documents, the Uniform Building Code shall apply to the construction, alteration or repair of all City facilities including bridges, pedestrian walkways, and pumping stations.

2-5.2 Precedence of Contract Documents
REPLACE SUBSECTION 2-5.2 WITH THE FOLLOWING:
Refer to the requirements of Division 0 of these contract documents.

2-5.3 Submittals.
REPLACE SUBSECTION 2-5.3 WITH THE FOLLOWING:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

ADD NEW SUBSECTION 2-5.4 TO READ:
2-5.4 Certificates of Compliance. A Certificate of Compliance shall be furnished prior to the use of any materials for which these specifications or the special provisions require that a certificate be furnished. In addition, when so authorized in these specifications or in the special provisions, the Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot so certified shall be clearly identified in the certificate.
Materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the plans and specifications, and any material not conforming to the requirements will be subject to rejection whether in place or not.

The City reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

2-6 WORK TO BE DONE.
ADD NEW PARAGRAPH TO THE END OF SUBSECTION 2-6 TO READ:

Any work done beyond lines and grades established by the Engineer pursuant to the plans or any extra work done without written authority of the Engineer, shall be considered as unauthorized work and no compensation will be allowed therefor. The Engineer shall have the authority to have such work removed and the area restored, and to deduct the cost thereof from money due the Contractor.

2-7 SUBSURFACE DATA.
REPLACE SUBSECTION 2-7 WITH THE FOLLOWING:

Refer to the requirements of Division 0 and Division 1 of these contract documents.

2-8 RIGHT-OF-WAY.
REPLACE SUBSECTION 2-8 WITH THE FOLLOWING:

The Contractor shall perform work within the public right-of-way or easements. The right to enter onto private property outside the public right-of-way or easement shall be obtained in writing from the property owner by the Contractor at the Contractor's expense. Permission to setup mobilization and staging areas outside the City of Oakland right-of-way shall be obtained in writing from the property owner at the Contractor's expense.

The Contractor shall be solely responsible for damages to persons or property occurring during or as a result of the Contractor's entry onto private property outside the right-of-way or easement area. The Contractor shall defend and hold the Owner and Public Agencies harmless from any and all claims, causes of action, demands or judgments resulting from the Contractor's entry onto private property outside the right-of-way or easement area.

2-9 SURVEYING.
REPLACE THE LAST SENTENCE OF THE FIRST PARAGRAPH OF SUBSECTION 2-9.1 WITH THE FOLLOWING:

Markers that otherwise are lost or disturbed by its operations shall be replaced at the Contractor's expense by a person licensed to practice land surveying in California as determined by the Engineer.

2-10 AUTHORITY OF THE BOARD AND THE ENGINEER.
REPLACE SUBSECTION 2-10 WITH THE FOLLOWING:

Refer to the requirements of Division 0 and Division 1 of these contract documents.

2-11 INSPECTION.
REPLACE SUBSECTION 2-11 WITH THE FOLLOWING:

Refer to the requirements of Division 0 and Division 1 of these contract documents.

SECTION 3 – CHANGES IN WORK

Section 3 of the Special Provisions shall conform to Section 9 of the Greenbook except as modified herein.

REVISE SECTION 3 TO READ:

3-1 GENERAL

Refer to the requirements of Division 0 and Division 1 of these contract documents.
SECTION 4 – CONTROL OF MATERIALS

Section 4 of the Special Provisions shall conform to Section 4 of the Greenbook except as modified herein.

4-1 MATERIALS AND WORKMANSHIP.

4-1.1 General.

REPLACE THE SECOND SENTENCE OF THE SECOND PARAGRAPH WITH THE FOLLOWING:

Materials and workmanship not conforming to the requirements of the bid construction documents shall be considered defective and will be subject to rejection.

ADD NEW SUBSECTION 4-1.1.1 TO READ:

4-1.1.1 Material Furnished by the Agency. Certain material to be installed by the Contractor may be furnished by the Agency at no cost to the Contractor. Any material to be furnished by the Agency will be listed in the plans and/or specifications. All other material to complete the contract shall be furnished by the Contractor. The Contractor shall be responsible for all materials furnished until the work the City accepts the Contract work. The Contractor shall replace any City-furnished materials lost or damaged from any cause whatsoever at the Contractor’s expense. The Contractor shall be liable to the City for the cost of replacing City-furnished material, and such cost may be deducted from any monies due or to become due the Contractor.

The City will furnish manhole frames and covers; lamphole frames and covers; and cleanout frames and covers (except for house connection or two-way cleanouts).

The Contractor shall make arrangements with the Engineer at least seven calendar days in advance of picking up Agency-furnished material.

Payment for all labor, equipment, tools, and incidentals, for picking up, transporting, and installing Agency-furnished material shall be included in the price bid for related items of work.

ADD NEW SUBSECTION 4-1.1.2 TO READ:

4-1.1.2 Required Recycled-Content Material Report. It is the City of Oakland policy that contractors and suppliers use recycled-content materials to the greatest extent feasible (unless specified otherwise). At the end of all projects $50,000 and greater, the Contractor shall submit a Recycled Materials Report. In this report the Contractor shall detail those products made with recycled materials that were used on the project by type of material, quantity, and cost.

ADD NEW SUBSECTION 4-1.1.3 TO READ:

4-1.1.3 Required Construction and Demolition Waste Reduction and Recycling. This contract is subject to Oakland’s Construction and Demolition Debris Waste Reduction and Recycling Ordinance (C&D Ordinance), OMC 15.34. The ordinance requires salvage or recycling of 100% of asphalt and concrete products and 65% of all other construction and or demolition debris, and submittal of plans and reports that document compliance with this requirement. Additional details are available at http://www2.oaklandnet.com/Government/o/PWA/o/FE/s/GAR/OAK024770.

The Contractor shall submit a Waste Reduction and Recycling Plan (WRRP) prior to the start of construction or issuance of applicable building permits. This plan shall state how construction and demolition debris generated by type and quantity from the project will be diverted from landfills to meet the standards noted above. The Contractor may submit the WRRP online at www.greenhalosystems.com, using an access code provided by the City, or on paper, subject to additional processing fees. The WRRP is available for download at http://www2.oaklandnet.com/oakca1/groups/pwa/documents/agenda/oak026388.pdf.

At the end of all construction, the Contractor shall submit a completed Construction & Demolition Summary Report (CDSR) in the same format selected for the WRRP, online or paper. The CDSR form is available online at http://www2.oaklandnet.com/oakca1/groups/pwa/documents/agenda/oak026389.pdf. The Contractor shall document in the CDSR all salvage, recycling and disposal activities associated with the project. Contractors who choose not to use www.greenhalosystems.com for submittals, will be subject to fees listed in the City’s Master Fee Schedule.
4-1.3 INSPECTION REQUIREMENTS.
ADD NEW SUBSECTION 4-1.3.4 TO READ:

4-1.3.4 Reinspection and Retesting. In the event work or materials are rejected and reinspection, retesting, or a combination thereof is necessary, or in the event portions of the work scheduled by the Contractor for inspection or testing are not ready at the time designated by the Contractor, then the Contractor shall be subject to the costs incurred by the Owner for such reinspection, retesting, or delays.

Said costs shall include, but not limited to, direct labor costs (including fringe benefits, labor overhead charges as established by current agency finance procedures), equipment, and related overhead costs.

It shall be the Contractor’s responsibility to notify the Engineer when work is ready for inspection, testing, or a combination thereof.

REPLACE SUBSECTION 4-1.5 TO READ.

4-1.5 CERTIFICATE OF COMPLIANCE. A Certificate of Compliance shall be furnished prior to the use of any materials for which these specifications or the special provisions require that a certificate be furnished. In addition, when so authorized in these specifications or in the special provisions, the Engineer may permit the use of certain materials or assemblies prior to sampling and testing if accompanied by a Certificate of Compliance. The certificate shall be signed by the manufacturer of the material or the manufacturer of assembled materials and shall state that the materials involved comply in all respects with the requirements of the specifications. A Certificate of Compliance shall be furnished with each lot of material delivered to the work and the lot so certified shall be clearly identified in the certificate.

Materials test data may be required by the Engineer to be included with the submittal of the Certificate of Compliance.

Materials used on the basis of a Certificate of Compliance may be sampled and tested at any time. The fact that material is used on the basis of a Certificate of Compliance shall not relieve the Contractor of responsibility for incorporating material in the work which conforms to the requirements of the plans and specifications, and any material not conforming to the requirements will be subject to rejection whether in place or not.

The Owner reserves the right to refuse to permit the use of material on the basis of a Certificate of Compliance.

The form of the Certificate of Compliance and its disposition shall be as directed by the Engineer.

4-1.6 TRADE NAMES OR EQUALS.
ADD THE FOLLOWING TO THE END OF SUBSECTION 4-1.6:

If the Contractor is authorized to substitute an equivalent item or material, it shall be with the understanding that there will be no increase in contract price due to the substitution. If a substitution is approved by the Engineer and is subsequently found not to be equal to the specified item or material, the Contractor shall remove and dispose of the substitute at the Contractor’s expense. The Contractor shall then furnish and install the specified item or material at no additional cost to the owner.

SECTION 5 - UTILITIES

Section 5 of the Special Provisions shall conform to Section 5 of the Greenbook except as modified herein.

5-1 LOCATION.
REPLACE THE THIRD PARAGRAPH OF SUBSECTION 5-1 WITH THE FOLLOWING PARAGRAPHS:

As provided in Section 4216 of the California Government Code, at least two working days prior to commencing any excavation, if the excavation will be conducted in an area that is known, or reasonably should be known, to contain subsurface installations, the Contractor shall contact Underground Service Alert (USA) of Northern California and obtain an inquiry identification number. Notification numbers shall be updated two working days before the twenty-eight day period expires, or as required by State law.
White Markings in Paved Areas: The Contractor shall avoid excessive or oversized marking, especially if marking outside the excavation area. Limit length, height, and interval of marks per USA guidelines. Letters and numbers shall not exceed 3” to 6” in height. On concrete surfaces the Contractor shall use spray chalk paints, water-based paints or equivalent less permanent type marking.

White Markings in Non-Paved Areas: When paint is not used, use appropriate colored stakes, lath, pennants or chalk lines. Select marker types that are most compatible to the purpose and marking surface. Adhere to paved area marking suggestions to the extent practical.

Each utility that is not a member of the Regional Notification Center (RNC) shall be notified individually. The City of Oakland Electrical Division (street lights, traffic signals, call boxes) is not a member of a RNC. The City of Oakland is not required to mark gravity-fed lines such as storm and sanitary sewers.

CHANGE THE FIFTH PARAGRAPH OF SUBSECTION 5-1 TO READ:
The Contractor shall be responsible for locating all the service laterals including, but not limited to, private building sewer, storm drainage, water, electrical, telephone and cable, prior to excavation in areas where service laterals could reasonably be expected to exist. The Contractor shall verify that private sewer laterals are in use (active) or abandoned prior to construction of sanitary sewer. The Contractor shall perform die testing where applicable to determine if laterals are in use (active) or abandoned. The Contractor shall notify the Engineer 10 days prior to performing necessary die testing. Any service laterals damaged by the Contractor shall be promptly repaired with the approval of the Engineer, at the Contractor’s expense. If no pay item is provided in the Contract for this work, full compensation for such work shall be considered as included in the prices bid for other items of work.

5-2 PROTECTION.
REPLACE THE FIRST SENTENCE OF THE SECOND PARAGRAPH WITH THE FOLLOWING:
Where protection is required to ensure support of utilities located substantially (i.e. within 3 feet) as shown on the Plans or in accordance with 5-1, the Contractor shall, unless otherwise provided, furnish and place the necessary protection at the Contractor’s expense.

ADD THE FOLLOWING TO THE END OF SUBSECTION 5-2:
The Contractor shall provide temporary and permanent supports under all existing concrete, asbestos concrete, clay, telephone, and power conduits. Cost for such supports shall be absorbed in the Contractor’s bid item for the pipeline construction.

The Contractor shall not tunnel under conduits unless approved by the Engineer. All voids within the tunnel limits shall be filled with one-sack cement/sand slurry.

5-5 DELAYS.
ADD THE FOLLOWING TO THE END OF SUBSECTION 5-5.
No payment will be made for the first two hours of each occurrence of delay related to identification and removal of an abandoned or unmarked utility.

5-6 COOPERATION.
ADD NEW SUBSECTION 5-6.1 TO READ:
5-6.1 Utility Work. The Contractor shall be advised that the relocation of overhead and underground utilities may be underway by other forces within or adjacent to the limits of Work. The Contractor shall cooperate and coordinate with all such other forces, through the Engineer, to avoid delays or hindrances to their work. The Engineer is responsible for the overall coordination of the project.

Installation of the utilities shown in the following table requires coordination with the Contractor’s activities. The Contractor shall make the necessary arrangements with the utility company through the Engineer and submit a schedule:

1. Verified by a representative of the utility company
2. Allowing at least the time shown for the utility owner to complete its work

GMK(Revision 2)
### Utility Relocation and Contractor-Arranged Time for the Relocation

<table>
<thead>
<tr>
<th>Utility</th>
<th>Utility Contact</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PG&amp;E Gas and Electrical Facilities</strong></td>
<td>Anne Marcus 510-437-2079 510-368-8626</td>
<td>“S11” STA 222+12.09, RT 9.00’ (GAS)</td>
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<tr>
<td>(City of Oakland)</td>
<td></td>
<td>“IB” STA 503+75.47, LT 33.79’ (GAS)</td>
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<td></td>
<td></td>
<td>“IB” STA 547+03.53, LT 35.02’ (GAS)</td>
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<tr>
<td><strong>PG&amp;E Gas and Electrical Facilities</strong></td>
<td>Susan Davis 510-437-2131</td>
<td></td>
</tr>
<tr>
<td>(City of San Leandro)</td>
<td></td>
<td></td>
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<tr>
<td><strong>AT&amp;T</strong></td>
<td>Nevada Cross 510-206-9054</td>
<td>“S12” STA 101+94.74, LT 22.00’</td>
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<tr>
<td><strong>EBMUD</strong></td>
<td>Robert McMullin 510-287-1296</td>
<td>“S12” STA 108+68.07, RT 27.87’</td>
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<td>“IB” STA 514+10.39, RT 36.60’</td>
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<td>“E12” STA 332+88.69, LT 45.97’</td>
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<td>“IB” STA 619+85.51, RT 57.89’</td>
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<td>“IB” STA 642+67.35, RT 53.48’</td>
</tr>
<tr>
<td><strong>City of Oakland</strong></td>
<td>Danny Lau 510-238-7211</td>
<td></td>
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<tr>
<td><strong>Level 3 Communications</strong></td>
<td>Rob Hadley 925-953-7081 925-383-6326</td>
<td></td>
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<tr>
<td><strong>Comcast</strong></td>
<td>Ben Greenwood 707-759-4070 925-765-3017</td>
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### Utility Relocation

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<thead>
<tr>
<th>Utility Owner</th>
<th>Utility Contact</th>
<th>Location</th>
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ADD NEW SUBSECTION 5-7 TO READ:

5-7 **UTILITY EXCAVATION BACKFILL.** The Contractor will not be entitled to damages, additional payment, or a time extension for impacts or delays attributable to utility excavation backfill material type or density if such utility is substantially located (i.e. within 3 feet) according to Subsection 5-1.
SECTION 6 – PROSECUTION, PROGRESS AND ACCEPTANCE OF THE WORK

Section 6 of the Special Provisions shall conform to Section 9 of the Greenbook except as modified herein.

REVISE SECTION 6 TO READ:

6-1 GENERAL
Refer to the requirements of Division 0 and Division 1 of these contract documents.

SECTION 7 – RESPONSIBILITIES OF THE CONTRACTOR

Section 7 of the Special Provisions shall conform to Section 7 of the Greenbook except as modified herein.

7-1 THE CONTRACTOR’S EQUIPMENT AND FACILITIES.
ADD THE FOLLOWING TO THE END OF SUBSECTION 7-1.1:
7-1.1 General. The Contractor shall render all machinery and equipment inoperable at all times except during actual construction. The Contractor shall be responsible for construction means, controls, techniques, sequences, procedures and construction safety.

ADD THE FOLLOWING SUBSECTION 7-1.4:
7-1.4 Powered Industrial Trucks, Forklifts, Heavy Equipment and Other Vehicles. Contractor employees who drive or operate any such equipment or vehicles on City of Oakland property or project sites, shall first provide proof of a current driver’s license and the Contractor shall verify training in accordance with any applicable Cal/OSHA standards, Department of Transportation, and Department of Motor Vehicles codes and standards. The Contractor shall be responsible for providing and keeping current all required licenses, certifications and insurance for such equipment and vehicles. The Contractor further agrees to ensure that all such equipment and vehicles are equipped with required lights, brakes, operating controls, backup alarms and other safety equipment and that all such devices are properly inspected, serviced, maintained in good working order and free of damage and defects. The Contractor agrees to immediately remove from service any equipment or vehicle with identified damage or defects that affect the safe operation of the equipment or vehicle.

The Contractor shall render all machinery and equipment inoperable at all times except during actual construction. The Contractor shall be responsible for construction means, controls, techniques, sequences, procedures and construction safety.

REPLACE SUBSECTION 7-2 WITH THE FOLLOWING:
7-2 LABOR.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

REPLACE SUBSECTION 7-3 LIABILITY INSURANCE WITH THE FOLLOWING:
7-3 INSURANCE REQUIREMENTS.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

REPLACE SUBSECTION 7-4 WITH THE FOLLOWING:
7-4 WORKERS' COMPENSATION INSURANCE.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

REPLACE SUBSECTION 7-5 WITH THE FOLLOWING:
7-5 PERMITS.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

REPLACE SUBSECTION 7-5 WITH THE FOLLOWING
7-6 THE CONTRACTOR’S REPRESENTATIVE.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

7-7 COOPERATION AND COLLATERAL WORK.
ADD THE FOLLOWING TWO PARAGRAPHS TO THE END OF SUBSECTION 7-7:
The Contractor shall notify the City of Oakland Sewer Maintenance Section at (510) 615-5566 when a building sewer / lateral is connected so that a sewer maintenance representative can inspect it.

The Agency and each utility company reserves the right to enter upon any street or easement for the purpose of making changes, new installations, repairs, or performing maintenance work.

7-8 WORK SITE MAINTENANCE.

7-8.1 General.
ADD THE FOLLOWING TO THE END OF SUBSECTION 7-8.1:
The Contractor's failure to comply with the Engineer's cleanup orders may result in the Owner having the cleanup work done by others. The Contractor shall bear all costs incurred by the Owner in having the work done.

The Contractor shall take all necessary measures to ensure that materials from the job site identified in the project Waste Reduction and Recycling Plan (WRRP) are recycled.

The Contractor shall sweep the streets within the affected project area with a power pickup sweeper at least once a day, or as directed by the Engineer. Additional sweeping may be required based on the Contractor's activities and the levels of dust and dirt generated. A Wet/Dry vacuum shall be used to vacuum all saw-cut slurry.

The Contractor shall be responsible for trash and debris removal within all construction areas along the corridor. This trash and debris removal is in addition to the water quality requirements identified elsewhere in these special provisions.

The Contractor shall accommodate the City of Oakland personnel and passage of standard street sweeping equipment to efficiently pass each construction area. Trash and debris that cannot effectively be collected by the City’s street sweeping equipment within and adjacent to the Contractor's work areas shall become the responsibility of the Contractor. The Contractor shall remove trash and debris in these areas consistent with the City's street sweeping schedule (typically nightly Monday through Friday).

The Contractor shall also sweep sidewalks within the affected project area at least once a day, or as directed by the Engineer. Additional sweeping may be required based on the Contractor's activities and the levels of dust and dirt generated. Periodic cleaning and/or power washing of windows store fronts, buildings, awnings, etc., will be required if the Contractor's activities soil these surfaces.

The location of contractor’s temporary facilities is subject to the approval of the Engineer and City of Oakland Engineer. Portable toilets shall be located to minimize adverse impacts to businesses and to residents. Contractor must provide proper security and maintenance of portable toilets

The Contractor shall maintain a graffiti-free work site. Contractor shall remove all graffiti on all equipment and improvements within 24 hours of occurrence. Refer to Special Provision 7-8.7 for additional details.

7-8.2 Air Pollution Control.
ADD THE FOLLOWING TO THE END OF SUBSECTION 7-8.2:
The use of water resulting in mud on public or private paved surfaces will not be permitted as a substitute for sweeping or other methods. The Contractor shall sweep the streets within the project area with a power pickup sweeper at least once daily, or as directed by the Engineer, for the duration of the project. A Wet/Dry vacuum shall be used to vacuum sawcut slurry.

7-8.4.1 General.
ADD THE FOLLOWING TO THE END OF THE SECOND PARAGRAPH:
Excess excavated material from trenches, structures, general excavation and manholes and similar structures shall be removed from the site immediately.

ADD THE FOLLOWING TO THE END OF SUBSECTION 7-8.4.1:
The Contractor shall take all necessary measures to ensure that materials from the job site identified in the project Job Site Recycling and Waste Reduction Plan are recycled.

7-8.4.2 Storage in Public Streets.
REPLACE SUBSECTION 7-8.4.2 WITH THE FOLLOWING:

Contractor shall not store any construction materials or equipment in the City of Oakland public right-of-way without written permission from the Engineer. If permission is not granted, no equipment or materials may be stored in the public right-of-way for more than 48 hours. Contractor shall store materials and park equipment in locations that do not interfere with the ingress/egress access to businesses or residents, inclusive of proper sight distances at driveways. In addition, storage of materials in the Oakland public right-of-way shall not block the visibility of businesses and signage.

REPLACE SUBSECTION 7-8.6 WITH THE FOLLOWING:

7-8.6 Water Pollution Control.

7-8.6.1 General. The intent of these requirements is to enforce federal, state, and other local agency regulation prohibiting storm water pollution from construction sites. The storm drain system discharges directly to creeks and the San Francisco Bay without treatment. Therefore, pollutant discharge into the storm drain system is strictly prohibited. Here pollutant discharge means any substance, material, or waste, and discharges NOT permitted under the National Pollutant Discharge Elimination System regulated by the State of California Regional Water Quality Control Board or the United States Environmental Protection Agency other than uncontaminated stormwater.

The Contractor shall conform to all applicable local, state and Federal regulations and laws pertaining to water pollution control including the City of Oakland’s Creek Protection, Stormwater Management and Discharge Control Ordinance. As applicable, the Contractor shall obtain Water Pollution Control Permits and file all documents including, but not limited to, the State of California Construction General Permit, Stormwater Pollution Prevention Plan, and the City of Oakland Creek Protection Permit. The Contractor shall conduct and schedule operations and follow and implement Best Management Practices (BMPs) in such a manner as to prevent water pollution. The Contractor shall also conform to the following requirements:

1) Sediments shall not be discharged to a storm drain system or receiving waters. In this subsection, the term “storm drain system” shall include storm water conduits, storm drain inlets and other storm drain structures, street gutters and paved surfaces. In this subsection “receiving waters” shall include channels, watercourses, creeks, lakes, the Oakland Estuary, and the San Francisco Bay.

2) Sediments generated on the Work site shall be contained on the Work site using appropriate BMPs.

3) No construction-related materials, waste, spill or residue shall be discharged from the Work site to streets, drainage facilities, receiving waters or adjacent property by wind or runoff.

4) Non-storm water runoff from equipment, vehicle washing or any other activity shall be contained within the Work site using appropriate BMPs.

5) Erosion shall be prevented. Erosion-susceptible slopes shall be covered, planted or otherwise protected in a way that prevents discharge from the Work site.

In this subsection, the term “storm drain system” shall include water conduits, storm drain inlets and other storm drain structures, street gutters and paved surfaces, channels, watercourses, creek, lakes, the estuary, and the San Francisco Bay.

7-8.6.2 Best Management Practices (BMPs). For the purpose of eliminating stormwater pollution, the Contractor shall implement effective control measures known as Best Management Practices (BMPs). BMPs include schedules of activities, prohibition of practices, general good housekeeping practices, operational practices, pollution prevention practices, maintenance procedures, and other management procedures to prevent pollutant discharge directly or indirectly into the storm drain system. BMPs also include the construction of some facilities that may be required to prevent, control, and abate stormwater pollution.
The Contractor shall implement and maintain such BMPs as are relevant to the work, and as are specifically required by the Plans or Special Provisions. The Contractor shall be responsible throughout the Contract duration for installing, constructing, inspecting, maintaining, removing and disposing of BMPs for wind erosion control, tracking control, erosion and sediment control, non-storm water control, and waste management and materials pollution control. Unless otherwise directed by the Engineer, the Contractor shall be responsible for BMP implementation and maintenance throughout any temporary suspension of the Work. Guidance for appropriate implementation of BMPs can be found in the Reference Publications listed in 7-8.6.5.

7-8.6.3 Storm Water Pollution Prevention Plan (SWPPP). The Contractor shall prepare and submit, per 2-5.3, a Storm Water Pollution Prevention Plan. The SWPPP shall conform to the requirements specified in the Special Provisions and those of the jurisdictional regulatory agency. The Notice of Intent will be filed by the Owner. The SWPPP binder and all amendments shall be present on-site during all construction activities. The Contractor shall be required to conduct all monitoring and reporting, as necessary, to conform to the Construction General Permit requirements.

7-8.6.4 Dewatering. Dewatering shall be performed by the Contractor when specifically required by the Plans or Specifications, and as necessary for construction of the Work. Dewatering shall be performed in conformance with all applicable local, state and Federal laws and permits issued by jurisdictional regulatory agencies. Permits necessary for treatment and disposal of accumulated water shall be obtained by the Contractor or the Agency as specified in the Special Provisions. Accumulated water shall be treated prior to disposal if so specified in the Special Provisions or required by a permit. The contractor shall submit a working drawing and related supporting information per 2-5.3 detailing its proposed plan and methodology and treatment and disposal of accumulated water. To the maximum extent practical, the Contractor shall reuse non-toxic, de-silted water for other onsite needs, such as dust control and irrigation.

The plan shall identify the location, type and size of dewatering devices and related equipment, the size and type of materials composing the collection system, the size and type of equipment to be used to retain and, if required, treat accumulated water, and the proposed disposal locations. If the proposed disposal location is a sanitary sewer, the Contractor shall submit to the Engineer written evidence of permission from the owner. If the proposed disposal location is a storm drain system or receiving body of water, the Contractor shall submit written evidence of permission from the owner of the storm drain system and, if not obtained by the Agency, original signed permits from jurisdictional regulatory agencies or written evidence that such permits are not required.

7-8.6.5 Reference Publications.
Reference publications are as follows:

5. Erosion and Sediment Control Field Manual, San Francisco Regional Water Quality Control Board (SFRWQCB) Available from Friends of the San Francisco Estuary, 1515 Clay Street, Suite 1400, Oakland, CA 94612 (510) 622-2419 or (510) 622-2337 or www.abag.ca.gov/bayarea/sfep/about/friends/html.
7. **Caltrans Stormwater Quality Handbooks.** Available at: the following website: [www.dot.ca.gov/hq/construc/stormwater/CSBMPM_303_Final.pdf](http://www.dot.ca.gov/hq/construc/stormwater/CSBMPM_303_Final.pdf)

7-8.6.6 Material Storage. Storage and exposure of raw materials, by-products, finished products, and containers shall be controlled as described below:

All construction materials shall be stored at least ten feet away from inlets, catch basins, and curb returns. The Contractor shall not allow any material to enter the storm drain system. Measures shall be taken to maintain a neat and protected pile. At the end of each working day, the Contractor shall collect and dispose of all scrap, debris, and waste material excluding materials set aside for recycling and salvage. Materials set aside for recycling and salvage shall be delivered to the recycling station within five days.

Materials that can contaminate rainwater or be transported by storm water or other runoff to the storm drain system require special storage. During wet weather or when rain is forecast, the Contractor shall store such materials inside a building or cover them with a tarp or other waterproof material secured with weighted tires or sandbags to prevent contact with rain.

The Contractor is reminded that storage and disposal of all hazardous materials such as paints, thinners, solvents, and fuels; and all hazardous wastes such as waste oil, shall meet all federal, state and local standards and requirements.

7-8.6.7 Pavement Saw Cutting Operations. The Contractor shall prevent any saw cutting debris from entering the storm drain system. The Contractor shall preferably use dry cutting techniques and sweep up residue. If wet methods are used, the Contractor shall vacuum slurry as cutting proceeds or collect all wastewater by constructing a sandbag sediment barrier. The bermed area shall be of adequate size to collect all wastewater and solids. The Contractor shall allow collected water to evaporate, as approved by the Engineer, if the wastewater volume is minimal and if maintaining the ponding area does not interfere with public use of the street area, create a safety hazard, or does not create standing water that remains longer than 72 hours. If the Engineer approves, the Contractor may direct or pump saw cutting wastewater to a dirt area for infiltration. This dirt area shall be adequate to contain all the wastewater. After wastewater has infiltrated, all remaining saw cutting residue shall be removed and disposed of properly.

With the approval of East Bay Municipal Utility District (EBMUD) and the Engineer, de-silted water may be pumped to the sanitary sewer to assist in the evaporation or infiltration process. Remaining silt and debris from the ponding or bermed area shall be removed or vacuumed and disposed of properly. If a suitable dirt area is not available or discharge to the sanitary sewer is not feasible, with the Engineer’s approval the Contractor shall filter the saw-cutting wastewater through filtering materials and methods meeting ABAG Standards For Erosion and Sedimentation Control Measures (latest edition) before discharging this wastewater to the storm drain.

7-8.6.8 Pavement Operations. The Contractor shall prevent the discharge of pollutants from paving operations by using measures to prevent run-on and runoff pollution, properly disposing of wastes, and by implementing the following Best Management Practices:

a. No paving during wet weather.

b. Store materials as required by 7-8.6.6.

c. Cover inlets and manholes when applying asphalt, seal coat, tack coat, slurry seal, fog seal, etc.

d. Place drip pans or absorbent materials under paving equipment when not in use. During wet weather store contaminated paving equipment indoors or cover with tarp or other waterproof covering.

e. Sweep work site daily to prevent sand, gravel or excess asphalt from entering, or being transported by rain, into the storm drain system.

f. Keep ample supplies of drip pans or absorbent materials on-site.
g. If paving involves portland cement concrete, refer to 7.8.6.6.

7-8.6.9 Concrete Operations. The Contractor shall prevent pollutant discharge from concrete operations by using measures to prevent run-on and runoff pollution, by properly disposing of wastes, and by implementing the following BMPs:

a. Store all materials in waterproof containers or under cover away from drain inlets or drainage areas.

b. Avoid mixing excess amounts of portland cement materials.

c. Do not wash out concrete trucks into storm drains, open ditches, streets, streams etc. Whenever possible, perform washout of concrete trucks off site where discharge is controlled and not permitted to discharge to the storm drain system. For on-site washout:

i. Locate washout area at least 50 feet from storm drains, open ditches or other water bodies, preferably in a dirt area. Prevent runoff from this area by constructing a temporary pit or berm area large enough to store the liquid and solid waste.

ii. Wash out concrete wastes into the temporary pit where the concrete can set, be broken up and then disposed of properly. If the water volume greater than what will allow concrete to set, allow the wash water to infiltrate, evaporate, or a combination thereof if possible. Otherwise, allow wash water to settle, then filter and pump it to the sanitary sewer with approval from EBMUD and the Engineer. Remove or vacuum the remaining silt and debris from the ponding or berm area and dispose of it properly.

d. Dispose of wastewater from exposed aggregate washing to a dirt area adequate to contain all the wastewater. Once the wastewater has infiltrated, remove any remaining residue. If a suitable dirt area is not available, filter the wash water through straw bales or other filtering materials meeting ABAG Standards For Erosion And Sediment Control Measures before discharging the wash water to the sanitary sewer with approval from EBMUD and the Engineer.

e. Collect and return sweepings from exposed aggregate concrete to a stockpile or dispose of the waste in a trash container.

7-8.6.10 Grading and Excavation Operations. The Contractor shall implement sedimentation and erosion control measures to prevent sediments or excavated material from entering the storm drain system.

The erosion and sedimentation control materials and methods shall be in accordance with ABAG Standards For Erosion and Sediment Control Measures, the procedures and methods described in the SFRWQCB Erosion and Sediment Control Field Manual, or a combination thereof.

At a minimum, the Contractor shall install filter materials (such as sandbags, filter fabric, etc.) at storm drain inlet(s) located in and downstream of the project site. These materials shall be in place between October 15 and April 15 and also when rain is forecast within 24 hours. The Contractor shall install filter materials or seal all surface inlet openings during the dry season or if there is potential for sediment or excavated material to be discharged to the storm drain system during the construction operation (e.g. sediments and debris tracked by construction vehicles, windblown or transported by other runoff). The storm drain inlets shall be sealed such that they can be opened in an emergency and unblocked at the end of each working day, so that no property is damaged as a result of accidents or overflows.

Sedimentation and erosion control/filter materials shall be placed in a manner to restrain any debris or sediment from flowing into the storm drain system. Said materials or control devices shall also be maintained, replaced, or a combination thereof as necessary to ensure effective sediment control and to prevent flooding.

7-8.6.11 Spill Prevention and Control. The Contractor shall take all precautions to prevent accidental spills during construction. However, in the event of a spill, the Contractor shall immediately contain any
leaks/spills to prevent them from entering the storm drain system. The Contractor shall properly clean up and dispose of spilled wastes and resulting clean-up materials. If the spilled waste is hazardous, the Contractor shall comply with all federal, state and local hazardous waste requirements.

a. The Contractor shall not wash any spilled material into the streets, gutters, storm drains, or creeks.

b. The Contractor shall report any hazardous materials spill immediately to the Oakland Fire Department, the Alameda County Hazardous Materials Division and other state and local agencies as required by state and local regulations.

7-8.6.12 Vehicle/Equipment Cleaning. The use of soaps, solvents, de-greasers, steam cleaning equipment or equivalent methods for vehicle or equipment cleaning on-site or in the street is not permitted. Vehicle or equipment may be cleaned only with water in a designated, bermed area of adequate size. Rinse water may not runoff site or into the storm drain system. The rinse-water shall be permitted to infiltrate in dirt area or shall be discharges to the sanitary sewer with the approval of EBMUD and the Engineer.

The Contractor shall dispose of wash water from the cleaning of water-base paint equipment and tools to the sanitary sewer.

When using oil-based paint the Contractor shall, to the maximum extent practicable, filter the paint thinner and solvents for reuse. Any waste thinner, solvent, and sludge from the cleaning of equipment and tools shall be disposed as hazardous waste.

7-8.6.13 Contractor Training And Awareness. The Contractor shall train all employees on the water pollution prevention requirements contained in these specifications. The Contractor shall inform all subcontractors of the water pollution prevention contract requirements and include appropriate subcontract provisions to ensure that these requirements are met.

7-8.6.14 Storm Drain Markers. The Contractor shall mark all new catch basins constructed as part of the project with stainless steel Storm Drain Markers with the logo "No Dumping: Drains to the Bay". Storm Drain Markers are available from the Engineer.

7-8.6.15 Good Housekeeping Practices. The Contractor shall implement the following applicable good housekeeping practices.

a. Store all materials that have the potential to be transported to the storm drain system by storm runoff or by a spill under cover in a contained area or in sealed waterproof containers.

b. Use ground tarps to collect fallen debris or splatters that could contribute to storm water pollution.

c. Secure opened bags of cement, and other light materials or powders that can be transported by wind.

d. Pick up litter, construction debris and other wastes daily from outside areas including the sidewalk area, gutter, street pavement and storm drains impacted by the project. Store all wastes in covered containers or dispose of immediately. Arrange for appropriate collection of those materials separated for recycling.

e. Dispose of wash water to the sanitary sewer with the approval of EBMUD and the Engineer or recycle wash water. Refer to 7-8.6.9.

f. Inspect vehicles and equipment arriving on-site for leaking fluids and promptly repair leaking vehicles and equipment. Use drip pans to catch leaks until repairs are made.

g. Avoid spills by handling materials carefully. Keep a stockpile of spill materials, such as rags or absorbents, readily accessible on-site. Clean up all spills immediately to prevent any material from being discharged to the storm drain system. Refer to 7-8.6.11.

h. Train employees regularly on good housekeeping practices and BMPs. Assign specific employees responsibility for BMPs, good housekeeping practices, and actions to take in the
event of a spill. Refer to 7-8.6.13.

i. Maintain and replace all sediment and water pollution control devices as necessary to ensure that said controls are working effectively (e.g. inspect all sediment ponds or sandbag sedimentation/filtering systems after each rain. Remove accumulated sediment and debris and replace or repair damaged sandbags immediately.)

7-8.6.16 Payment. The payment for implementation and maintenance of BMPs, implementing SWPPP measures and other work of this section shall be deemed included in the price paid for the lump sum Water Pollution Control, and no additional payment shall be made therefor. Payment for dewatering shall be considered as in the items of work that require its use.

The contract price paid for the each Storm Drain Marker shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and doing all work involved in marking the catch basins as shown on the plans, as specified in the Standard Specification and these special provisions, and as directed by the Engineer.

The contract price paid for the lump sum Prepare Storm Water Pollution Prevention Plan shall include full compensation of preparing, updating, and submitting a Storm Water Pollution Prevention Plan as specified in these special provisions and as directed by the engineer.

7-8.6.17 Enforcement. Various sections of the Oakland Municipal Code enforce subsection 7-8.6. City enforcement may include, but is not limited to: citations, abatement orders, bills for City cleanup costs and administration, civil suits, and criminal charges. City enforcement actions do not void or suspend any enforcement actions by other agencies. At a minimum, the Contractor shall implement the storm water Clean Water Program BMPs listed in 7-8.6.2 General, or implement equally effective alternatives approved by the Engineer on all projects within the City of Oakland.

ADD NEW SUBSECTION 7-8.7 TO READ:
7-8.7 Removal of Graffiti. The contractor shall maintain a worksite free of graffiti. All new improvement under the subject contract and all on-site equipment and materials including but not limited to trailer, barricade, k-rails, excavator, loader, truck, storage bin, signage, etc. free of graffiti. Contractor shall remove all graffiti on such equipment and improvements within 24 hours of occurrence. Unless otherwise specified in the Bid Schedule, the costs for all labor, tools and equipment, and for implementation of all work involved in the removal of graffiti shall be considered as included in the payment made for other items of work, and no separate payment shall be made therefor. Should the Contractor fail to keep the new improvement under the subject contract and equipment and materials free of graffiti, the Engineer may suspend the Work per 6-3 until the graffiti is removed or abated.

In addition, the contractor shall maintain all existing improvement in the public right-of-way in the vicinity of the job site free of graffiti. If directed by the Engineer in writing, the Contractor shall remove all graffiti within 24 hours of occurrence. The costs associated with the implementation of all work involved in the removal of graffiti shall be considered as extra work subject to the Engineer's written approval. Should the Contractor fail to keep the existing improvement in the public right-of-way free of graffiti, the Engineer may suspend the Work per 6-3 until the graffiti is removed or abated.

ADD NEW SUBSECTION 7-8.8 TO READ:
7-8.8 Contractor's Identification. At all times the Contractor shall, at its expense, provide for the proper identification of its work to the public. This identification shall include the Contractor's name and telephone number and shall be printed on barricades used on the job.

CHANGE SUBSECTION 7-9 TO READ:
7-9 PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS. The Contractor shall be responsible for the protection of public and private property adjacent to and along the line of work. The Contractor shall exercise due caution to avoid damage to such property. Before submitting a bid the Contractor shall verify and document the condition of existing improvements that may be damaged or removed by construction operations.

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The Contractor shall repair or replace all existing improvements within the right-of-way (e.g. curbs, sidewalks, driveways, fences, walls, signs, utility installations, pavements, structures, pavement markings and traffic striping, etc.) that are damaged or removed as a result of its operations. Repairs and replacements shall be at least equal to existing improvements, and shall match them in finish and dimension. The Engineer may require replacements to be installed at locations other than the location where the existing improvements were removed.

The Contractor shall immediately notify the Engineer and the City of Oakland Electrical Division at (510) 615-5430 of any damage to any traffic signal, street light equipment or City electrical facilities. City Electrical Division forces shall temporarily repair damage to traffic signal equipment or facilities caused by the Contractor's operations. The Contractor shall coordinate with the Electrical Division to make permanent repairs to traffic signal or street lighting facilities within five (5) days of damage. All repair work will be inspected and shall conform to Electrical Division requirements and details of the Standard Plans. If the Contractor does not proceed with or complete repairs within the allotted time, the Engineer may order the work completed by City forces or by another licensed electrical contractor. Should this occur, the Contractor will be billed for any necessary repair work by others, including administrative costs. Repair costs may be deducted from Contractor's progress payment if not paid within thirty days of billing date.

Should the Contractor damage any public or private property, the Contractor shall make repairs and restore the improvements as directed by the Engineer. Any damage impacting safety shall be repaired or restored immediately. Any dispute on the Contractor’s responsibility of damage to existing public or private improvements shall be addressed promptly. The Engineer shall have the authority to direct repairs or restoration on a disputed basis if responsibility of damage remains in question. Trees, lawns, and shrubbery that are not to be removed shall be protected from damage or injury. If damaged or removed because of the Contractor’s operations, they shall be restored or replaced in as nearly the original condition and location as is reasonably possible. Lawns shall be replaced with sod, unless otherwise approved by the Engineer.

Unless shown on the plans, no trees shall be removed. Trees, limbs, and roots within the project area that interfere with the Contractor’s operations may be trimmed, with authorization from the Engineer. Only a qualified arborist or tree surgeon shall perform tree trimming. Prior to any trimming being performed, the Contractor shall submit to the Engineer, for review, the qualifications of the proposed arborist or tree surgeon. Any tree roots one inch or greater in diameter which have to be removed or are damaged during construction operations shall be saw-cut evenly and shall be treated with a heavy coat of commercially available water base asphalt emulsion sealing compound.

The Contractor shall give reasonable notice to occupants or property owners to permit them to salvage or relocate plants, trees, bubblers and other improvements within the right-of-way that will be destroyed because of the construction work.

The Contractor shall absorb in the bid all costs for protecting, removing, and restoring existing improvements and other work of this subsection.

7-10 PUBLIC CONVENIENCE AND SAFETY.
ADD THE FOLLOWING TO SECTION 7-10:

Unless a separate lump sum bid item is included for traffic control, the Contractor shall absorb in the bid all costs incurred from the requirements of 7-10.

The Contractor shall provide for through vehicle and pedestrian traffic and ingress and egress from all private and public property adjacent to the work. All pedestrian access shall be ADA compliant. The Contractor shall give special attention to provide continuous and uninterrupted traffic to and from all businesses on and adjacent to the work.

Whenever the Contractor’s operations inhibit the visibility and/or access to businesses, the Contractor shall provide detours. Wording and size of such signage shall be of a reasonable size and nature to convey the message, and as directed by the Engineer. Contractor is responsible to move and add signage as construction operation dictate.
No Parking signage and construction barricade signage shall have the Contractor's name and 24-hour telephone neatly and legibly displayed. The Contractor shall be responsible for providing, attaching, and maintaining these signs on moveable barricades.

Contractor acknowledges that maintaining parking for the public is an extremely critical aspect of this project. In addition to the requirements of Special Provision 7-10.3, whenever the Contractor has properly noticed an area for prohibited parking and the Contractor no longer needs the parking restricted for half a day or more, the Contractor shall promptly release this parking to the public. In this type of situation, Contractor shall immediately remove the prohibited parking signage on the barricades, or add laminated signs to the barricades that clearly re-state the modified parking and no parking restrictions. The intent of this requirement is to have the Contractor promptly allow public parking whenever safety and construction operations allow.

Public convenience also requires that the Contractor minimize the impacts of equipment mobilization, material delivery, construction staging.

Payment: Full compensation for all work and costs related to the requirements of Special Provision 7-10 are included in the Contractor’s price under all other various items and no separate payment or compensation shall be made.

CHANGE SUBSECTION 7-10.1 TO READ:

7-10.1 Traffic and Access.
7-10.1.1 General. The Contractor's operations shall cause no unnecessary inconvenience. The public's access rights shall be considered at all times. Unless otherwise authorized, traffic shall be permitted to pass through the work, or an approved detour shall be provided. Construction and repair work within the public right-of-way that affects pedestrian and bicycle circulation elements, spaces or facilities, shall comply with the following provisions.

Construction sites in or encroaching on the public right-of-way shall be protected with barriers in such a manner to warn and protect pedestrians, bicycles, or vehicles of potential hazards.

Safe and adequate pedestrian walkways shall be maintained at all times as required in the most recent edition of the Work Area Traffic Control Handbook (WATCH book), Part 11. Where a temporary alternative circulation path is provided, it shall comply with Title 24 access requirements for slope and width dimensions. Safe and adequate pedestrian zones and public transportation stops, as well as pedestrian crossings of the work at intervals not exceeding 300 feet shall be maintained unless otherwise directed by the Engineer.

If a particular side of a street has curb ramp access on one or both corners of a block face, wheelchair access to that block shall be maintained at all times unless directed otherwise by the Engineer.

When construction will block a coach stop or require relocation of a bus route, the Contractor shall notify the Engineer and the appropriate Transportation Representative of the affected public transit agency at least 72 hours prior to the blockage or relocation.

Vehicular access to driveways shall be maintained to the property line, except when necessary construction precludes such access for reasonable periods of time. If the backfill has been completed to such extent that safe access may be provided, and the street is opened to local traffic, the Contractor shall immediately clear the street and driveways and provide and maintain access.

The Contractor shall cooperate with the various parties involved in mail delivery and garbage collection/removal in order to maintain existing schedules for these services.

Grading operations, roadway excavation and fill construction shall be conducted by the Contractor in a manner to provide a reasonably satisfactory surface for traffic. When rough grading is completed, the roadbed surface shall be brought to a smooth, even condition satisfactory for traffic.

Unless otherwise authorized, work shall be performed in only one half of the roadway at one time. One half shall be kept open and unobstructed until the opposite side is ready for use. If one half a street only is being improved, the other half shall be conditioned and maintained as a detour.
All trench excavations performed in streets open to public traffic shall be completely backfilled and paved with temporary or permanent paving at the end of each day’s operation, unless otherwise approved by the Engineer. Temporary paving shall be maintained in a safe condition at all times.

Nothing specified herein shall prohibit emergency work, repair, or a combination thereof necessary to insure public health and safety.

7-10.1.2 Restricted Hours of Operation and Streets. The Contractor shall restrict hours of operation according to local traffic patterns as specified by the Engineer “working hours” as described in Division 1. This provision does not preclude or supersede any other code or requirement established or in acted by the City of Oakland or other public agencies that apply and may restrict the hours of operation.

No work shall be undertaken on any street listed in Attachment 2 "HOLIDAY RESTRICTED STREETS" from October 31st to January 2 unless otherwise directed in writing by the Engineer.

A street designated by the Oakland City Council as a “LIMITED OPERATIONS AREA” (see Attachment 3) shall have the following additional restrictions, unless specifically waived by the Special Provisions:

I. No work that will interfere with traffic shall be performed in any public street or roadway during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. (except Sundays and Holidays).

II. No equipment, construction materials or excavated material that will interfere with traffic shall be stored on any public street or roadway during the hours noted above.

III. All trenches and excavations in any public street or roadway shall be backfilled and opened to traffic, or covered during actual construction operations, or where otherwise permitted in writing by the Engineer.

IV. Each work section of work shall be completed or temporarily paved and open to traffic in not more than five days after commencing work unless otherwise permitted in writing by the City Engineer.

In the event the Contractor cannot maintain the minimum number of unobstructed traffic lanes required or the project impacts traffic beyond the limits of these Provisions, the Contractor shall submit for approval five sets of plans for each proposed detour to the Engineer at least seven calendar days prior to its implementation. This language does not relieve the Contractor of responsibility to maintain traffic as set forth in these specifications, the Provisions, as directed by the Engineer, or a combination thereof.

7-10.1.3 Existing Traffic Signals, Street Signs, Regulatory Signs. The Contractor shall properly maintain all existing signs within the work limits and shall not temporarily remove any signs without the Engineer’s prior approval. Any signs removed by the Contractor shall be properly stored and reinstalled as directed by the Engineer prior to the completion of contract work.

All pavement markings removed or damaged by work shall be replaced before allowing any traffic back on the pavement area. If the markings cannot be immediately replaced, temporary markings may be used as directed by the Engineer.

The Contractor shall not proceed with any work requiring traffic signal modifications or shutdown without the Engineer’s written approval at least seven calendar days prior to the desired shutdown date.

ADD NEW SUBSECTION TO READ:

7-10.1.4 Vehicular Traffic. The Contractor shall conduct operations in such a manner as to provide public convenience and safety and according to the provisions in this subsection. The provisions shall not be modified or altered without written approval from the Engineer.

Standard traffic control devices shall be placed at the construction zone according to the latest edition of the Work Area Traffic Control Handbook or Caltrans Traffic Manual, Chapter 5 – “Traffic Controls for Construction and Maintenance Work Zone,” or as directed by the Engineer.
All trenches and excavations in any public street or roadway shall be back filled and opened to traffic, or covered with suitable steel plates securely placed and opened to traffic at all times except during actual construction operations unless otherwise permitted by the Engineer.

Each section of work shall be completed or temporarily paved and open to traffic in not more than 5 days after commencing work unless otherwise permitted in writing by the Engineer.

Where construction encroaches into the sidewalk area, a minimum of 5 ½ feet of unobstructed sidewalk shall be maintained at all times for pedestrian use. Pedestrian barricades, shelter, and detour signs per State Standard Plans and Specifications may be required.

The contractor shall conduct its operation in such a manner as to leave the following traffic lanes unobstructed and in a condition satisfactory for vehicular travel during the Obstruction Period. At all times traffic lanes will be restricted and reopened to travel. Emergency vehicle and personnel access shall be provided through all work areas at all times. The Oakland Fire Department, Fire Station 4 and Fire Station 20 is in close proximity of project site.

CHANGE SUBSECTION 7-10.2 TO READ:
7-10.2 Storage of Equipment and Materials in Public Streets. Construction materials may not be stored in streets, roads, or highways for more than five days after unloading. All materials or equipment not installed or used in the construction within five days after unloading shall be stored elsewhere by the Contractor at its expense unless the Engineer authorizes additional storage time.

Construction equipment shall not be stored at the work site before its actual use, nor for more than five days after it is no longer needed on the work. The Engineer may authorize additional storage time when necessary for repair or assembly of equipment.

Excavated material, except that to be used as backfill in the adjacent trench, shall not be stored in private properties, public streets, roads, or highways for any period of time and shall be removed and disposed of immediately from the site. Only Engineer-approved excavated backfill material shall be allowed to be stored. Such material storage at the work site or elsewhere shall only be allowed for a period not exceeding five calendar days after excavation. The storage site shall be subject to the Engineer’s approval. After the backfill is placed, all excess material shall be removed from the site and disposed of immediately.

The Contractor shall maintain the flow of any surface runoff waters obstructed by the storage and materials stored in public streets in accordance with the above provisions and 7-8.6.

REPLACE SUBSECTION 7-10.2.2 TO READ:
7-10.2.2 Traffic Control System.
Refer to requirements in Division 1, Section 01 55 26.

CHANGE SUBSECTION 7-10.3 TO READ:
7-10.3 Street Closures, Detours, Barricades. The Contractor shall comply with all applicable State, County and City requirements for street closures.

The Contractor shall provide barriers, guards, lights, signs, temporary bridges, flag persons and watch persons in order to advise the public of detours and construction hazards. The Contractor shall also be responsible for compliance with additional public safety requirements that may arise during construction. The Contractor shall furnish and install, and upon completion of the work, promptly remove all signs and warning devices.

All material and work related to pedestrian and vehicular traffic control including, but not limited to, the location and size of signs, lighting and lighted traffic control devices shall comply with the "Work Area Traffic Control Handbook, (WATCH book) latest edition, or the California Manual on Uniform Traffic Control Devices, Part 6 – Temporary Traffic Control, latest edition, except as modified by the Engineer.

Temporary construction traffic signs (such as DETOUR, ROAD CLOSED, LOCAL ACCESS ONLY, etc.) installed by the Contractor shall be of commercial quality on metal with reflective paint. The lettering shall be commercially printed, silk-screened or professionally hand-lettered. At the Engineer’s request, the Contractor shall remove all temporary signage not meeting the above stated requirements from the site.

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During night operations construction barricades, signs, etc. shall be properly illuminated and reflective of existing light or vehicular light.

The Contractor may place signs prohibiting parking and stopping at those locations approved by the Engineer. Such signs shall be placed, moved and removed at the Engineer’s discretion. The Contractor may obtain from the Engineer the required signs for the prohibition of parking and stopping at a cost established by the current Master Fee Schedule.

No work shall be started until necessary signs and barricades are at the job site. A partial or complete street closure by the Contractor without proper detour signing complete in place shall be cause for suspending the work in accordance with 6-3.

The Contractor shall notify Police, Fire, Traffic Engineering departments of jurisdictional agencies involved, and local transit agencies, and comply with their requirements in advance of closing, or partially closing, or of reopening, any street, alley, or other public thoroughfare; and, according to the following:

- Oakland Fire Services Agency 2 hours (510) 238-3331
- Oakland Police Services Agency 48 hours (510) 238-3357
- AC Transit 72 hours (510) 891-4909

When necessary to detour traffic, the Contractor shall, at the direction of the Engineer, remove detour striping in accordance with 300-1.3.3 of these Special Provisions.

ADD NEW SUBSECTION 7-10.3.1 TO READ:

**7-10.3.1 UNIFORM SAFETY STANDARDS.** The purpose of these standards is to provide for safe work areas and to control pedestrian and vehicular traffic around construction sites after working hours. In each of the cases presented, specific site conditions dictate the amount and type of protective devices to be implemented. All work shall comply with WATCH Handbook and CA MUTCD requirements. The Contractor shall provide detour signage per the WATCH Handbook and the CA MUTCD when applicable.

All provided ramping and detour routes shall be constructed of non-slippery materials that provide a secure surface during or after wet weather.

The Contractor can construct curb ramps and ancillary work in no more than two corner areas of one intersection at a time. These corners shall be diagonal to each other across the intersection so that pedestrians can be safely routed through the intersection. Excavation work shall also be in accordance with Oakland Municipal Code Section 12.12.110(a) GENERAL REGULATIONS IN THE PERFORMANCE OF EXCAVATION WORK [OMC Section 12.12.110(a)].

The Contractor shall submit a traffic control plan for all construction in accordance to Subsection 7-10.2.2 Traffic Control System before construction begins. This plan shall show how the Contractor will keep the public out of the excavated area, and how pedestrians and vehicles will be routed around the excavated area.

The Contractor can construct curb ramps and ancillary work in no more than two corner areas of one intersection at a time. These corners shall be diagonal to each other across the intersection so that pedestrians can be safely routed through the intersection. Excavation work shall also be in accordance with Oakland Municipal Code Section 12.12.110(a) GENERAL REGULATIONS IN THE PERFORMANCE OF EXCAVATION WORK [OMC Section 12.12.110(a)].

**CASE 1:** Short-Term Shallow Excavation in Sidewalk Area. Shallow is defined as six inches or less. Short term is defined as 48 hours or less.

1. Place Type I barricades at each end of excavated site. Place Type I barricades at face of curb fronting excavated area.
2. Maintain access to private/business property by ramping at finished grade level.

**CASE 2:** Long-Term Shallow Excavation in the Sidewalk Area. Long term is defined as greater than 48 hours. Shallow is defined as six inches or less in depth.
1. Span excavated area with plywood sub-flooring (not to exceed six linear feet). Place temporary surfacing (cutback) at point of contact with existing sidewalk and plywood to eliminate tripping hazard.

2. Construct 5' wide walkway in parking lane with barricades per the Watch Book to divert pedestrians around excavated area.

3. Maintain access to private/business property with ramping at finished grade level.

CASE 3: **Short-Term Deep Excavation in the Sidewalk Area.** Short term is defined as 48 hours or less. Deep is defined as greater than six inches in depth.

1. Span excavated area with plywood sub-flooring (not to exceed six linear feet). Place temporary surfacing (cutback) at point of contact with existing sidewalk and plywood to eliminate tripping hazard.

2. Construct 5' wide walkway in parking lane with barricades per the Watch Book to divert pedestrians around excavated area.

CASE 4: **Long-Term Deep Excavation in the Sidewalk Area.** Long term is defined as greater than 48 hours. Deep is defined as greater than six inches in depth.

1. Span excavated area with plywood sub-flooring (not to exceed six linear feet). Place temporary surfacing (cutback) at point of contact with existing sidewalk and plywood to eliminate tripping hazard.

2. Construct 5' wide walkway in parking lane with barricades per the Watch Book to divert pedestrians around excavated area. (OMC Section 12.12.110(a) Article 1, Section 14 of Excavation Regulations).

CASE 5: **Shallow Excavation in Street Area.** Shallow is three inches or less depth.

1. Close affected lane(s) of vehicular traffic in accordance with WATCH Handbook. Use Type III barricades.

2. Cover excavation with steel plating in accordance with (OMC Section 12.12.110(a) Article 2, Section 13 of Excavation Regulations).

OR

3. Fill excavated area with temporary surfacing in accordance with (OMC Section 12.12.110(a) Article 3, Section 10 of Excavation Regulations).

CASE 6: **Deep Excavation in Street Area.** Deep is defined as greater than three inches.

1. Close affected lane(s) or vehicular traffic in accordance with WATCH Handbook. Use Type III barricades.

2. Place concrete K Rails around excavated site when excavation is greater than one foot deep, traffic flow is heavy, and excavation activity is continuous.

3. Place Type III barricades around perimeter of excavation in low traffic volume locations.

4. Install steel bridging over excavated area in accordance with OMC Section 12.12.110(a) Article 3, Section 10 of Excavation Regulations.

CASE 7: **Special Circumstances such as Excavation in Central Business District or other High Commercial or High Volume Areas.** Contractor shall give the inspector a specific proposal to make construction site safe during and after working hours. Contractor should consider using a combination of measures outlined in Cases 1 through 6.

7-10.4 Safety.
7-10.4.1 Safety Orders.
ADD THE FOLLOWING SENTENCE AT THE END OF THE FIRST PARAGRAPH:
The Contractor shall have a Competent Person, as described by CAL/OSHA regulations, present at the worksite at all times during construction.

REPLACE THE SECOND PARAGRAPH WITH THE FOLLOWING:

Before excavating any trench 5 feet or more in depth, the Contractor shall submit a detailed plan to the Engineer showing the design of shoring, bracing, sloping, or other provisions to be made for the workers’ protection from the hazard of caving ground during the excavation of such trench. The Contractor shall submit the shoring plan in advance of any excavation. If such plan varies from the shoring system standards established by the Construction Safety Orders for the Division of Industrial Safety of the State of California, the plan shall be prepared by a registered civil or structural engineer licensed to practice in California. The Contractor is responsible for site safety. Nothing in this requirement shall be deemed to allow the use of shoring, sloping, or protective system less effective than that required by the Construction Safety Orders. Nothing in this requirement shall be construed to impose tort liability on the City of Oakland or any of its employees.

ADD THE FOLLOWING NEW PARAGRAPH AFTER THE SECOND PARAGRAPH:

The Contractor shall provide positive ventilation during work in existing sewerage facilities or while making connections to existing sewerage facilities. The Contractor’s employees working in said facilities shall be provided with safety lines, harnesses, gas detectors, and other protective equipment as required by OSHA and CAL/OSHA.

7-10.4.3 Special Hazardous Substances and Processes.

ADD THE FOLLOWING TWO PARAGRAPHS TO THE END OF SUBSECTION 7-10.4.3:

Hazard Communication and Material Safety Data Sheets. The Contractor shall provide copies of current Material Safety Data Sheets (MSDS) to the Engineer for all chemical products used, handled, stored or transported to City property or project sites. The Contractor shall provide updated copies of such MSDS to the Engineer within 15 days of the Contractor’s receipt of such updated copies.

7-10.4.4 Confined Spaces.

ADD THE FOLLOWING PARAGRAPH TO THE END OF SUBSECTION 7-10.4.4:

d) Additional City of Oakland Requirements: The following are considered confined spaces for the purposes of 7-10.4: all manholes, lift stations, tanks, vaults, pipelines, some trenches and excavations, or other enclosed or partially enclosed spaces. Contractors are prohibited from entering such confined spaces for any reason and at any time, unless specifically authorized to do so in written contractual agreements. The Contractor is responsible for compliance with Cal/OSHA standards and regulations pertaining to confined space entries. The Contractor shall provide any required air monitoring equipment, safety equipment and emergency rescue devices for confined space entry. Contractors shall ensure that emergency rescue services are provided for their employees who may be involved in confined space entry and that such emergency services comply with applicable Cal/OSHA requirements.

ADD NEW SUBSECTION 7-10.4.5 TO READ:

7-10.4.5 Compliance with Laws. The Contractor will perform the Work and any other obligations under this Agreement in strict compliance with all applicable local, state and Federal laws, codes, standards and regulations.

7-10.4.5.1 Security. The Contractor shall maintain a daily log of all employees and Subcontractors present on-site. This log shall be used in an emergency to identify missing personnel. Contractor employees and Subcontractors shall be logged in and out of the site each day.

A visitor is defined as any person not covered by contractual agreements with the Owner, excluding regulatory inspectors and compliance officers. Visitors may include vendors, tour groups or guests of the Owner or the Contractor. All visitors shall have prior written authorization from the Engineer. Visitors shall be escorted by a Contractor supervisor or manager, or by the Owner’s personnel, at all times while on-site. Visitors are prohibited from entering any area of the work site that requires personal protective equipment (PPE), respirators, or specialized safety equipment, medical monitoring or safety training.

Contractors shall immediately notify the Engineer of any other party who requests entry to the jobsite. This includes requests from county, state or Federal government agencies.
7-10.4.5.2 Supervision. The Contractor will at all times be solely responsible for all means, methods, techniques, sequences and procedures of the Work, and the acts and omissions of all employees, Subcontractors and agents, and all other persons performing any of the Work.

7-10.4.5.3 Employee Training and Qualifications. The Contractor will provide only properly trained and qualified personnel to perform work under this Contractor Agreement. The Contractor will provide only employees who are trained in both general safe work practices and all applicable specific hazards of the Work.

7-10.4.5.4 Environmental, Health and Safety Requirements. The Contractor agrees that Contractor has been retained by the Owner for reasons that include, but are not limited to, the Contractor's expertise with regard to safety and health hazards associated with the work to be performed by Contractor. The Contractor agrees that it has, and will have, sole responsibility for the health, safety, and welfare of its employees, Subcontractors, and agents performing Work under this Agreement. The Contractor has the authority and responsibility to control and correct all hazards associated with the work to be performed by Contractor. If the Contractor becomes aware of a hazard that the Contractor contends was created or caused by the Owner, the Contractor shall notify the Owner immediately in the case of an imminent hazard, and no later than five working days in all other cases. If the Contractor fails to do so, the Contractor agrees to assume all responsibility to control and correct the hazard as if the Contractor were the creator or the cause of the hazard.

1. Safety Equipment. Contractors shall provide their own first aid supplies and emergency response equipment. The Contractor shall certify that at least one employee on each work shift has current training in emergency first aid and cardiopulmonary resuscitation (CPR). The Owner does not supply air monitoring or sampling equipment, respiratory protection, personal protective equipment (PPE), fall protection equipment or other safety equipment to persons who are not Owner's employees. Contractors are required to provide their own tools and equipment and maintain their own PPE, respiratory protection, breathing air supplies, breathing air distribution systems, fall protection and other safety equipment and supplies.

2. Lockout/Tagout and Control of Hazardous Energy. At the pre-construction meeting the Contractor shall provide the Engineer with copies of its lockout and tagout procedures for control of hazardous energy related to Owner's equipment and utilities involved in the Contractor's scope of work. The Contractor shall obtain permission and authorization from the Engineer before placing any lockout or tagout on owner's equipment. Contractor employees shall have their own individual locks and tags assigned to each employee for use in locking out and tagging out equipment required for their assigned work tasks, regardless of whether the owner also applies its own lockouts and tags. The Contractors shall ensure that lockout and tagout activities and control of hazardous energy comply with Cal/OSHA standards pertaining to these activities.

3. Equipment and Utilities. Contractors are prohibited from starting, stopping, or otherwise accessing or operating owner owned or leased equipment and utilities, unless specifically authorized to do so in written, contractual documents.

The owner will provide the Contractor with information, if any is in their possession, regarding the location of underground or above ground mechanical, electrical, gas, telephone, sewers, storm drains, water lines and other utilities that may be impacted by the nature of the Work; provided, however, that the owner makes no warranty regarding the sufficiency or accuracy of such information. The Contractor will promptly inform the owner in writing if the Contractor believes any information provided by the owner is inaccurate in any material respect, or if the Contractor encounters unexpected or previously unknown site conditions. The Contractor will become thoroughly familiar with the tolerances, dimensions and location of all such utilities. If necessary, the Contractor will contact representatives of utility companies and public agencies, and review plans and information, if any, provided by such representatives and agencies about the Work site.

The Contractor will be solely responsible for any damage done by Contractor to such utilities during the Work. No repair of such damage will be included in the cost of the Work unless the Contractor could not have located such utilities prior to such damage by conducting the
investigation required by this Agreement. In such event, the repair of such damage may be included in the cost of the Work by Change Order, as set forth in this Agreement.

4. **Welding and Other Hot Work.** Contractors are prohibited from welding, burning, cutting, or performing other “hot work” unless specifically authorized to do so in written contractual agreements. All hot work shall comply with Cal/OSHA standards for these work activities, including those standards pertaining to hot work permits and safe handling of compressed gases.

5. **Injury and Illness Prevention Plan.** The Contractor shall develop and implement a written Injury and Illness Prevention Plan (IIPP) and Code of Safe Practices that specifically apply to the Contractor’s scope of work and anticipated work activities. The IIPP and Code of Safe Practices shall comply with Cal/OSHA standards, as applicable. Copies of the IIPP and Code of Safe practices shall be provided at the pre-construction meeting.

**7-10.4.5.5 Prohibited Acts.** Contractor employees and Subcontractors are prohibited from bringing firearms, knives and weapons of any kind into owner’s facilities or property, unless specifically authorized to do so in written contractual documents. The Contractor shall remove any person found in unauthorized possession of such devices on owner facilities and property.

Threats and acts of violence or vandalism in the workplace are strictly prohibited. This includes, but is not limited to, threats to owner personnel or vandalism/property damage to owner/City of Oakland facilities, equipment, supplies or properties.

Contractor and Subcontractors are prohibited from scavenging or otherwise salvaging or removing any owner equipment, tools, waste materials or other property unless specifically authorized to do so in written contractual agreements.

**7-10.4.5.6 Work Site, Material Storage and Disposal.** The Contractor will perform the Work without interfering with owner or City of Oakland employees or operations in areas around the Work site. The Contractor shall secure and store all materials and supplies in a safe manner in accordance with local, state and Federal laws, standards and regulations. Contractors will on a daily basis, at their own expense, keep the Work site and areas immediately adjacent thereto in an orderly and neat condition, clean and free from accumulation of waste materials and rubbish. Upon completion or termination of the Work, the Contractor will remove all waste materials, rubbish, temporary structures, tools, equipment, and surplus materials from the Work site.

Contractors are prohibited from using or accessing owner or City of Oakland waste disposal systems unless specifically authorized to do so in written contractual documents. Contractors shall provide their own waste storage and disposal containers, store and dispose of all waste materials in a timely manner and in accordance with local, state and Federal environmental, health and safety laws, standards and regulations.

**7-10.4.5.7 Incident Reporting.** The Contractor shall immediately notify the Engineer of any occupational injury or illness, employee exposure to hazardous substances, vehicle accidents, property damage, or environmental spills or releases regardless of the severity of such incidents. The Contractor shall provide a written incident report to the Engineer within 24 hours of any such occurrence. The owner reserves the right to review Contractor incident investigations and perform their own investigation(s), for the sole purpose of verifying facts and protecting owner or City of Oakland personnel and property.

REPLACE SUBSECTION 7-11 WITH THE FOLLOWING:

**7-11 PATENT FEES OR ROYALTIES.**
The Contractor shall absorb in the Bid all patent fees or royalties on any patented article or process that may be furnished or used in the work.

The Contractor agrees to hold the Owner harmless from and to indemnify the owner against any and all costs, attorneys’ fees, and damages arising out of or connected with any claim, demand, action, lawsuit, judicial determination or judgment concerning infringement upon the rights of others, including patent rights, by the use of any article or process which may be furnished or used in the work. In the event of any such infringement claim, the Contractor shall notify the owner within ten days of such claim,
and keep the owner advised of all developments. The Contractor shall comply with all reasonable requests by the owner for information and data in defense of such suit. The Contractor shall agree to defend any and all such claims, demands, actions and suits.

In the event that any equipment or process furnished or used in the work is determined by the owner or by a Court to infringe upon the rights of a third party, the owner shall in addition have the option of:

1. Replacing the equipment with non-infringing equipment;
2. Modifying the equipment or process to the extent required to avoid such infringement;
3. Continuing to use the equipment or process;
4. Receiving as partial compensation the refund of all monies paid to the Contractor.

In the event of replacement or modification, the amounts spent on such replacement or modification shall be charged against and be recoverable from the Contractor. Final payment to the Contractor by the owner will not be made while any suit or claim remains unsettled.

The City may itself defend any such claim, demand, action or suit, and settle or take any other action it deems necessary or advisable in connection with any such claim, demand, action or suit.

REPLACE SUBSECTION 7-12 WITH THE FOLLOWING:

7-12 ADVERTISING.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

REPLACE SUBSECTION 7-13 WITH THE FOLLOWING:

7-13 LAWS TO BE OBSERVED.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

REPLACE SUBSECTION 7-14 WITH THE FOLLOWING:

7-14 ANTIRUST CLAIMS.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

SECTION 8 – FACILITIES FOR AGENCY PERSONNEL

Section 8 of the Special Provisions shall conform to Section 9 of the Greenbook except as modified herein.

REVISE SECTION 8 TO READ:

8-1 GENERAL
Refer to the requirements of Division 0 and Division 1 of these contract documents.

SECTION 9 – MEASUREMENT AND PAYMENT

Section 9 of the Special Provisions shall conform to Section 9 of the Greenbook except as modified herein.

9-1 MEASUREMENT OF QUANTITIES FOR UNIT PRICE WORK.

9-1.1 General.
DELETE THE WORD "pipe" FROM THE 2nd SENTENCE OF THE FIRST PARAGRAPH OF SUBSECTION 9-1.1.

REPLACE SUBSECTION 9-3 WITH THE FOLLOWING:

9-3 PAYMENT.
Refer to the requirements of Division 0 and Division 1 of these contract documents.

ADD THE FOLLOWING SUBSECTION:

9-4 AS-BUILT DRAWINGS. The Contractor shall provide and keep up-to-date a complete "as-built" record set of paper prints that shall be corrected daily and shall show every change from the original contract
Drawings and Specifications and the exact "as-built" locations, kinds and sizes of material and equipment. This set of prints shall be kept on the job site and shall be used only as a record set.

Final As-Built Drawings: On completion of the work, the Contractor shall provide the final, complete set of as-built drawings to the Resident Engineer.

The Engineer will inspect "as-built" Drawings at the time of the monthly payment review. If it is determined that "as-built" Drawings are not properly maintained, the Owner may withhold 5% of the contract price from the Contractor, in addition to any other withheld amounts.

9-4.1 Payment. Preparing and maintaining of the As-built drawings duties shall be considered as included in the price bid for the various bid items of work and no additional compensation shall be allowed therefore.
PART 2 - CONSTRUCTION MATERIALS

Part 2 of these Special Provisions shall conform to Part 2 of the Standard Specifications for Public Works Construction, except as modified herein.

SECTION 200 – ROCK MATERIAL

200-2 UNTREATED BASE MATERIALS.
200-2.2 Crushed Aggregate Base.
200-2.2.1 General
REVISE SUBSECTION 200-2.2.1 TO READ:
Crushed aggregate base shall comply with State Standard Specification 26-1.02A and 26-1.02B.

200-2.2.2 Grading.
REVISE SUBSECTION 200-2.2.2 TO READ:
The crushed aggregated base shall comply with grading requirements of Class 2 Aggregate Base in State Standard Specification 26-1.02B.

200-2.2.3 Quality Requirements.
REVISE SUBSECTION 200-2.2.2 TO READ:
The crushed aggregate base shall conform to quality requirements of Class 2 Aggregate Base in State Standard Specification 26-1.02B.

ADD NEW SUBSECTION 200-2.2.4 TO READ:
200-2.2.4 Payment. Full compensation for labor material, equipment and incidentals to deliver and compact the aggregate base to the limit specified in the plans and special provisions for crushed aggregate base shall be paid for other bid items of work involved, and no additional compensation will be allowed therefor.

200-2.4 Crushed Miscellaneous Base.
REVISE SUBSECTION 200-2.4.2 TO READ:
200-2.4.2 Grading. The material shall be uniformly graded and shall conform to the gradation of crushed aggregate base in 200-2.2.

200-2.4.3 Quality Requirements.
REVISE THE 1ST AND 2ND LINES OF TABLE 200-2.4.3 (A) TO READ:

<table>
<thead>
<tr>
<th>TEST</th>
<th>TEST METHOD</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-Value(^1)</td>
<td>California 301</td>
<td>78 min.</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>California 217</td>
<td>26 min.</td>
</tr>
</tbody>
</table>

200-2.5 Processed Miscellaneous Base.
200-2.5.1 General
ADD THE FOLLOWING SENTENCE TO SUBSECTION 200-2.5.1 TO READ:
Processed Miscellaneous Base shall have an aggregate grading of 3/4” maximum, coarse.

200-2.5.3 Quality Requirements.
REVISE THE 1ST AND 2ND LINES OF TABLE 200-2.5.3 (A) TO READ:

<table>
<thead>
<tr>
<th>TEST</th>
<th>TEST METHOD</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-Value(^1)</td>
<td>California 301</td>
<td>55 min.</td>
</tr>
<tr>
<td>Sand Equivalent</td>
<td>California 217</td>
<td>25 min.</td>
</tr>
</tbody>
</table>

200-2.6 Select Subbase.
200-2.6.1 General
REVISE SUBSECTION 200-2.6.1 TO READ:
Select subbase shall comply with State Standard Specification 25-1.02A and 25-1.02B.

200-2.6.2 Grading
REVISE SUBSECTION 200-2.6.2 TO READ:
The crushed aggregate base shall comply with grading requirements of Class 2 Aggregate Subbase in State Standard Specification 25-1.02B.

200-2.6.3 Quality Requirements.
REVISE SUBSECTION 200-2.6.3 TO READ:
The crushed aggregate base shall conform to quality requirements of Class 2 Aggregate Subbase in State Standard Specification 25-1.02B.

ADD NEW SUBSECTION 200-6.2.4 TO READ:
200-2.6.4 Payment. Full compensation for labor material, equipment and incidentals to deliver and compact the select subbase to the limit specified in the plans and special provisions for crushed aggregate base shall be paid for other bid items of work involved, and no additional compensation will be allowed therefor.

ADD NEW SUBSECTION 200-3 TO READ:
200-3 CONTROLLED DENSITY FILL.
Controlled density fill material shall be a fluid workable mixture of aggregate, cement, and water.

Cement shall comply with one of the following:
1. ASTM C 150
2. Blended hydraulic cement complying with either of the following:
   2.1. ASTM C 595
   2.2. Physical requirements in ASTM C 1157

The Contractor shall submit a mix design including test data before excavating the trench where controlled density fill material is to be used. When tested under ASTM D 4832, the material shall have a 28-day compressive strength from 50 pounds per square inch to 60 pounds per square inch.

Water shall be free from oil, salts, and other impurities that adversely affect the backfill.

Aggregate shall be one of the following:
1. Commercial-quality concrete sand
2. Excavated or imported material in any combination, free of organic material and other deleterious substances and complying with the grading requirements shown in the following table:

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Percentage passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>1&quot;</td>
<td>80–100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>60–100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>50–100</td>
</tr>
<tr>
<td>No. 4</td>
<td>40–80</td>
</tr>
<tr>
<td>No. 100</td>
<td>10–40</td>
</tr>
</tbody>
</table>

SECTION 201 - CONCRETE, MORTAR AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE.
201-1.1.4 Concrete Specified by Compressive Strength.
ADD THE FOLLOWING BETWEEN THE 5TH AND 6TH PARAGRAPHS OF SUBSECTION TO READ:
When directed by the Engineer in lieu of field-testing, a testing laboratory selected by the Engineer shall evaluate mix designs. Laboratory batch samples shall be made in accordance with ASTM C 192. The Contractor shall supply and deliver adequate samples of all material proposed for use at no cost to the Engineer. Mix designs shall be submitted to the Engineer at 35 days in advance of proposed use when laboratory evaluation is performed. At least six test cylinders shall be molded from laboratory trial batches. Cylinder testing shall be performed as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>one at 7 days</td>
<td>one at 14 days</td>
</tr>
<tr>
<td>two at 28 days</td>
<td></td>
</tr>
</tbody>
</table>

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The remaining two cylinders shall be tested at the Engineer’s direction.

Concrete used for sidewalks, driveways, curbs, gutters and curb ramp construction shall be 2,500 psi mix in accordance with subsection 201-1. Concrete shall contain lampblack in the amount of one pound per cubic yard.

**201-1.4 Mixing.**

**201-1.4.3 Transit Mixers.**

ADD NEW ITEM TO LIST IN 7TH PARAGRAPH OF SUBSECTION 201-1.4.3:

h) Time and date of batching and Revolution counter reading at time of batching and at time of discharge.

**201-2 STEEL REINFORCEMENT FOR CONCRETE.**

**201-2.2.3 Wire Mesh Reinforcement.**

ADD THE FOLLOWING PARAGRAPH TO SUBSECTION 201-2.2.3:

Wire mesh used as reinforcement shall only be a flat sheet. Rolled mesh shall be permitted only when authorized by the Engineer.

ADD NEW SUBSECTION 201-8 TO READ AS Follows:

**201-8 MANHOLES, CLEANOUTS AND APPURTEINANT MATERIALS.**

Material quality, the manufacture process, and the finished sections shall be subject to the Engineer's inspection and approval. Such inspection may be made at the manufacture place and on the job site after delivery. The materials shall be subject to rejection at any time for failure to meet any of the Specification requirements even though samples may have been accepted as satisfactory at the manufacture place. Materials rejected after delivery to the job site shall be marked for identification and shall be removed at once from the job site. All materials damaged after delivery and prior to project acceptance by Owner shall be rejected, even if installed. The Engineer's judgment on the materials shall be final. The Contractor may attempt to make acceptable repairs on installed material(s), if the Engineer so agrees. However, the Engineer's judgment on the repairs' acceptability will be final. Unsatisfactory material shall be removed and replaced with satisfactory material entirely at the Contractor's expense. The Engineer may accept a certification indicating compliance with the specifications in lieu of inspection.

**201-8.1. Materials.**

**201-8.1.1 Rock Base.** Rock base shall conform to the requirements of 200-1.2 and shall be the ¾” inch mix according to table 200-1.2 (A).

**201-8.1.2 Cement Mortar.** Cement mortar shall conform to the requirements of 201-5.

**201-8.2 Manholes**

**201-8.2.1 Cast-In-Place Concrete Manholes.** Materials used in cast-in-place concrete manholes shall be as shown on the plans and in accordance with the applicable requirements of 201.

**201-8.2.2 Pre-cast Manhole Sections.** Pre-cast manhole sections, where not otherwise modified in the Plans, shall conform to ASTM C478 and meet the following requirements:

a. The wall thickness shall not be less than 4 1/8 inches.

b. All sections shall be fully cured and shall not be shipped nor subjected to loading until the design compressive strength has been reached.

c. Pre-cast base sections shall have the base slab integral with the sidewalls. Pre-cast base sections may only be used if the invert plan and base alignment of the sewer connections exactly match the field-measured angles between the connecting sewers.

**201-8.2.3 Manhole Bases.** Materials used in cast-in-place concrete manhole bases shall be in accordance with the applicable requirements of Section 201. At the Contractor’s option and with the Engineer’s approval, pre-cast base sections with integral floor conforming to ASTM C478 may be used.
201-8.2.4 Plastic Pipe Connections. Plastic pipe connections to manholes shall have a rubber waterstop tightly banded to the pipe and cast into the manhole base. Banding materials shall be 316 stainless steel or other approved corrosion resistant materials secured with Type 305 stainless steel nuts and bolts.

201-8.2.5 Manhole Extensions. Concrete grade rings for extensions shall be a maximum of six inches thick. In general, manhole extensions will be used on all manholes in roads, streets or other locations where a subsequent change in existing grade may be likely. Extensions will be limited to a maximum height of 18 inches.

201-8.2.6 Jointing Manhole Sections. Male and female joints of manhole sections shall be sealed with a round rubber "O" ring gasket or a preformed flexible joint sealant. The "O" ring shall conform to ASTM C443. The preformed flexible joint sealant shall conform to Federal Specifications SS-S00210, and be Kent Seal No. 2 as manufactured by Hamilton-Kent; Ram-Nek as manufactured by K. T. Snyder Company; or equal. The size of the preformed joint sealant shall be as recommended by the manufacturer of the pre-cast manhole sections.

201-8.3 Cleanouts. Cleanouts shall be as shown on the Plans or the Standard Details and shall be the same material type as approved for use in main sewer or house connection sewer construction.

201-8.4 Lampholes. Lampholes shall be as shown on the Plans or the Standard Details and shall be the same material type as approved for use in main sewer or house connection sewer construction.

201-8.5 Appurtenant Materials. 
201-8.5.1 Pipe and Fittings. Pipefittings, including material for drop connections at the manhole, shall be the type and dimensions as shown on the Standard Details or as specified in these Special Provisions.

201-8.5.2 Pipe Stubouts For Future Sewer Connections. Pipe stubouts shall be the same type as approved for use in lateral, main, or trunk sewer construction. Strength classifications shall be same class as in adjacent trenches. Where there are two different pipe classes at a manhole, the higher strength pipe will govern strength classification. Rubber-gasketed watertight plugs shall be furnished with each stub-out and shall be adequately braced against all hydrostatic or air pressures.

ADD NEW SUBSECTION 201-9 TO READ AS FOLLOWS:
201-9 TACTILE CONCRETE PAVEMENT STRIP WITH ETCHED FINISH
201-9.1 General
201-9.1.1 Description. Tactile concrete pavement strips with etched finish aid visually impaired transit passengers in identifying the entry points to EB-BRT curbside stations and locations of curb ramps that lead to median station entries. Tactile concrete pavement strips shall be integrally colored and treated with a heavy retarder finish as detailed on the plans and approved mock ups.

201-9.1.2 Submittals. Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or Shop Drawings describing materials, finishes, color and quantities of items being supplied.

201-9.1.3 Quality Assurance. The workers assigned to this work shall be tooled and trained to perform the installation of integrally colored concrete and retarder etch finishes. The Contractor shall be certified to work with specified retarder product, or approved equal, and shall have a minimum of 10 years of experience in the installation of integrally colored concrete and retarder etch finishes and, at the preconstruction conference, shall provide a list of the locations of past projects demonstrating the quality of his work and shall provide a foreman capable of achieving work of the quality of the past projects.

201-9.1.4 Field Mock-Up. Prior to commencing this work, the Contractor shall construct a minimum of three 48-by-48 inch test panels of tactile concrete pavement strips with etched finish at a location designated by the Engineer. Sample panels shall demonstrate the contrast with standard concrete pavement used to construct adjacent sidewalk pavement and the desired tactile finish. The tactile quality is produced by the exposure of aggregate in the integral colored concrete through the retarder application process. The sample panels shall be constructed using the same materials, methods, equipment and workers as will be used for the execution of the actual work. The submitted samples shall be as follows:
1. Sample #1: Sample tactile finish through application of Grace Construction Products Top-Cast Grades 150, or approved equal.
2. Sample #2: Sample tactile finish through application of Grace Construction Products Top-Cast Grades 200, or approved equal.
3. Sample tactile finish through application of Grace Construction Products Top-Cast Grades 250.

Contractor shall construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer and designated members of the disabled community representing blind persons and wheelchair users.

**Contractor shall construct all sample panels such that they are accessible by wheelchair. The approved sample panel shall be maintained intact until the Engineer directs its removal.**

Contractor shall only proceed with the construction of tactile concrete pavement strips with etched finish in locations shown on the plans after having received final approval by the Engineer and designated members of the disabled community representing blind persons and wheelchair users of a successfully executed test panel. All executed stamped concrete application throughout the project shall match its corresponding approved test panel.

The approved sample panel shall be maintained intact until the Engineer directs its removal.

**201-9.2 Materials.** Crushed aggregate base for tactile concrete pavement strips with etched finish shall comply with requirements of Section 200-2.2 – Crushed Aggregate Base.

Portland cement concrete shall comply section 201-1.

Admixture for integral color shall be Chromix by L.M. Scofield Company, or approved equal. Color shall be C-34 Dark Gray, or approved equal. Admixture shall conform to the requirements of ACI 303.1, ASTM C979.

Retarder finish shall be Top-Cast by Grace Construction Products, or approved equal. Degree of retarder application shall be determined through the mock-up process described above.

**201-9.3 Construction.** Construction of tactile concrete pavement strips with etched finish shall comply with Section 303-5 and Section 303-7 and manufacturers’ instructions for the application of colored concrete and retarder.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of tactile concrete pavement strips with etched finish.

If placing tactile concrete pavement strips with etched finish around new or remaining curb ramp, protect the grooved area and detectable warning surface of the curb ramp.

If placing tactile concrete pavement strips with etched finish around or adjacent to miscellaneous structures (i.e. manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the tactile concrete pavement strips with etched finish is finished beyond the miscellaneous structure.

Leave forms in place for a minimum of 12 hours after surface finishing.

If the tactile concrete pavement strips with etched finish are constructed using extruded or slip form method, comply with section 73-1.03D of the State Standard Specifications.

Clean any discolored or etched concrete or other materials that are to remain adjacent to the area of construction of tactile concrete pavement strips with etched finish by abrasive blast cleaning or other method authorized by the Engineer. Repair or replace any damaged adjacent surfaces as directed by the Engineer. No additional payment shall be made for cleaning and replacing of damaged adjacent materials.

**SECTION 203 – BITUMINOUS MATERIALS**
203-5 Emulsion-Aggregate Slurry.
REPLACE SUBSECTION 203-5.2 WITH THE FOLLOWING:

203-5.2 Materials.
The latex/polymer shall be SBR, SBS, SEBS, or Neoprene, at the option of the Contractor.

1) Latex/Polymer Modified Asphalitic Emulsion for Emulsion Aggregate Slurry.
Latex/Polymer Modified Asphalitic emulsion shall be a cationic quickset, quick traffic type conforming to the requirements of type PMCQS-1h, and shall meet all the requirements for such material as specified below. The emulsion shall be homogeneous and show no separation after thorough mixing and shall break and set on the aggregate within five minutes. The polymer modified asphalt emulsion shall conform to the requirements prescribed in Table 1.

<table>
<thead>
<tr>
<th>TEST ON EMULSION</th>
<th>METHOD OF TEST</th>
<th>REQUIREMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity, SSF, @ 77 °F sec.</td>
<td>ASTM D244</td>
<td>20-100</td>
</tr>
<tr>
<td>pH</td>
<td></td>
<td>2+/1</td>
</tr>
<tr>
<td>Distillation Residue %, Minimum</td>
<td>CT-331</td>
<td>60</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TEST ON RESIDUE PREPARED USING CALTRANS TEST METHOD CT-331</th>
</tr>
</thead>
<tbody>
<tr>
<td>Penetration, 77 F, 100g, 5 sec.</td>
</tr>
<tr>
<td>Softening Point (Ring &amp; Ball), °F.</td>
</tr>
<tr>
<td>Ductility, @ 77°F, 5cm/min, cm</td>
</tr>
<tr>
<td>Fraass-Breaking Point (°C)</td>
</tr>
</tbody>
</table>

The Contractor shall furnish a one-quart sample of asphaltic emulsion drawn for each tank load of material to be used on the project. Samples will be obtained in accordance with ASTM method D140 or such other methods as are approved by the Engineer. A certificate of compliance will be furnished by the Contractor in accordance with Section 203-1.3, “Test Reports and Certification”, of the Standard Specifications for all asphaltic emulsion used under these specifications. Test reports shall include evidence that all materials are individually acceptable and are collectively compatible when mixed together to produce the emulsion-aggregate slurry. The certificate of compliance shall include all information stipulated in Section 203-1.3 of the Standard Specifications and these special provisions. Additional information relevant to the specifications shall be furnished if requested by the Engineer.

2) Aggregate for Emulsion-Aggregate Slurry.
   a. Aggregate for the slurry seal shall comply in all respects to requirements in Section 203-5, “Emulsion-Aggregate Slurry”, of the Standard Specifications for a Type II slurry seal. Aggregate shall consist of sound, durable, crushed stone or crushed gravel and approved mineral filler. The material shall be free from viable matter and other deleterious substances. Aggregates shall be 100% crushed with no rounded particles, volcanic in origin and black in color, as supplied by George Reed, Table Mountain Plant, Sonora, CA, or Equal. The use of gray or light-colored aggregate will not be allowed. The
percentage composition by weight of the aggregate shall conform to the following grading:

<table>
<thead>
<tr>
<th>Percent Passing</th>
<th>Sieve Sizes</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3/8&quot; (9.5mm)</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>No. 4 (4.75 mm)</td>
<td>90-100</td>
</tr>
<tr>
<td></td>
<td>No. 8 (2.36 mm)</td>
<td>65-90</td>
</tr>
<tr>
<td></td>
<td>No. 16 (1.18 mm)</td>
<td>40-70</td>
</tr>
<tr>
<td></td>
<td>No. 30 (600 um)</td>
<td>25-50</td>
</tr>
<tr>
<td></td>
<td>No. 200 (75 um)</td>
<td>5-15</td>
</tr>
</tbody>
</table>

b. The aggregate shall have a minimum sand equivalent of 60 (Test Method No. Calif. 217).

c. A certificate of compliance shall be furnished by the Contractor, for aggregates used in the slurry seal. The certificate of compliance shall include laboratory test results indicating the average gradation, minimum sand equivalent, residual asphalt as percent (%) aggregate weight, emulsified asphalt as percent (%) of aggregate weight, maximum film striping (25% max., Calif. 302) and durability index (60 min., Calif. 229), all in accordance with Sections 203-5.2, and 203-5.3 of the Standard Specifications and these Special Provisions. The certified test reports and the testing required in connection with the reports shall be at no cost to the City.

3) **Water and Retarder for Emulsion-Aggregate Slurry.** Water and Retarder shall be used to insure proper workability and to permit uncontrolled traffic on the slurry no more than two hours after placement without occurrence of bleeding, raveling, separation, or scalping.

ADD NEW SUBSECTION 203-5.5 TO READ:

**203-5.5 Field Observation and Testing.** The Engineer from time to time, and at her/his discretion, will perform tests to verify conformance to requirements for materials specified in the Special Provisions. At a minimum, the Contractor shall perform the following listed tests. Testing results shall be submitted to the City of Oakland.

A. Measure the quantity of emulsion and estimate the quantity of aggregate being used for comparison with the quantity per square yard as specified in the approved design mix. Emulsion shall be measured at the storage tanks and at the mixing machine(s). The quantity of aggregate will be visually estimated by the Engineer.

B. Determine the percent of residual asphalt in the slurry mix by extraction test using ASTM Test No. D2172.

C. Determine aggregate loss using the wet track abrasion test, ASTM Test No. D 3910-80a.


E. Determine the properties of the asphaltic emulsion in accordance with AASHTO Designation: T59, “Testing Emulsified Asphalt.”

The Contractor shall cooperate fully in providing safe access for the Engineer’s personnel performing the tests.

If all or any one of these tests indicate that the mix or application rate differ from the design mix or from the Contract requirements, the operation shall immediately be stopped and adjustments made to the equipment. The Engineer shall designate areas of the street to be used for test demonstrations.

Full compensation for meeting the requirements of the provisions shall be considered as included in
the contract item for slurry seal and no additional compensations will be paid therefore.

203-6 ASPHALT CONCRETE.

203-6.1 General

ADD NEW PARAGRAPHS TO THE END OF THIS SUBSECTION TO READ:
The following PG asphalt mixes shall be used unless otherwise specified:
- Upper Course (Top 2" of AC) or AC OVERLAY: ½" Maximum Aggregate, medium Type A Bituminous Pavement Mixture PG64-10 with 15% reclaimed asphalt pavement (RAP)
- Lower Course(s) (more than 2" below surface) or AC BASE REPAIR: 3/4" Maximum Aggregate, medium Type A Bituminous Pavement Mixture PG64-10 with 15% reclaimed asphalt pavement (RAP)

203-7.6 RAC Mixing.

203-7.6.1 General.

ADD TO THE END OF 203-7.6.1 TO READ:
Uniformity of binder distribution will be determined by an extraction test made in accordance with any of the following test methods or other published test methods approved by the Engineer.

ASTM D 2172
California Test Method 382
ASTM D 4125

203-10.2 LATEX MODIFIED ASPHALT CONCRETE.

REVISE SUBSECTION 203-10.2.1 TO READ:
203-10.2.1 Paving Asphalt. Paving asphalt to be mixed with the latex and aggregate shall be Performance Grade PG 64-10 conforming to 203-1, or as specified in the Special Provisions.

203-10.2.4 Composition and Grading.

CHANGE THE FIRST PARAGRAPH OF 203-10.2.4 TO READ:
The mix shall be C2 unless otherwise specified on the Plans or in the Special Provisions. Where Alternate Rock Products-Type S, Section 400, are specified, the class and grade shall be Type III-C3-PG 64-10 or as specified in the Special Provisions.

ADD TO SUBSECTION 203-15 TO READ:
203-15 GEOSYNTHETIC PAVEMENT INTERLAYER.
The geosynthetic pavement interlayer shall comply State Standard Specification 39 for geosynthetic pavement interlayer.

SECTION 206 – MISCELLANEOUS METAL ITEMS

ADD NEW SUBSECTION 206-7 TO READ:
206-7 Manhole and Cleanout Fittings.

Manholes shall conform to the City of Oakland Standard Details for Public Works Construction.

206-7.1 Manhole Steps. Manhole steps shall be as shown on the plans or Standard Details and shall conform to ASTM C478. Steps shall be steel or reinforced copolymer plastic model PS2-PFS or PS2-PF by M.A. Industries, or approved equal.

206-7.2 Cleanout Frames and Covers. Castings shall conform to ASTM A48, Class 30B. The bearing surfaces of the frames and covers shall be machined. The covers shall seat firmly into the frames without rocking. The frames and covers shall be coated. Exposed surfaces, with the casting assembled and disassembled, shall be painted with a commercial quality asphalt paint after testing and inspection.

ADD NEW SUBSECTION 206-8 TO READ:
206-8 CATCH BASIN INSERT (STORMTEK ST3).

206-8.1 General. Catch basin insert Stormtek brand, Model ST3 or equivalent as approved by the Engineer, shall be used for proposed and existing inlets as shown on the plans or as directed at the locations specified by the Engineer. At least 28 calendar days prior to start of construction in each construction zone, the Contractor shall provide a request to the Engineer for the location of the catch basin insert.
basin inserts. At least 14 days prior to start of construction in each construction zone, the Contractor shall provide the Engineer the inlet dimensions, including length and depth of all pipes of existing inlets or modified inlets that are to receive an insert, as measured in field. Catch basin inserts shall not be ordered until the following:

1. The Engineer has provide the locations of the catch basin inserts
2. Existing inlet dimensions have been verified in field
3. New inlets have been constructed and the dimensions have been verified in field
4. The Engineer has approved inlet dimensions provided by the Contractor
5. The Engineer has provided the height of catch basin insert.

Locations of catch basin inserts shown on the plans are for information only. Actual locations of catch basin inserts shall be as specified by the Engineer.

206-8.2 Material Composition. Mounting frame shall be made of coated or stainless steel. Frame members shall be made from 2” flat bars with a minimum thickness of 3/16 inch. Insert screen shall be made of heavy-gage sheet metal with 5 millimeter openings. Total openings constitute 50% of the screen surface. Top 4 inches of the screen is grated with bars spaced at 2 inches on center. Insert top cover shall be made of heavy-gage sheet metal screen with 5 millimeter opening and 1” support frame. Structural support members for the screen and top cover are made of coated or stainless steel. Members are made from 1” flat bars with a minimum thickness of 1/8 inch. Height of insert shall be verified with the Engineer for all existing inlets prior to installation.

206-8.3 Construction. Mounting frame members must be welded. Structural support frame members must be welded. Insert screens must be welded onto structural support frames. Mounting frames must be bolted onto the catch basin wall at the outlet opening. Mounting frames must be anchored at all four corners with HILTI expansion anchors or approved equivalent. Inserts must be installed vertically onto the mounting frame directly in front of the outlet opening. Inserts must be completely removable by lifting it off the mounting frame.

ADD NEW SUBSECTION 206-10 TO READ:

206-9 ARCHITECTURAL FENCE
206-9.1 General
206-9.1.1 Description. Work under this item shall consist of fabricating, transporting and installing complete and in place architectural fence on curbside BRT platforms as shown on the Plans and in accordance with these Special Provisions.

206-9.1.2 Cross Reference. Architectural Fence work shall follow the specifications described in Division 3.1, Section 05 52 00 – Metal Railings.

ADD NEW SUBSECTION 206-10 TO READ:

206-10 SIDEWALK TRENCH DRAIN FRAME AND GRATE
206-10.1 Frame. Cast Iron Frame material shall be galvanized, ASTM A36 steel. Frame shall be load rated for H20 traffic. Typical horizontal gap between grate and grate shall be 1/8”. All visible welds to be ground smooth on outside edges. Frames will be true to square. Top of grate shall be flushed with adjacent concrete slab finished grade. Trench drains shall have rebar anchors standard to secure trench in its final location.

206-10.2 Grate. Grates shall have the same manufacturer as the tree wells unless otherwise directed by the Engineer. Grate pattern shall be “double wave” pattern. Grate shall be anti-slip and vandal proof. 3/8” torx flat-head bolt shall be used to bolt down grate onto frame unless otherwise directed by the Engineer. Grate material shall be high quality 100% recycled grey iron, ASTM A48 class 35b or better. Finish will be natural patina of raw iron. Grate openings shall not be greater than 1/4”, in conformance with ADA Accessibility Guidelines. Where connections to roof drain occur, trench drain grate shall be solid with no openings.

SECTION 207 – PIPE

ADD THE FOLLOWING TO THE SECTION HEADING:
If specific pipe materials are shown in the plans, Contractor shall not have the option of using other pipe materials.

### PIPE COVER AND MATERIAL REQUIREMENTS

<table>
<thead>
<tr>
<th>PIPE DIAMETER (inches)</th>
<th>LESS THAN 3 FEET</th>
<th>3 TO 15 FEET</th>
<th>15 FEET PLUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 TO 36</td>
<td>RCP Class V</td>
<td>RCP Class III</td>
<td>RCP Class IV</td>
</tr>
</tbody>
</table>

RCP  Reinforced Concrete Pipe with rubber gasket joint

The following table shall be used for establishing pipe strengths for reinforced concrete pipe:

<table>
<thead>
<tr>
<th>Pipe Class</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Ultimate D-Load lbs/ft of diameter/lf</td>
<td>1,200</td>
<td>1,500</td>
<td>2,000</td>
<td>3,000</td>
<td>3,750</td>
</tr>
</tbody>
</table>

207-9 IRON PIPE AND FITTINGS.
207-9.2 Ductile Iron Pipe for Water and Other Liquids.
207-9.2.4 Lining and Coating.
CHANGE THE LAST SENTENCE OF SUBSECTION 207-9.2.4 TO READ:

The inside and outside surfaces of cast iron pipe and fittings for general use shall be coated with a bituminous coating 1 mil (0.0254mm) thick in accordance with ANSI A21.51.

REPLACE SUBSECTION 207-11.8 WITH THE FOLLOWING:

207-11.8 Underdrain and Cleanout.
207-11.8.1 Underdrain.
Underdrain shall be perforated plastic pipe and shall conform to Section 68-2 "Underdrains", of the State of California Standard Specifications. The Perforated plastic pipe underdrains shall be Schedule 40 PVC pipe, complying with ASTM D 1785.

207-11.8.2 Cleanout
The Cleanouts shall be fabricated from the same material as the underdrain pipe. Do not mix aluminum and steel in the same installation except for covers and coupling band fastening hardware. Outlet and riser pipe and fittings shall not be perforated. Covers shall be fitted and bolted into the riser pipe or elbow. Covers shall seat uniformly and not be subject to rocking.

207-19 POLYETHYLENE (PE) SOLID WALL PIPE.
207-19.1 General.
ADD THE FOLLOWING TWO SENTENCE TO THE END OF THE SUBSECTION:

HDPE pipe shall be SDR 11.

REPLACE SUBSECTION 207-19.3 WITH THE FOLLOWING:

207-19.3 Pipe or Liner Acceptance. When manufactured, each lot of pipe, liner, and fittings shall be inspected for defects and tested in accordance with ASTM D3350. The liner or pipe shall be homogeneous throughout, uniform in color, free of cracks, holes, foreign materials, blisters or deleterious faults.

The Contractor shall supply written certification by the manufacturer that materials used in the manufacture of the pipe and the pipefittings conform to these specification requirements. The Contractor shall also supply written certification that all resins/pellets used are from a single producer. Failure to meet this requirement will result in rejection of the pipe or liner during shop drawing review.

For testing purposes, a production lot shall consist of all pipe or liner having the same marking number. It shall include any and all items produced during any given work shift and shall be so identified as opposed to previous or ensuing production.

ADD NEW SUBSECTION 207-25 TO READ AS FOLLOWS:
207-25 POLYETHYLENE (PE) LARGE DIAMETER PROFILE WALL PIPE.

207-25.1 General. Polyethylene (PE) profile wall pipe and fittings for use in gravity flow sanitary sewers and storm drains, and for use as liners for sanitary sewers shall be heavy-walled HDPE pipe SDR 11.

207-25.2 Material Composition. Polyethylene (PE) profile wall pipe and fittings for use in gravity flow sanitary sewers, and for use as liners for sanitary sewers must be heavy-walled HDPE pipe.

Black PE materials used for the manufacture of polyethylene pipe, tube and fittings shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. The material shall be listed and approved for potable water in accordance with NSF/ANSI 61.

Gray PE material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E. When requested on the order, the Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.

Polyethylene pipe shall be manufactured in accordance with AWWA C901-96 for sizes 1-1/4” thru 3” IPS diameters and to the requirements of ASTM D3035. Pipe 4”IPS and DIPS sizes 4” and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99. 2” and smaller water service pipe and tubing shall be manufactured in accordance with ASTM D2239 for inside diameter control IPS size or ASTM D2737 for outside diameter control CTS size.

Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings. Fabricated fittings shall be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe. Fabricated fittings shall be tested in accordance with AWWA C906.

207-25.4 Marking. Pipe shall be marked in accordance with ASTM F714 and/or AWWA C906. Markings shall indicate the pipe's Pressure Rating (PR) and/or Pressure Class (PC).

Each standard and random length of pipe shall be clearly marked with the following information: the nominal pipe size (in inches); the legend “PE sewer and drain pipe”; the RSC classification; the material designation: P-34 grade or cell classification; the manufacturer's name; the production code and plant location; and manufacture date.

207-25.5 Dimensions. Pipe dimensions shall comply with dimensions given in ASTM D2239.

SECTION 209 – STREET LIGHTING AND TRAFFIC SIGNAL MATERIALS

209-1 GENERAL.
ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 209-1 TO READ:

Before any work is started the Contractor shall file with the Engineer the names, addresses and telephone numbers of at least three (3) people capable of responsible action in the event of any emergency outside of regular working hours.

The locations of electrical system elements shown are approximate; the Engineer determines the final location.

Traffic signal work shall be performed at the locations listed in the following table. The Contractor must use the applicable standards for each intersection as identified in the table. Refer to State Standard section 86-1 for locations in Segment A that shall follow the City of Oakland specification for traffic signals.
Intersections with Traffic Signal Work in Segment B

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Street Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadway and 20th St</td>
<td>E 12th St/E 8th St and 14th Ave</td>
</tr>
<tr>
<td>Broadway and 19th St</td>
<td>Fruitvale Ave and E 12th St</td>
</tr>
<tr>
<td>Broadway and 17th St</td>
<td>International Blvd and 2nd Ave</td>
</tr>
<tr>
<td>Broadway and 15th St</td>
<td>International Blvd and 4th Ave</td>
</tr>
<tr>
<td>Broadway and 14th St</td>
<td>International Blvd and 5th Ave</td>
</tr>
<tr>
<td>Broadway and 13th St</td>
<td>International Blvd and 7th Ave</td>
</tr>
<tr>
<td>Broadway and 12th St</td>
<td>International Blvd and 8th Ave</td>
</tr>
<tr>
<td>Broadway and 11th St</td>
<td>International Blvd and 10th Ave</td>
</tr>
<tr>
<td>Franklin St and 12th St</td>
<td>International Blvd and 12th Ave</td>
</tr>
<tr>
<td>Webster St and 12th St</td>
<td>International Blvd and 14th Ave</td>
</tr>
<tr>
<td>Harrison St and 12th St</td>
<td>E. 12th St and 13th Ave</td>
</tr>
<tr>
<td>Alice St and 12th St</td>
<td>International Blvd and 13th Ave</td>
</tr>
<tr>
<td>Jackson St and 12th St</td>
<td>E 12th St and 11th Ave</td>
</tr>
<tr>
<td>Madison St and 12th St</td>
<td>International Blvd and 16th Ave</td>
</tr>
<tr>
<td>Oak St and 12th St</td>
<td>International Blvd and 18th Ave</td>
</tr>
<tr>
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<td>International Blvd and 20th Ave</td>
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<tr>
<td>Webster St and 11th St</td>
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<tr>
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<tr>
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<td>International Blvd and Miller Ave</td>
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<td>International Blvd and 39th Ave</td>
</tr>
<tr>
<td>E 12th St NB and 14th Ave</td>
<td></td>
</tr>
</tbody>
</table>

209-3 COMPONENTS FOR STREET LIGHTING AND TRAFFIC SIGNAL SYSTEMS.

ADD NEW SUBSECTION 209-3.1.1 TO READ:

209-3.1.1 City Furnished Material List. All materials required shall be supplied by the Contractor.

ADD NEW PARAGRAPH TO END OF SUBSECTION 209-3.2 TO READ:

209-3.2 Anchor Bolts, Nuts, and Washers. City standard street light pole anchor bolts shall be the type and size shown on plans and according to City standard detail drawing E-21. Anchor bolts for signal standard shall conform to State Standard Plans and Specifications.

ADD NEW SUBSECTION 209-3.1.2 TO READ:

209-3.1.2 Paint Colors. Signal and lighting equipment along the BRT corridor shall be painted Boxwood Green or Traffic Signal Black, as noted on the applicable plan sheets. The Contractor shall submit shop drawings submittals to the Engineer for each location to coordinate with the City of Oakland and direct the appropriate colors to be used at each location along the corridor.

209-3 Standards.

209-3.3.1 General.

ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 209-3.3.1 TO READ:
The signal standard shall conform to State Standard Plans and Specifications. Rectangular corrosion-resistant metal identification tags conforming to State Standard Specifications shall be attached on all standards and poles. Street light poles shall conform to the plans.


For any custom light pole and arm identified on the plans, Contractor shall provide shop drawings and structural calculations prepared by an engineer licensed in the State of California to verify that the structure can withstand fixture load plus wind load of 90 mph prior to fabrication of the pole.

209-3.3.3.2 Steel Standards.
REPLACE SUBSECTION 209-3.3.3.2 WITH THE FOLLOWING:

Unless otherwise specified in the Special Provisions, steel standards shall comply with State Standard Specification Section 86-2.04. All standards shall be galvanized unless other specified.

209-3.3.4 Fiberglass Standards.
DELETE SUBSECTION 209-3.3.4 Fiberglass Standards.

209-3.4 Mast Arms.
ADD NEW PARAGRAPH TO THE END OF SUBSECTION 209-3.4 TO READ:

The signal mast arm shall conform to State Standard Plans and Specifications.

209-3.5 Conduit
209-3.5.1 General.
ADD NEW PARAGRAPH AT THE END OF SUBSECTION 209-3.5.1 TO READ:

City of Oakland conduits shall be HDPE unless otherwise notes and of the following sizes:

1. Street Lighting – 2-inch HDPE Schedule 80 Conduit
2. Traffic Signal – 3-inch HDPE Schedule 80 Conduit
3. Interconnect – 3-inch HDPE Schedule 80 Conduit
4. Inductive Loop Detector Lead-In-Cable - 2-inch HDPE Schedule 80 Conduit
5. Between Street Light Foundation and City #5 Curb Box – 2-inch Rigid Steel Conduit (RSC)
6. Between Traffic Signal mast arm pole foundation and City #6 Curb Box – 3-inch Rigid Steel Conduit (RSC)
7. Between Traffic Signal (non signal mast arm) foundation and City #6 Curb Box - 2-inch Rigid Steel Conduit (RSC)
8. Between Controller Cabinet Foundation and City #6 Curb Box – two (2) 3-inch HDPE Schedule 80
9. Between service cabinet foundation and City #6 Curb Box – one (1) 3-inch HDPE Schedule 80
10. Between service cabinet foundation and PG&E Service Box – one (1) 3-inch PVC Schedule 80. Contractor is responsible for verifying and providing the PG&E conduits per their requirements.
11. Riser on PG&E pole and stub into City Curb Box or PG&E Service Box – Contractor is responsible for verifying and providing the PG&E risers and conduits per their requirements.

209-3.7 Pull Boxes.
ADD NEW PARAGRAPH TO THE END OF SUBSECTION 209-3.7 TO READ:

All new pull boxes shall be positively grounded with grounding rod in accordance with State Standard Plan ES8A.

All non-traffic rated curb boxes shall be precast, non-concrete fibrellyte, conforming to Electrical Standard Drawing E-9.

Pull boxes for street lighting circuits only shall be City of Oakland standard #5 per standard drawing E-9. Pull box covers to be installed in low-voltage lighting systems shall be inscribed “CITY OF OAKLAND” “STREET LIGHTING”.

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Pull boxes for traffic signal circuits shall be City of Oakland standard #6 per standard drawing E-9. Pull box covers to be installed in signal systems or combined signal and low-voltage lighting systems shall be inscribed “CITY OF OAKLAND” “TRAFFIC SIGNAL” or “CITY OF OAKLAND” “INTERCONNECT” as appropriate.

Some traffic signal boxes have extensions and are noted as such in the plans with the designation “6E”.

Pull box covers to be installed in fiber optic cable only lines shall be inscribed “CITY OF OAKLAND” “INTERCONNECT”.

Pull box covers for lighting circuits only shall be inscribed “CITY OF OAKLAND” “ELECTRICAL”.

Pull box covers for traffic signal conductors with or without lighting circuit conductors shall be inscribed “CITY OF OAKLAND” “TRAFFIC SIGNAL”.

Curb boxes located within travel roadway or otherwise noted on plans shall be traffic rated. Traffic rated curb boxes shall be in accordance with State Standard Specifications 86-2.07, “Traffic Pull Boxes.”

209-3.8 Splice Insulation.
209-3.8.1 General.
ADD NEW PARAGRAPH TO THE END OF SUBSECTION 209-3.8.1 TO READ:
Splicing for street light circuit shall conform to the City of Oakland Electrical Standard Detail E-29.

209-3.12 Service Pedestal.
ADD NEW SUBSECTION 209-3.12 TO READ:
Circuit breakers shall be the cable-in/cable-out type, mounted on non-energized clips. All circuit breakers shall be mounted vertically with the up position of the handle being the “ON” position.

Each service shall be provided with up to two main circuit breakers, which shall disconnect ungrounded service entrance conductors. Where the “Main” circuit breaker consists of two circuit breakers as shown on the plans or required in the special provisions, each of the circuit breakers shall have a minimum interrupting capacity of 10,000 A, rms.

The neutral conductor shall run from the service equipment enclosure to the controller Cabinet without splicing to any other neutral conductor.

Contractor to furnish and install ground rod at service cabinet panel foundation.
Service Pedestal shall conform to Caltrans Electrical Systems Service Equipment.

209-3.12.1 Single Meter Service Pedestal.
ADD NEW SUBSECTION 209-3.12.1 TO READ:
Single Meter Type III-AF, 120/240 V, 100 A, service pedestal (Tesco Controls, Inc model # 26-100 or approved equal) for unmetered street light and metered traffic signal. Exterior shell of service pedestal shall be galvanized steel painted Boxwood Green or Traffic Signal Black unless otherwise noted in plans. The Engineer shall designate which color to be painted.

209-3.12.2 Dual Meter Service Pedestal
DELETE THIS SECTION

209-4 STREET LIGHTING SYSTEM MATERIALS.
209-4.2 Wire/Conductors.
209-4.2.1 General.
REPLACE FIRST SENTENCE OF PARAGRAPH WITH THE FOLLOWING:
Unless otherwise noted in plans, street light wire (both underground and pole riser) shall be No. 8 AWG single, stranded copper conductors insulated with 60 mils THWN OR THHN insulation rated at 600 volts as shown on plans (Black, Red, Green).

209-4.3.2 Fuse Splice Connectors.
REPLACE SUBSECTION 209-4.3.2 WITH THE FOLLOWING:
In-line water tight fuseholder and fuse in the adjacent curb box as follows:
Fuseholder shall be waterproof with a power rating of 600V and 30A to accept 13/32” dia. X 1-1/2” long fuse. Reference: Buss Tron HEX-AA fuse.

Fuse shall be 250VAC 5 Amp 13/32” dia. X 1-1/2” long: Reference: Buss KTK-5

For 120 V Street Light, video cameras (if not individually protected through 5 Amp circuit breakers in controller cabinet), and IISNS, Fuseholder HEB-AA, Fuse 5A KTK

For 240 V Street Light, Fuseholder HEX-AA, Fuse 5A KTK

209-4.4 High Pressure Sodium (HPS) Luminaires.

209-4.4.1 General

DELETE THIS SUBSECTION

209-4.7 Photoelectric Control.

209-4.7.1 General.

Replace SUBSECTION 209-4.7.1 TO READ:

Photoelectric control shall be Type IV.

Photoelectric controls shall conform to the provisions in Section 86-6.07 “Photoelectric Controls”, of the State Standard Specifications and these special provisions.

209-4.9 Light Emitting Diode (LED) Luminaires.

ADD NEW SUBSECTION 209-4.9 TO READ:

The LED Cobra Head Street Light shall be the new City standard as follows:

209-4.9.1 General. Three types of luminaires are identified on the plans:

1. Street light fixtures. (Cobra head LED fixtures)
2. Ornamental Candelabra Fixtures
3. Pedestrian luminaire fixtures

All new fixtures are LED roadway luminaire with type and arm length as identified on the equipment schedule on the plans. A City of Oakland 28’6” Round tapered steel pole RAL 6009 Dark Green. Pole shall be per page 17 of the City of Oakland Streetlight design manual or as noted on the plan and equipment schedule. Foundation shall be in accordance with state standard plan ES-6A or The poles and foundations shall be as noted on the plan and equipment schedule.

Fixtures are LED roadway luminaire with type and arm length as identified on the equipment schedule of a City of Oakland 28’6” Round tapered steel pole RAL 6009 Dark Green. Pole shall be per page 17 of the City of Oakland Streetlight design manual or as noted on the plan and equipment schedule. Foundation shall be in accordance with state standard plan ES-6A or as noted on the plan and equipment schedule.

The complete luminaire designated shall be a LED Series roadway luminaire, to operate one or more optimized LED arrays from a nominal voltage (as noted on the plans), 60 Hz power source and shall be capable of starting and operating the light engine(s) within the limits specified by the LED manufacturer.

The luminaire shall contain completely prewired integral drivers and optical assembly “Light Engine(s)” that shall provide a distribution type (specify according to photometric type table). Labeling shall be in accordance with ANSI standards. All units shall be UL/cUL Certified.

Manufacturer shall have a minimum of a 15-year history of designing and manufacturing outdoor luminaires and at least 10 years of LED design history in some form of outdoor application which can include signage, traffic signals or roadway/parking fixtures.
The fixture offering shall range from 3,000 total lumens at 4000K and 43 watts to 22,000 total lumens at 5700K and 270 watts in the 120-277 volt range (no more than 5% additional watts at 480V). In any case, the fixture shall not have a color temperature rating higher than 4000K. There shall be options for various photometric options to include a minimum offering of Narrow Asymmetric Medium, Asymmetric Short and Asymmetric Medium. The photometric options shall be able to offer solutions that are based on both Illuminance and luminance. The fixture shall have a minimum street side coefficient of utilization of 74% (maximum of 26% for House Side). The contoured cobrahead–shape housing shall closely resemble representative HID/LED cobrahead fixtures that exist today.

Pedestrian luminaire fixtures, as shown on the plans, shall be mounted to conventional traffic signal poles in some or all locations. The Contractor shall provide shop drawings depicting the connection between the pedestrian luminaire arm and the traffic signal pole. Separate shop drawings, with dimensions, shall be provided that covers the connection detail including bolt sizes, material of the connection and the mounting details, including welded and/or bolted connections. The shop drawings shall be submitted to the Engineer for approval prior to installation of the pedestrian luminaire fixtures.

209-4.9.2 Optical/LED Array.
- On units that contain more than one light engine, there shall be a provision to specify that at least one light engine unit (closest to the electrical cavity) can offer photometry in the house side direction.
- Aluminum clad metal core printed circuit board assembly, designed to operate as a class I circuit.
- There shall be a separate, single precision die cast removable bezel to hold a glass lens in place, covering the entire optical enclosure.
- The circuit board shall be attached to a machined surface on the precision casting so as to maximize heat transfer and mechanical adherence over the life of the fixture.
- Each fixture shall contain one single translucent tempered glass lens designed to maximize efficiency of light output and minimize the effect of dirt depreciation.
- The lens shall have a single long life silicon gasket.
- The silicon gasket shall be “channeled” so as to form around both sides of the glass lens.
- There shall be no caulk of any kind used to seal any parts of the fixture optical enclosure for IP65 applications.

209-4.9.3 Luminaire Requirements.
- Off-state power draw of 0 watts (excluding PE or remote control devices).
- 3-prong locking ANSI C136.10 photocell receptacle with tool-less orientation.
- A minimum system power factor of 0.90 tested and specified at 120v input and maximum load conditions.
- Maximum THD < 20% tested and specified at 120v input and maximum load conditions.
- Nominal LED forward current of 525 mA as the standard, with options for 350mA and 700mA typical.
- Driver life expediency 100,000 hours.
- Operating temperature range of -40°C to 50°C.
- UL Class 1 power supply units (i.e. drivers) operating in DC constant current mode.
- Drivers shall be pre-wired to the light engine and have a “quick pinch” disconnect from the power door.
- Mode supplying DC forward current for LED operation (no pulsed operation allowed).
- EMI compliance with FCC 47 CFR Part 15 Class A.
- Class A sound rating.
- The luminaire shall contain the factory-installed driver supplied with the light engine.
- The light engine assembly and housing shall be from the same manufacturer.
- The drivers shall reliably start and operate the light engine at ambient temperatures from -40°C to 50°C.
- The housing color shall be grey, factory applied.

Surge Protection
For the 120-277 VAC single phase luminaire, the standard protection for the electrical system shall survive 120 repetitive surge events of "B2" (B2 - 4kV/1.2 x 50uS, 2kA/8 x 20uS) waveforms at 1 minute or less intervals. B2 waveforms are as defined in IEEE/ANSI C62.41.-1991, Scenario 1 Location Category B2. Events shall be 5 of each phase/polarity (45, 90, 270 - Positive, 90, 225, 270 - Negative) and mode (L1-L2, L1-G, L2-G, L1/L2-G).

Power Door Assembly
- The fixture shall have a precision die-cast aluminum “power door”.
- There shall be a secondary retention latch to avoid the power door from dropping down once the screw is backed out but prior to the operator/installer needing the door open. The latch can be easily pushed by the operator/installer to allow the power door to swing down.
- Shall contain hinge latches that do not require any tools to remove from the fixture.
- Warranty shall not be affected by opening the power door and accessing the electrical cavity.
- Shall have all of the needed electrical and electronic components for the fixture attached to it with quick disconnect connectors that can be squeezed and pulled apart. The exception to this is for the high capacity surge protection which will be inside the cavity due to the size.
- Shall have terminal block shall be “lineman friendly” and angled within the electrical cavity so as to allow for easy wire connections.

Mechanical Construction
- The luminaire shall be comprised of precision die-cast aluminum housing, scaled to the appropriate wattage and lumen requirement output.
- The housing construction will incorporate heat sink fins that are integrally cast with the housing to maximize heat transfer and minimize thermal impacts of environmental conditions such as debris-clogged fins.
- The luminaire shall meet ANSI 2G vibration standards with an option to meet 3G vibration standards.
- Slipfitter in the housing shall not pass through the housing and tighten from the arm directly to mount on 1.66" to 2.375" O.D. horizontal tenons, and provide +/- 5 degrees of tilt adjustment.
- The effective Projected Area (EPA) shall not exceed 1.4 square foot maximum.

209.4.9.4 Photometric Requirements.
- High brightness LED’s.
- A nominal Correlated Color Temperature (CCT) of 4000 °K and 5700 °K typical binned per ANSI C78.377-2008.
- A typical Color Rendering Index (CRI) ≥ 70.
- An IESNA TM-15 UL/UH rating of 0.
- A minimum initial Luminaire Efficacy ≥ 74 lm/W with a typical at 80 lm/W depending on CCT

209.4.9.5 Performance Claims.
- LED performance claims shall be independently verified from the LED manufacturer. Verification shall include lumen output, life and color properties.
- CCT and CRI and shall be tested and measured in accordance with LM-79. Lumen depreciation data shall be measured in accordance with LM-80.
- Lumen Maintenance projections shall not exceed 6X of the available system-level lumen depreciation test data.
- A normal operation temperature from -40º C to 50º C.
- Substitution of a non-approved driver shall result in void of warranty.
- System shall be rated at L85 for no less than 50,000 hours.
- LED module(s)/array(s) shall deliver at least 85% of initial lumens, when installed for a minimum of 50,000 hours.
209.4.9.6 Measurement/Performance/Safety Standards.
2. LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources.
3. Luminaire is UL Listed to UL1598.
4. LM-79 tests and reports shall be available and be performed in accordance with IESNA standards.
5. Shall be UL/cUL listed, suitable for wet locations.
7. Shall be RoHS compliant.

209-5 TRAFFIC SIGNAL MATERIALS.
209-5.1 Steel Pedestrian Standards and Pedestals for Controller Cabinets.
ADD NEW PARAGRAPHS AT THE BEGINNING OF SUBSECTION 209-5.1 TO READ:
Push button post shall be 4'6” tall Caltrans Type 1-B standard and comply with State Standard Specifications Section 86-2.04.

209-5.3 Conductors and Cable.
209-5.3.1 General.
ADD NEW PARAGRAPHS AT THE END OF SUBSECTION 209-5.3.1 TO READ:
Traffic signal cable shall consist of 12, No. 14 AWG conductors. Conductors shall be solid and conform to the requirements of ASTM Designation B3. The conductors shall be individually insulated with polyethylene compound. Cable shall comply with IMSA Specification 19-1. The insulation shall be approved as Type TW Underwriters' Laboratories, Inc.

Traffic signal conductor identification, numbering, and color coding shall conform to City standard drawing E-34.

Mast arm traffic signal heads shall be connected with 5-conductor, No. 14 AWG cable between head and terminal block inside traffic signal mounting adapter. The cable shall meet the above specifications for 12-conductor cable.

CHANGE A SENTENCE IN THE THIRD PARAGRAPH OF SUBSECTION 209-5.3.1 TO READ:
From "conforming to IMSA 9-1” to “IMSA Specification 19-1”.

ADD NEW PARAGRAPHS AT THE END OF SUBSECTION 209-5.3.1 TO READ:
Condulet

Where noted on the plans codulets shall be attached to the controller cabinet with metallic connectors. Any penetrations into cabinet shall be sealed with either rubber grommet or caulking.

209-5.3.4 Fiber Optic Cable.
REPLACE SECTION 209-5.3.4 WITH THE FOLLOWING TO READ:
209-5.3.4.1 General. All cable shall be in accordance to these specifications and to the latest City of Oakland Telecommunications Standards. Submittals specified in the standard specifications and in the latest City of Oakland Telecommunications Standards shall be submitted for approval following the submittal procedure set forth in these Special Provisions.

All fiber optic cable shall be armored, loose tube, gel-free, single-mode fiber optic (SMFO) cable with a wavelength of 1,310/1,550nm and a maximum attenuation of 0.35/0.2dB/km.

All fiber optic cable shall be manufactured by Corning, or approved equal. 12-strand SMFO cable shall be used as the branch cable to connect the main trunk cable to the field devices as shown on the Plans.

Non-armored cable is allowable only at locations where the existing conduit cannot accommodate the armored cable(s) if the armored cable results in a fill of the conduit in excess of thirty five –percent (35%). In no case shall the non-armored cable cause the fill percentage in the conduit to exceed the NEC standard.
**209-5.3.4.2 SMFO Trunk Cable.** Each length of cable shall be permanently identified by specifying the manufacturer and type of cable at intervals not greater than 6 feet along the outside of the outer jacket. Each length of cables shall be permanently marked with length marking intervals not greater than 3 feet.

The Contractor shall submit certification from the manufacturer that the above requirements have been met by the cable supplied to the project. Documentation of factory results shall be provided to the Project Engineer prior to shipping.

**209-5.3.4.3 12 SMFO Branch Cable.** Furnish and install 12 SMFO branch cable that has factory terminated Male SC-type connectors on all twelve fibers at one end of the cable. The end opposite the connectors shall be left bare for fusion splicing in a fiber optic splice box. Branch cable shall meet or exceed the applicable provisions of the following documents:

- CFR 1755.900, RUS Specification for Filled Fiber Optic Cables;
- EIA-455-27A, Method of Measuring (Uncoated) Diameter of Optical Waveguide Fibers;
- EIA-455-28B, Method for Measuring Tensile Failure Point of Optical Waveguide Fibers;
- EIA-455-34, Interconnection Device Insertion Loss Test;
- EIA/TIA-455-82A, Water Penetration Test;
- EIA-455-95, Absolute Optical Power Test for Optical Fibers and Cables;
- EIA-455-103, Buffered Fiber Bend Test; and
- EIA-359-A-1, Special Colors.

**209-5.3.4.4 Fiber Optic Jumper Cable.** Furnish and install jumper cables that meet the following requirements:

- 250 \( \mu \text{m} \) buffering of each fiber
- 900 \( \mu \text{m} \) buffering of each fiber applied after the initial 250\( \mu \text{m} \) buffering
- Maximum factory measured insertion loss of 0.5 dB per EIA/TIA 455-171
- Less than 0.2 dB loss when subjected to EIA/TIA-455-1B, 300 cycles, 1.1 lbs.
- Aramid yarn strength member
- Rugged 0.12 inch (approximate) PVC sheathing
- Minimum bend radius of 12.5” following installation, 25” during installation
- Minimum tensile strength of 100 lbf
- ST connectors as needed, factory terminated with strain relief
- Comply with NEC requirements for indoor cable when used indoors
- Rated by the manufacturer for use in outdoor field cabinets

Use either single fiber or duplex jumper cables. Provide permanent markings on duplex jumper cables that provide a visual distinction between the two fibers. Provide strain relief for jumper cables at both ends and elsewhere as needed. Adhere to manufacturer recommended installation and minimum bend radius requirements.

The fiber termination panel end of the patch cable shall be a LC connector, and the switch end of the patch cable shall be a LC connector.

**209-5.3.4.5 Fiber Optic CAT 6 Patch Cable.** Furnish and install Fiber Optic CAT 6 Patch cables that meet the following requirements:

- Network Compatibility: 10 and 100 Base-T
- RJ45 male to male connectors
- Color blue
- Model # P-A3L791 as manufactured by Belkin or equal.
209-5.3.4.6 Fiber Optic Pigtails. Fiber optic pigtails shall meet the requirements for jumper cable, except as amended by this subsection. Pigtails need not have a 0.12 inch PVC jacket. Use pigtails that have a factory installed male SC type connector on one end. Leave the other end of the pigtail bare for splicing to fiber.

209-5.3.4.7 Underground Fiber Splice Closures. Underground fiber splice closures shall be butt-end style, corrosion resistant, watertight, and meet the latest requirements of GR-771-CORE. Underground splice closures shall seal, bond, anchor, and provide efficient routing, storage, organization, and protection for fiber optic cable and splices. The splice closure shall provide an internal configuration and end cap with a minimum of two express ports for entry and exit of backbone cable and a minimum of three additional ports for distribution and branch cables. Splice closures shall have a reliable dual seal design with both the cable jackets and core tubes sealed, without the use of water-blocking material. The splice closures shall be capable of being opened and completely resealed without loss of performance.

The fiber splice closures shall be equipped with splice trays that are designed specifically for housing single-mode fusion splices protected by heat-shrink sleeves, are easy to install and remove, and have provisions for a minimum number of splices accommodated by the splice closure. At a minimum, the splice closure shall accommodate 48 splices. The splice closure maximum dimensions shall not exceed 17”L x 9”W x 7.5”H.

209-5.3.4.8 Fiber Termination Panel. The fiber termination panel shall be REALM Distribution System (RDS) 1RU Patch and Splice Panel or approved equal. The panel shall be:

1) 1.75” in height and 17.5” in width
2) Allows for 3 adapter plates and up to 72 fibers using LC duplex adapters (Per rack unit)
3) Dual sliding tray system allows front panel slide out access without straining rear mounted cable
4) Mounts in 19” or 23” racks or cabinets
5) Can be pre-loaded with adapter plates, adapters, pigtails or splice cartridges
6) Custom or standard loading options available
7) Front door locking option available

The fiber splice cartridge shall be:
1) From 6 to 24 fiber configurations
2) Based on standard footprint of 118mm between mounting holes
3) Cartridge is available to include: laser safety smoked polycarbonate cover, bulkhead adapters, color coded pigtails, splice sleeve holder and splice sleeves
4) Pigtails can be 900um tight or loose buffered (900um loose buffer saves space & allows for easy splicing of 250um-250um fiber in loose tube cable
5) Pigtail end can be configured with ribbon fiber
6) Back side of cartridge has port ID chart for up to 24 terminations
7) Provision of optional MPO style connector/s at the rear port for quick plug & play applications
8) Heavy duty cable clamp and waterfalls included
9) Optional screw down metal cover

The fiber termination panel (FTP) shall be a 12-port panel that can accommodate 12-strand lateral cable.

209-5.3.4.9 Ethernet Edge Switch. The Ethernet Edge Switch shall be a Cisco IE-3000-8TC (Layer 2) or approved equal which has successfully been installed and operated in the City of Oakland for a period of one year as determined by the City of Oakland IT Division.

Cisco IE-3000-8TC shall include the following items:

- 1Gigabit ps Single Mode Rugged SFP (2 fibers per port)
- Field hardened power transformer

The Edge Switch shall be environmentally hardened and intended for industrial applications and shall meet or exceed the NEMA TS2 2003 environmental requirements. The switch shall meet, at a minimum, the following requirements:
• A minimum of two (2) 100BASE-FX ports (transmit and receive) capable of transmitting Ethernet data at 100 Mb/s over single mode fiber, full duplex (SFP ports)

• A minimum of six (6) autosensing 100BASE-TX / 10BASE-T RJ45 ports capable of transmitting Ethernet data at 10 or 1 Gb/s, full duplex.

• Switch shall be capable of operating using an input voltage of 120VAC at 60Hz with a maximum power consumption of 20 watts, or shall come equipped with power supplies capable of doing so.

• Switch ports shall comply with the following standards:
  - IEEE 802.3 10Base-T
  - IEEE 802.3u 100Base-TX
  - IEEE 802.3u 100Base-FX
  - IEEE 802.3ab 1000Base-T
  - IEEE 802.3z 1000Base-SX and 1000Base-LX
  - IEEE 802.1P priority queuing
  - IEEE 802.3X flow control

• Wire speed switching on all ports simultaneously, non-blocking

• IEEE 802.1Q VLAN Tagging 4 port trunking groups with up to 2~4 ports per group with support for 256 VLANS

• Meets Bellcore GR-63-CORE vibration and shock specifications for NEBS Level III compliance (optional)

• Operating temperature = -34 to +74 degrees Celsius

• Relative humidity = 10% - 90%, non-condensing

• UL listed (UL1950), cUL, CE

• Emissions meet FCC Part 15, Class A

• Minimum MTBF of 8 years (Bellcore Method)

• Packet Filtering and Port Security Destination MAC

• MAC address learning with a minimum of 1028 MAC addresses and ≥ 1028 static MAC addresses

• IEEE 802.1p QoS Classification based on: Port based priority VLAN Priority field in VLAN tagged frame DS/TOS field in IP packet UDP/TCP logical ports

• IEEE 802.1w Rapid Spanning Tree Algorithm

• IP Multicast Filtering through IGMP Snooping

• Support Telnet, SNMP v1 & v2, RMON, Web Browser, Port Mirroring (RFC 1757, TFTP, FTP and CL
cienne)

• MIB statistics counters for all ports

• Management and configuration shall be able to be performed through an integrated web interface

• Support remote reset and remote management

• Support remote turn on/off of 10/100 Base-T ports

The switch shall have a minimum MTBF of 60,000 hours. The MTBF shall be calculated in accordance with the methods described in Mil-Std HDBK 217F for a temperature of 55ºC for naval sheltered.

209-5.3.4.10 C2F Hub Switch. The hub switch shall be a Cisco WS-C3850-48XS-S and ws-3850-48XS-E, with 48 small form pluggable (SFP) ports (Part No. GLC-LH-SMD). The hub switch shall include a 350 W minimum power supply (no power over Ethernet). The port configuration shall include a minimum of 4 x 1 Gigabit Ethernet and a minimum of 2 x 10 Gigabit Ethernet SFP (total 12 SFP – Cisco OEM).

209-5.4 Controllers.

209-5.4.1 General.

ADD TO THE END OF SUBSECTION 209-5.4.1 TO READ:

Unless otherwise noted in the plan, the controller shall be the Model 2070E (Caltrans Rack Mount type) ATC traffic controller and the conflict monitor shall be Type 2010 per California Department of Transportation’s (Caltrans) Specification, shall be registered on the current Caltrans Pre-Qualified Product List (QPL). The controller shall be equipped with the following modules:

2070-1E CPU with 8MB RAM and Ethernet Port

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2070-2E  Field I/O Module for 332 cabinets
2070-3B  8x40 Line Display and dual keyboard panel
2070-4A  Heavy-Duty 3A Power Supply Module
2070-7A  Dual Serial Port Card, RS-232
OS-9  Microware OS9 v3.2 or higher operating system

Latest version of Trafficware/Naztec 2070 controller firmware with remote traffic responsive functionality shall be installed.

Two copies of the software operations manual shall be provided with each Model 2070E controller delivered.

Furnish and install auxiliary output file in controller cabinet. Remove and replace existing conflict monitor with 18-phase conflict monitor.

209-5.4.1a Central Control System Seat License.
ADD NEW SECTION 209-5.4.1a TO READ:

The Contractor shall pay for the expanded controller field connection licenses for the existing City of Oakland Advanced Traffic Management System (ATMS) software, Naztec ATMS.now, to accommodate the field controller(s) added or replaced by the project. Contractor is responsible for coordination and configuration of the software installation and shall provide the licenses to operate said software to the City of Oakland through AC Transit. Contractor is directed to work through the Resident Engineer for transmitting the licenses.

209-5.4.1b GPS-Based Time Source Receiver.
ADD NEW SECTION 209-5.4.1b TO READ:

The GPS-based time source data receiver shall meet the environmental requirements of NEMA TS2, and include mounting hardware and weather gaskets for top-of-cabinet installation. The GPS time source shall include fused power connections to the 24VDC Model 206 cabinet power supply, and a 4800-baud RS-232 data connections cable to the controller unit (CU) Model 2070-7A serial port communications card. An NMEA standard GPS-based time source receiver unit supplied shall be a Garmin International Model GPS-16A, or City of Oakland approved equal, with Model 2070-7A controller data and power supply cables. If GPS time source is installed in a cabinet with a controller other than a Model 2070, the GPS time source shall be compatible with the existing controller, and it shall be approved by the City of Oakland.

209-5.4.3 Cabinets.
209-5.4.3.1 General.
ADD TO THE BEGINNING OF SUBSECTION 209-5.4.3.1 TO READ:

Unless otherwise noted in the plan, the controller cabinet assembly shall be Model 332 and wired with all auxiliary equipment to control the system and shall conform to State Standard Specifications.

Where shown on the plans, each cabinet shall also include a side mounted NEMA 4X cabinet or approved equal.

209-5.5 Traffic Signal Faces and Fittings.
ADD THE FOLLOWING TO THE BEGINNING OF SECTION 209-5.5 TO READ:

The traffic signal faces and signal heads shall comply with the following specifications:

1. Signal module shall be 12-inch and of Dialight Corp or approved equal which has successfully operated in the City of Oakland for a period of one year as determined by the City of Oakland Electrical Services Division.
2. Each traffic signal shall be complete with metal housing, glass lenses, metal or glass reflectors, sockets visors and other parts, all in accordance with these specifications. Tabs shall be located at 45-135-225-315 degree positions of the visor.
3. The signal heads shall conform to the specifications of the Institute of Traffic Engineers’ (ITE) Technical Report Number 1, 1970 Revision. Visor shall also conform to the ITE Publication ST-008B.
4. Each Signal head, as a minimum, shall display three round colored lenses arranged vertically with “Red” on top, “Yellow” in the middle and “Green” at the bottom in addition to the following:
The 3-section mast arm signal shall include a MV_1 (Caltrans MAS) plumbizer.

The RED Circular and Arrow indications shall be the Dialight Corporation LED modules or approved equal. The catalog numbers are as follows:

- 12-inch Red Arrow LED module – Model #435-1314-001 Tinted
- 12-inch Red Circular LED module – Model #433-1210-003 Tinted

The GREEN Circular and Arrow indications shall also be the Dialight Corporation LED modules or approved equal. The catalog numbers are as follows:

- 12-inch Green Arrow LED module – Model #435-2324-001 Tinted
- 12-inch Green Circular LED module – Model #433-2220-001 Tinted

The YELLOW Circular and Arrow indications shall also be the Dialight Corporation LED modules or approved equal. The catalog numbers are as follows:

- 12-inch Yellow Arrow LED module – Model #435-3334-001 Tinted
- 12-inch Yellow Circular LED module – Model #433-3230-001 Tinted

209-5.6 Pedestrian Signal Sections.
REPLACE SECTION 209-5.6 WITH THE FOLLOWING TO READ:

Pedestrian module shall be Dialight Corp’s LED countdown head (#430-6479-001X) or approved equal which has successfully operated in the City of Oakland for a period of one year as determined by the City of Oakland Electrical Services Division.

209-5.7 Signal Mounting Assemblies.
REPLACE SECTION 209-5.7 WITH THE FOLLOWING TO READ:

Signal mounting assemblies shall confirm with State Standard Plans and Specifications. All pole mounted signal mounting assemblies shall be State “with terminal compartment” type.

209-5.8 Detectors.
209-5.8.4 Video Detection Camera.
ADD NEW SUBSECTION 209-5.8.4 TO READ:

Unless otherwise specified, the video detection camera shall be Vantage Vector with radar for advance zones RZ-4 Advanced WDR by Iteris, Inc. or approved equal which has successfully been installed and operated in the City of Oakland for a period of one year as determined by the City of Oakland Electrical Services Division. Each video camera system needs to also include the "Edge" processor system and communication cards.

The video detection camera shall be a complete functioning system with color cameras, processors, all necessary video and power cabling, mounting brackets, lightning and surge protection as recommended by the manufacturer, video detection processors, 17” rack mounted video monitor at each controller cabinet and extension modules capable of processing the number of cameras and phase combination video sources shown on the plans.

209-5.9 Accessible Pedestrian Signal (APS) Push Button Assemblies.
REPLACE SUBSECTION 209-5.9 WITH THE FOLLOWING TO READ:

Unless otherwise specified, APS Push Button Assemblies shall be ADA compliant pedestrian push button. Pedestrian push button shall have audible and vibrotactile features which have successfully operated in the City of Oakland for a period of one year as determined by the City of Oakland Electrical Services Division. The audible function shall have a custom message approved by the City or Oakland’s Transportation Services see Attachment 10. The Contractor shall prepare the text of each audible message and submit to the Engineer for approval by the City of Oakland prior to installation at each traffic signal.

APS Push Button Assemblies shall be in accordance with State Standard Specifications 86-5.02, California Manual on Uniform Traffic Control Devices (California MUTCD), Americans with Disabilities Act (ADA) and Institute of Transportation Engineers.

The Contractor shall furnish metal type housing pedestrian push button (PPB) including sign with appropriate arrow indication and high visibility banding. Sign shall be in accordance with California MUTCD Sign R10-4b. The sign shall fit completely within the assembly frame. Braille shall not be provided. The sign shall be fabricated from aluminum with Type III High Intensity sheeting.
Pedestrian Push Button shall be in accordance with State Standard Specifications Section 86-5.02, “Pedestrian Push Button Assemblies,” and these special provisions. Unless otherwise noted on the plans, pedestrian push buttons shall be located within 5 feet of the side of the curb ramp, measured from the edge farthest from the center of the intersection, and between 1.5 and 6 feet from the edge of the curb.

At each pole on which a pedestrian push button is located at a signalized intersection (new or existing) within the project limits, contractor shall install reflective tape as specified in the California Building Code Section 1178.5.9. The reflective tape shall consist of a textured horizontal yellow band 2-inches in width encircling the pole, and a 1-inch wide black border band above and below the yellow band. Reflective tape shall be placed on the pole, at the height of the button. Button shall be installed over the tape. Reflective tape shall be made of reflective sheeting, 3M Engineer Grade, or approved equivalent.

209-5.10 Splice Chamber.
ADD NEW SUBSECTION 209-5.10 TO READ:

All splice chamber parts/components shall be furnished by the City of Oakland Electrical Services Department and paid for by the Contractor, District. The Contractor shall submit to the Engineer for approval the proposed schedule for number of splice chambers required at each intersection and dates the splice chambers are needed for each intersection. The schedule shall incorporate the following requirements:

1. A maximum of 100 splice chambers shall be in the City’s possession at any given time
2. A maximum of 50 splice chambers can be fabricated upon 4 weeks proper notice

The schedule and quantity shall be confirmed each month and revised as necessary. Revised schedules must be approved by the Engineer. The Engineer will order the splice chamber according to the approved schedule. The Contractor shall pick up the splice chambers from the City of Oakland’s facilities as directed by the Engineer.

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209-5.11 Internally LED Illuminated Street Name Sign (IISNS).
ADD NEW SUBSECTION 209-5.11 TO READ:

IISNS shall be Temple Edge Lit model R409, or approved equal which has successfully operated in the City of Oakland for a period of one year as determined by the City of Oakland Electrical Services Division.

ADD NEW SUBSECTION 209-5.12 TO READ:

The Contractor shall furnish and install, where shown on the Plans, an Opticom emergency vehicle preemption and transit signal priority system manufactured by GTT and approved by the City of Oakland Electrical Services Division, functional with existing City systems, and conforming to the Alameda County Transportation Commission SMART Corridors and AC Transit Rapid Bus Program. The EVP/TSP equipment must conform to the equipment installed by the AC Transit Line 51 project. The devices to be furnished and installed by the contractor shall be functional with the existing on-board equipment that is currently used by the City of Oakland emergency vehicles.

The EVP/TSP equipment must be compatible with the Central Management System, with Advanced Schedule Management functionality that will be deployed by AC Transit and City of Oakland for this project.

209-5.12.1 General.

The EVP (Optical) and TSP (GPS Radio) shall operate as a single system. The equipment for EVP and TSP must be from a single manufacturer. The system shall share a phase selector card. The equipment as referred to in these Special Provisions must include, but not be limited to, the following:

1. Optical Detection Unit and Mounting (Model No. 721)
2. TSP Intersection Equipment (GPS Radio Unit – Model No. 3100, GPS installation cable – Model No. 1070)
3. Discriminator Module (Model No. 764)
4. System Chassis
5. Card Rack – as needed by location
6. Green Sense Harness (Model No. 768)
7. Detector Cable (Model No. 138)
8. All associated power cables, accessories, and components recommended by the manufacturer and necessary to accomplish a fully functional EVP and TSP installation.
209-5.12.2 Functional Capabilities.

The EVP/TSP equipment will provide traffic signal priority preemption to emergency vehicles and Class 1 (Transit) detection by altering the phasing of the traffic signals depending on the phase selection criteria. Each modulated light signal detection system shall consist of an optical emitter assembly or assemblies located on the appropriate vehicle and an optical detector/discriminator assembly or assemblies located at the traffic signal. Emitter assemblies are not required for this project except units for testing purposes to demonstrate that the systems perform as specified. The Contractor shall conduct the test in the presence of the Engineer as described below under “System Operation” during the signal test period. The Contractor shall give the Engineer a minimum of two working day’s notice prior to performing the tests.

Each system shall permit detection of authorized vehicles. Class II (emergency) vehicles and Class 1 (transit) vehicles and shall be capable of being detected at any range up to 1800 feet from the optical detector. Detection shall be both optical detection and GPS/radio detection.

Each optical system shall permit detection of authorized vehicles. Class II (emergency) vehicles and Class 1 (transit) vehicles and shall be capable of being detected at any range up to 1800 feet from the optical detector.

The optical modulation frequency for Class II signal emitters shall be 14.035 Hz ±0.250 Hz.

The optical modulation frequency for Class 1 signal emitters shall be 10Hz ±0.250 Hz.

Each TSP GPS wireless system shall permit detection of Class 1 vehicles at any range up to 2300 feet from the TSP GPS wireless antenna.

A system shall conform to the requirements in Section 25352, of the California Vehicle Code.

209-5.12.3 Optical Detection.

Each optical detection assembly shall consist of one or more optical detectors, and connecting cable. Each such assembly, when used with standard emitters, shall have a range of at least 1000 feet for Class I signals and 1800 feet for Class II signals. Standard emitters for both classes of signals shall be available from the manufacturer of the system.

209-5.12.3.1 Optical Detector (Model No. 721).

Each optical detector shall be a waterproof unit capable of receiving optical energy from two separately aimable directions. The horizontal angle between the two directions shall be variable from 180 degrees to 5 degrees. The reception angle for each photocell assembly shall be a maximum of 8 degrees in all directions about the aiming axis of the assembly. Measurements of reception angle will be taken at a range of 1000 feet for a Type I emitter and at a range of 1800 feet for a Type II emitter.

All internal circuitry shall be solid state.

Each optical detector shall be contained in a housing, which shall include two rotatable photocell assemblies, an electronic assembly, and a base. The base shall have an opening to permit its mounting on a mast arm or a vertical pipe nipple, or suspension from a span wire. The mounting opening shall have female threads for Size 21 conduit. A cable entrance shall be provided which shall have male threads and gasketing to permit a waterproof cable connection. Each detector shall have mass of less than 2.4 pounds and shall present a maximum wind load area of 35.6 square inches. The housing shall be provided with weep holes to permit drainage of condensed moisture.

Each optical detector shall be installed, wired and aimed as specified by the manufacturer.

209-5.12.3.2 Cable (Model No. 138).

Optical detector cable (EV-DLC) shall meet the requirements of IPCEA S 61-402/NEMA WC 5, Section 7.4, 600-V control cable, 170°F, Type B, and the following:

1. The cable shall contain 3 conductors, each of which shall be No. 20 (7 x 28) stranded, tinned copper with low-density polyethylene insulation. Minimum average insulation thickness shall be 0.025 inches. Insulation of individual conductors shall be color coded: 1 yellow, 1 blue, 1 orange.
2. The shield shall be either tinned copper braid or aluminized polyester film with a nominal 20 percent overlap. Where the film is used, a No. 20 (7 x 28) stranded, tinned, bare drain wire shall be placed between the insulated conductors and the shield and in contact with the conductive surface of the shield.
3. The jacket shall be black polyvinyl chloride with minimum ratings of 600 V and 175°F and a minimum average thickness of 0.04 inches: The jacket shall be marked as required by IPCEA/NEMA.
4. The finished outside diameter of the cable shall not exceed 0.35 inches.
5. The capacitance, as measured between any conductor and the other conductors and the shield, shall not exceed 157 pf per meter at 1000 Hz.
6. The cable run between each detector and the controller cabinet shall be continuous without splices or shall be spliced only as directed by the detector manufacturer.

209-5.12.4 TSP System Intersection Equipment.
Note the Traffic Signal Priority system and the Emergency Vehicle Preemption must be manufactured by a single manufacturer and the equipment must share a single phase selector card. The TSP must provide transit priority based on a user defined headway based system and provide a user defined schedule based option.

The TSP system shall maintain a complete history log of the following events, with bus emitter ID and unique time stamps for each event.

1. Time approaching bus detected, identified by direction
2. Time bus departs the intersection, identified by direction
3. Start of priority request sent to controller, identifying bus direction and calculated headway from preceding bus
4. End of priority request sent to controller, identifying bus direction.

The system shall include a GPS radio unit containing a GPS receiver with antenna and 2.4 GHz spread spectrum transceiver with antenna, multimode phase selector, auxiliary interface panel, GPS card rack and GPS installation cable. This installation shall be provided for every traffic signal identified as being modified or added in Segment B.

The TSP system intersection equipment shall be weather resistant, RF-energy-emitting GPS radio unit containing a GPS receiver with antenna and a 2.4 GHz spread spectrum transceiver with antenna. The radio unit shall be connected to a multimode phase selector by means of an 11-conductor radio/GPS cable.

209-5.12.5 Discriminator Module (Model No. 764).
Each discriminator module shall be designed to be compatible and usable with a Model 2070E controller unit and to be mounted in the input file of a Model 332 or Model 336 controller cabinet, and shall conform to the requirements of Chapter I of the State of California, Department of Transportation "Traffic Signal Control Equipment Specifications". The equipment shall be capable of providing multi-mode phase selector with Optical and GPS/Radio capabilities including four channel multiple-priority. The multi-modal device shall be able to be installed into a standard card rack within the controller cabinet. The unit shall be capable of using existing infrared or Radio/GPS system card racks. Additional card racks shall be provided if needed for installation.

209-5.12.5.1 Minimum Requirements. Each discriminator module shall meet the following minimum requirements:

1. Four channels of detection
2. Radio range of 2,500 – feet.
3. User-settable range setting by estimated time of arrival and or distance
4. Call bridging
5. Precise preemption output pulse
6. Optically isolated outputs
7. Variable outputs
8. High and low priority and probe frequency discrimination
9. First come, first serve priority within each priority level.
10. 10/100 Mb Ethernet and USB 2.0 communication capability.
11. RS232 communications front port, rear backplane and Auxiliary Interface Panel
12. History log of most recent GPS system activities (10,000 count)
13. Multivehicle agency/class/vehicle code combinations capability
14. Customizable ID code validation
15. Two character display, LED and keypad
16. Programmable option for priority control parameters
17. Capable of data export directly into Type 33X input files.
18. Compatible with Model 2070 E traffic signal controller
19. Meets NEMA environmental and electrical test specifications

209-5.12.5.2 Operation. Each discriminator module shall be capable of operating four channels, each of which shall provide an independent output for each separate input.

Each discriminator module, when used with its associated detectors, shall be capable of:
1. Receiving Class I signals at a range of up to 2300 feet from the TSP GPS wireless antenna and Class I and Class II signals at a range of up to 1800 feet from the optical detector.
2. Decoding the signals, on the basis of frequency, at 9.639 Hz ±0.119 Hz for Class I signals and 14.035 Hz ±0.255 Hz for Class II signals.
3. Establishing the validity of received signals on the basis of frequency and length of time received. A signal shall be considered valid only when received for more than 0.50 second. No combination of Class I signals shall be recognized as a Class II signal regardless of the number of signals being received, up to a maximum of ten signals. Once a valid signal has been recognized its effect shall be held by the module in the event of temporary loss of the signal for a period adjustable from 4.5 seconds to 11 seconds in at least 2 steps at 5 seconds ±0.5 second and 10 seconds ±0.5 second.
4. Providing an output for each channel that will result in a "low" or grounded condition of the appropriate input of a Model 2070E controller unit. For Class I signals, the output shall be a 6.25 Hz ±0.1 percent, rectangular waveform with a 50 percent duty cycle. For Class II signals the output shall be steady.

Each discriminator module shall receive electric power from the controller cabinet at either 24 VDC or 120 VAC. Multimode Phase Selector shall operate between 89 to 135 VAC, 60Hz as up to 500mA or 24 VDC at up to 1 Amp. The phase selector shall have a safe operation range between -24 degrees F to 165 degrees F. It must be capable of operating within a humidity range of 5% to 95%.

Each channel together with its associated detectors shall draw not more than 100 mA at 24 VDC or more than 100 mA at 120 VAC. Electric power, one detector input for each channel and one output for each channel, shall terminate at the printed circuit board edge connector pins listed in Table 209-5.12.5.2(A).
TABLE 209-5.12-2(A)

<table>
<thead>
<tr>
<th>BOARD EDGE CONNECTOR PIN ASSIGNMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>A DC ground</td>
</tr>
<tr>
<td>B +24 VDC</td>
</tr>
<tr>
<td>C (NC)</td>
</tr>
<tr>
<td>D Detector input, Channel A</td>
</tr>
<tr>
<td>E +24 VDC to detectors</td>
</tr>
<tr>
<td>F Channel A output (C)</td>
</tr>
<tr>
<td>G Channel A output (E)</td>
</tr>
<tr>
<td>J Detector input, Channel B</td>
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<tr>
<td>K DC Ground to detectors</td>
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<tr>
<td>L Chassis ground</td>
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<td>M AC-</td>
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<td>N AC+</td>
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<td>P (NC)</td>
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<td>S (NC)</td>
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<td>T (NC)</td>
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<tr>
<td>U (NC)</td>
</tr>
<tr>
<td>V (NC)</td>
</tr>
<tr>
<td>W Channel B Output (C)</td>
</tr>
<tr>
<td>X Channel B Output (E)</td>
</tr>
<tr>
<td>(C) Collector, Slotted for Keying</td>
</tr>
<tr>
<td>(E) Emitter, Slotted for Keying</td>
</tr>
<tr>
<td>(NC) Not connected, cannot be used by manufacturer for any purpose.</td>
</tr>
</tbody>
</table>

209-5.12.5.3 Channel Input/Output. Two auxiliary inputs for each channel shall enter each module through the front panel connector. Pin assignment for the connector shall be as follows:

1. Auxiliary detector 1 input, Channel A
2. Auxiliary detector 2 input, Channel A
3. Auxiliary detector 1 input, Channel B
4. Auxiliary detector 2 input, Channel B

Each channel output shall be an optically isolated NPN open collector transistor capable of sinking 50 mA at 30 V and shall be compatible with the Model 2070E controller unit inputs.

Each discriminator module shall be provided with means of preventing transients received by the detector from affecting the Model 2070E controller assembly.

209-5.12.5.4 Front Panel. Each discriminator module shall have a single connector board and shall occupy one slot width of the input file. The front panel of each module shall have a handle to facilitate withdrawal and the following controls and indicators for each channel:

1. Three separate range adjustments each for both Class I and Class II signals.
2. A 3-position, center-off, momentary contact switch, one position (down) labeled for test operation of Class I signals, and one position (up) labeled for test operation of Class II signals.
3. A "signal" indication and a "call" indication each for Class I and for Class II signals. The "signal" indication denotes that a signal above the threshold level has been received. A "call" indication denotes that a steady, validly coded signal has been received. These two indications may be accomplished with a single indication lamp; "signal" being denoted by a flashing indication and "call" with a steady indication.

209-5.12.5.5 Front Panel Connections. The front panel shall be provided with a single circular, bayonet-captured, multi-pin connector for two auxiliary detector inputs for each channel. Connector shall be a mechanical configuration equivalent to a MIL C-26482 with 10 4 insert arrangement, such as Burndy Trim Trio Bantamate Series, consisting of:

1. Wall mounting receptacle, G0B10-4PNE with SM20M-1S6 gold plated pins.
2. Plug, G6L10-4SNE with SC20M-1S6 gold plated sockets, cable clamp and strain relief that shall provide for a right angle turn within 2.56” (65 mm) maximum from the front panel surface of the discriminator module.
209-5.12.5.6 Cabinet Wiring. The Model 332 cabinet has provisions for connections between the optical detectors, the discriminator module and the Model 2070E controller unit.

Wiring for a Model 332 cabinet shall conform to the following:

1. Slots 12 and 13 of input file “J” have each been wired to accept a 2 channel module.
2. Field wiring for the primary detectors, except 24-VDC power, shall terminate on either terminal board TB 9 in the controller cabinet or on the rear of input file “J”, depending on cabinet configuration. Where TB 9 is used position assignments shall be as shown in Table 209-5.12.6(A)

<table>
<thead>
<tr>
<th>Position</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Channel A detector input, 1st module (Slot J-12)</td>
</tr>
<tr>
<td>5</td>
<td>Channel B detector input, 1st module (Slot J-12)</td>
</tr>
<tr>
<td>7</td>
<td>Channel A detector input, 2nd module (Slot J-13)</td>
</tr>
<tr>
<td>8</td>
<td>Channel B detector input, 2nd module (Slot J-13)</td>
</tr>
</tbody>
</table>

The 24 VDC cabinet power will be available at Position 1 of terminal board TB 1 in the controller cabinet.

All field wiring for the auxiliary detectors shall terminate on terminal board TB O in the controller cabinet. Position assignments shall be as shown in Table 209-5.12.6(B).

<table>
<thead>
<tr>
<th>FOR MODULE 1 (J-12)</th>
<th>FOR MODULE 2 (J-13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position</td>
<td>Position</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>8</td>
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<td>3</td>
<td>9</td>
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<td>4</td>
<td>10</td>
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<tr>
<td>5</td>
<td>11</td>
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<tr>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

209-5.12.7 Installation. The Contractor shall install the detector unit(s), GPS/radio equipment, mounting hardware, cabling, discriminator unit(s), system chassis, card rack(s), and green sense harness and shall coordinate with manufacturer’s representative for programming and calibration of the detector and discriminator units. The Contractor shall follow step-by-step instructions provided by the equipment manufacturer and supplier to provide a fully functional installation. Contractor shall confirm location of each TSP wireless access point provides suitable line of sight prior to installation. Each location shall be approved by the Engineer prior to installation. Adjustments to TSP wireless access points for line of sight incidental to other work must be approved by Engineer prior to installation.

209-5.12.8 System Operation. A TSP system shall be provided that fully complies with all requirements set out in the TSP System Requirements document, and with all compatibility requirements contained elsewhere in these specifications, see Attachment 9.

The TSP system shall be able to activate exclusive transit phases, grant early green or extended green. TSP shall not truncate pedestrian walk and flashing don’t walk time period.

The Contractor shall demonstrate that all of the components of each system are compatible and will perform satisfactorily as a system. Satisfactory performance shall be determined using the following test procedure during the functional test period:

1. Each system to be used for testing shall consist of an optical emitter assembly, an optical detector, optical detector cable, GPS/radio equipment and cabling, and a discriminator module.
2. The discriminator modules shall be installed in the proper input file slot of the Model 2070E controller assembly.
3. Two tests shall be conducted; one using a Class I signal emitter and a distance of 1000' (300 m) between the emitter and the detector, the other using a Class II signal emitter and a distance of 1800' (550 m) between the emitter and the detector. All range adjustments on the module shall be set to "Maximum" for each test.

4. Each above test shall be conducted for a period of one hour, during which the emitter shall be operated for 30 cycles, each consisting of a one minute "on" interval and a one minute "off" interval. During the total test period (1) the emitter signal shall cause the proper response from the Model 2070E controller unit during each "on" interval and (2) there shall be no improper operation of either the Model 2070E controller unit or the monitor during each "off" interval.

209-5.12.9 Software Interface and Central Management System. Opticom Central Management System software shall be provided, installed and configured to permit an operator to remotely access all parameters in all TSP modules installed in local intersection cabinets. The software shall include the Advanced Schedule Management (ASM) module and provide headway-based and schedule-based functionality. The software shall operate on a standard MS Windows-based PC situated at the City of Oakland TMC that communicates directly with all TSP modules in each local intersection cabinet along the BRT route. The operator shall interface with the software from remote workstations at AC Transit, City of Oakland, City of San Leandro and Caltrans. The software shall maintain a historical log of all events at the TSP modules in all local intersection cabinets.

The software shall produce reports that satisfy all reporting requirements listed in the TSP System Requirements document at the operators command.

209-5.12.9.1 Central Management System Server. The Contractor shall provide and configure a server for the Central Management System to be installed at the City of Oakland TMC.

209-5.12.9.1.1 Server Hardware. The server shall meet the following minimum hardware requirements:

1. 2X AMD Opteron 6134 2.3GHz, 8C, 4M L2/12M L3, 1333Mhz
2. 32 GB 1333 LV RDIMMs for 2 processors
3. 2 TB (RAID 5 or other)
4. 1GB Ethernet connection
5. Data backup methodology in place
6. DVD Drive

209-5.12.9.1.2 Server Software. The server shall include software meeting the following requirements:

2. SQL Database: SQL Server 2008 R2, Service Pack 2 (Standard) or SQL Server 2005, Service Pack 4 (Standard)

209-5.12.10 System Demonstration. Prior to installation of any TSP equipment, the contractor must demonstrate to the satisfaction of the Engineer full ability of the TSP system to provide signal priority in accordance with the TSP System Requirements set out in Attachment 9, in both headway adherence mode and schedule adherence mode. This may be achieved by demonstrating and documenting successful in-service operation at another location, or by setting up a pilot demonstration in a laboratory, or by temporarily setting appropriate equipment on AC Transit District buses and at traffic signals operated by an agency within AC Transit Districts’ service area. Contractor shall obtain all necessary and appropriate approvals from all public agencies involved in or affected by the demonstration. The method of demonstration must be approved by the Engineer before the demonstration proceeds.

Prior to conducting the demonstration, contractor must submit a detailed TSP System Demonstration Plan that explains how each requirement set out in the TSP System Requirements in Attachment 9 will be verified, and describes in detail each applicable test procedure, the manner in which the test results will be recorded, the basis for determining compliance with each requirement, and the actions to be taken whenever a test fails to prove the system satisfies a requirement. All demonstration verification tests must be witnessed by the Engineer or authorized representative, and must be documented to the satisfaction of the Engineer before permanent installation of any TSP equipment.
209.5.12.11 System Verification. The contractor must submit a TSP System Verification Plan to the satisfaction of the Engineer prior to installation of any permanent TSP equipment. The plan shall explain how each requirement set out in the TSP System Requirements in Attachment 9 will be verified, and describes in detail each applicable test procedure, the manner in which the test results will be recorded, the basis for determining compliance with each requirement, and the actions to be taken whenever a test fails to prove the system satisfies a requirement. The plan must be used to determine final verification that the fully installed system complies with all TSP System Requirements set out in Attachment 9. Acceptance of the TSP System shall require completion of all verification tests with test results satisfactory to the Engineer.

SECTION 210 - PAINT AND PROTECTIVE COATINGS

210-1 PAINT.
210-1.6 Paint for Traffic Striping, Pavement Marking, and Curb Marking.
210-1.6.5 Reflective Material.

REPLACE THE LAST PARAGRAPH OF SUBSECTION 210-1.6.5 WITH THE FOLLOWING TWO PARAGRAPHS:

Thermoplastic traffic striping shall be reflectorized material applied to the road surface in a molten state by extrusion method or as approved by the Engineer. It shall have surface application of glass beads, which upon cooling to normal pavement temperature shall produce an adherent reflectorized stripe of the specified thickness and width, and shall be resistant to deformation by traffic. Thermoplastic material shall conform to State Specification PTH-02ALKYD, PTH-02SPRAY, or PTH-02HYDRO to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-004.

Thermoplastic striping application shall conform to State Standard Specification section 84-1.03E and the requirements included herein. Thermoplastic material shall be applied at a thickness of 0.125 to 0.188 inch. Glass beads shall be applied immediately to the surface of the molten thermoplastic material by an automatic bead dispenser closely behind the striped line. The glass bead dispenser shall be equipped with an automatic cut-off control that shall be synchronized with the cut-off of the thermoplastic material. Beads shall be applied at the rate of not less than 10 pounds per 100 square feet.

The Contractor shall use a durable, high skid and slip resistant, thermoplastic pavement marking material suitable for use as bike lane. The material shall:

1. Be a resilient preformed thermoplastic product containing a minimum thirty percent (30%) intermix of anti-skid/anti-slip elements and where the top surface contains anti-skid/anti-slip elements. These anti-skid/anti-slip elements must have a minimum hardness of 8 (Mohs scale).
2. Be a resistant to the detrimental effects of motor fuels, antifreeze, lubricants, hydraulic fluids, and other automobile fluids.
3. Be a capable of being applied on bituminous pavement and portland cement concrete pavements by the use of a handheld heat torch, infrared heater, or a blue-flame radiant heater.
4. Be a capable of being applied to asphalt concrete and portland cement concrete surfaces without preheating the application surface to a specific temperature.
5. Be a capable of being affixed to green concrete (concrete that has set but not appreciably hardened). The material shall not require the portland cement concrete application areas to be cured or dried out.
6. Be a capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures.
7. Be supplied in segments measuring 2 feet. x 3 feet.
8. Be capable of being applied in temperatures down to 45°F without any special storage, preheating or treatment of the material before application.
9. Contain heating indicators evenly distributed on the surface that shall act as visual cues during both the application process and post-application.
10. Be manufactured by an ISO 9001:2008 certified for design, development and manufacturing. Manufacture shall provide proof of current certification. The scope of the certification shall include the design, development and manufacture of preformed thermoplastic marking material.

11. Be composed of an ester-modified rosin impervious to degradation by motor fuels, lubricants, or other automobile fluid, in conjunction with aggregates, pigments, binders, and anti-skid/anti-slip elements uniformly distributed throughout the material.

12. Conform to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state, being non-reflective, and being of a color different from white or yellow.

Green thermoplastic pavement marking use for bike lanes shall have a color that is in accordance with FHWA Memorandum dated April 15, 2011: Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14). The pigment system shall not contain heavy metals or any carcinogen, as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

The Daytime chromaticity coordinates for the color used for green thermoplastic pavement marking shall be as follows:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Y</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>0.230</td>
<td>0.754</td>
<td>0.266</td>
<td>0.500</td>
</tr>
</tbody>
</table>

The Nighttime chromaticity coordinates for the color used for green thermoplastic pavement marking shall be as follows:

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Y</td>
<td>X</td>
<td>Y</td>
</tr>
<tr>
<td>0.230</td>
<td>0.754</td>
<td>0.336</td>
<td>0.540</td>
</tr>
</tbody>
</table>

The top surface of the green thermoplastic pavement marking shall have regularly spaced indents. The closing of these indents during application shall act as a visual cue that the material has reached a molten state, allowing for satisfactory adhesion and proper embedment of the anti-skid/anti-slip elements, and a post-application visual cue that proper application procedures have been followed.

The surface of the preformed thermoplastic material shall contain factory applied anti-skid elements with a minimum hardness of 8 (Mohs scale). Upon application the material shall provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303.

The surface of the preformed thermoplastic material shall contain factory applied anti-skid elements with a minimum hardness of 8 (Mohs scale). Upon application the material shall provide a minimum static coefficient of friction of 0.6 when tested according to ASTM C 1028 (wet and dry), and a minimum static coefficient of friction of 0.6 when tested according to ASTM D 2047.

The thermoplastic material for green thermoplastic pavement marking shall be supplied at a minimum thickness of 90 mil

The thermoplastic material green thermoplastic pavement marking shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

**210-2 PLASTIC LINER.**
DELETE ALL SUBSECTIONS OF SECTION 210-2 EXCEPT FOR SUBSECTION 210-2.3.3.

**210-5 POLYVINYL CHLORIDE (PVC) COATINGS.**
DELETE THE SUBSECTION.
SECTION 211 - MATERIAL TESTS

REPLACE SUBSECTION 211-1.1 TO READ:
211-1.1 Laboratory Maximum Density. Laboratory maximum density shall be determined by California Test Method No. 216, Part II.

REPLACE SUBSECTION 211-1.2 TO READ:
211-1.2 Field Density. Field density shall be determined by California Test Method 231.

ADD NEW SUBSECTION 211-4 TO READ:
211-4 IMPORT FILL MATERIAL.
The following subsection shall be used for all projects in the City of Oakland where fill material is imported for any purpose.

211-4.1 Definitions.

1. Import Material: Any fill identified for import to the project site from an offsite location, including but not limited to: soil, gravel, crushed rock, rock dust, crushed concrete, sand, compost and biosolids (organic matter recycled from sewage).
2. Source Area: The location from which the Import Material originated.
3. Chemical of Concern: Any chemical identified for analysis per 211-4.2.2.
4. Pathogen of Concern: Any pathogen identified for analysis per 211-4.2.2.

211-4.2 General.
1. Import Material Certification. The Contractor shall submit an original, signed copy of the Import Material Certification Form (Attachment 5) at the end of these Special Provisions) to the Engineer at least 15 working days prior to delivering Import Material to the construction site. A separate form shall be submitted for each separate Import Material and Source Area. The Contractor shall attach the following documentation to the Import Material Certification Form:
   a. Chemical and Pathogen of Concern analysis results for the Import Material, including laboratory data sheets, chain-of-custody documentation, description of sample collection methods, and any additional information pertinent to assessing the potential for the Import Material to be contaminated by Chemicals or Pathogens of Concern;
   b. Class A (pathogen reduction), Exceptional Quality (low heavy metals concentrations) documentation if the Import Material is biosolids.
2. Sampling and Analysis of Import Material. Unless otherwise agreed to in writing by the Engineer, the Contractor shall comply with the sampling, handling and analytical protocol outlined below.
   a. The Contractor shall collect samples per the frequency outlined in Table 211-4.2(A).
b. **Table 211-4.2(A). Sampling Frequency for Import Material Characterization**

<table>
<thead>
<tr>
<th>Volume of Import Material</th>
<th>Sampling Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1,000 cubic yards</td>
<td>1 sample per 250 cubic yards</td>
</tr>
<tr>
<td>1,000 to 5,000 cubic yards</td>
<td>4 samples for first 1,000 cubic yards + 1 sample for each additional 500 cubic yards</td>
</tr>
<tr>
<td>&gt;5,000 cubic yards</td>
<td>12 samples for first 5,000 cubic yards + 1 sample for each additional 1,000 cubic yards</td>
</tr>
</tbody>
</table>


All samples shall be representative of Import Material conditions at the time of import. Composite samples shall be considered acceptable unless analysis for volatile organic compounds (VOCs) is required, in which case individual discrete samples shall be submitted for analysis. Composite samples shall consist of no more than four discrete samples. All compositing of samples shall be performed by a California State-certified laboratory. The sampling, handling, and preservation shall be completed in accordance with the procedures outlined in EPA Document SW-846.

c. All analyses of chemicals and pathogens shall be performed by a California State-certified laboratory.

Table 211-4.2(B) outlines, by Source Area land use history, the Chemicals of Concern and prescribed analytical methods to be followed for characterization of Import Material that is soil or aggregate (not recycled).
Table 211-4.2(B). Required Analyses by Source Area Land Use History – Soil and Aggregate (Not Recycled)

<table>
<thead>
<tr>
<th>Source History</th>
<th>Chemicals of Concern + Analytical Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virgin, undeveloped property</td>
<td>heavy metals (EPA methods 6010B and 7471A); asbestos (OSHA method ID-191)</td>
</tr>
<tr>
<td>History of residential use</td>
<td>heavy metals (EPA methods 6010B and 7471A); asbestos (OSHA method ID-191); TPH (modified EPA method 8015)</td>
</tr>
<tr>
<td>History of agricultural activity</td>
<td>heavy metals (EPA methods 6010B and 7471A); asbestos (OSHA method ID-191); TPH (modified EPA method 8015); organo-chlorine pesticides (EPA method 8081A or 8080A); organo-phosphorus pesticides (PEA method 8141A); chlorinated herbicides (EPA method 8151A)</td>
</tr>
<tr>
<td>History of commercial / industrial activity</td>
<td>heavy metals (EPA methods 6010B and 7471A); asbestos (OSHA method ID-191); TPH (modified EPA method 8015); VOCs (EPA method 8021 or 8260B, as appropriate, and combined with collection by EPA method 5035); semi-VOCs (EPA method 8270C); PCBs (EPA method 8082 or 8080A)</td>
</tr>
</tbody>
</table>

1For railroad properties, the Contractor shall also analyze Import Material for chlorinated herbicides per EPA method 8151A.

If the Contractor is unable to determine a complete land use history of the Source Area to the satisfaction of the Engineer, the Contractor shall be obliged to undertake all the analyses listed in Table 211-4.2(B).

Table 211-4.2(C) prescribes the analytical methods to be followed for characterization of Import Material that consists of the following recycled products: aggregate (e.g., crushed concrete, asphalt, etc.); compost; and biosolids.

Table 211-4.2(C). Required Analyses – Recycled Material

<table>
<thead>
<tr>
<th>Import Material</th>
<th>Chemicals/Pathogens of Concern + Analytical Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycled aggregate</td>
<td>heavy metals (EPA methods 6010B and 7471A); asbestos (OSHA method ID-191); TPH (modified EPA method 8015); PCBs (EPA method 8082 or 8080A)</td>
</tr>
<tr>
<td>Compost</td>
<td>heavy metals (EPA methods 6010B and 7471A); organo-chlorine pesticides (EPA method 8081A or 8080A); organo-phosphorus pesticides (PEA method 8141A); chlorinated herbicides (EPA method 8151A); fecal coliform (EPA method 1680); salmonella (EPA method 1682)</td>
</tr>
<tr>
<td>Biosolids²</td>
<td>heavy metals (EPA methods 6010B and 7471A); semi-VOCs (EPA method 8270C); PCBs (EPA method 8082 or 8080A)</td>
</tr>
</tbody>
</table>

¹List of required analyses based on Compost Quality Standards and Testing Protocol, Alameda County Waste Management Authority (2006)
²Biosolids shall also have been designated Class A for pathogen reduction.
In addition to meeting the screening criteria outlined in 211-4.3 for the chemicals of concern listed in Table 211-4.2(C) above, all biosolids shall:

1. be designated Class A per 40 CFR 503.8 (i.e., no detectible concentrations of the following pathogens: enteric viruses, fecal coliform, helminth ova, and salmonella); and
2. be designated Exceptional Quality (i.e., low heavy metals concentrations per Table 3 of 40 CFR 503.13.

The Contractor may use sewage plant data to confirm the Class A designation. For Chemicals of Concern, the Contractor shall provide data from analyses run on stockpile samples of the actual material to be imported (i.e., general sewage plant data for the Chemicals of Concern listed in Table 211-4.2(C) above are insufficient).

3. Verification by Owner: The Owner may, at its option and at any time, collect samples of Import Material to verify that it meets the specifications outlined in 211-4. The Contractor shall fully cooperate in the collection of the samples.

If the resulting chemical or pathogen analyses indicate that the material does not meet the specifications outlined in 211-4, the Contractor shall be responsible for providing, to the satisfaction of the Engineer, subsequent sampling and analyses at the Contractor’s sole expense to determine the extent of out-of-specification material delivered to the construction site.

If the Contractor uses Import Material that is, or is found to be, not in accordance with the specifications of 211-4, the Contractor shall promptly remove all out-of-specification Import Material. The Contractor shall verify, to the satisfaction of the Engineer, that all out-of-specification Import Material has been removed and any effects from its placement at the site have been mitigated sufficiently. The subsequent disposal of the out-of-specification Import Material shall be the sole responsibility and at the sole expense of the Contractor. The owner shall not be liable for, nor will it pay, any additional costs incurred by the Contractor for the characterization, removal, disposal, or replacement of the out-of-specification Import Material.

211-4.3 Screening Levels for Import Material.

1. All Chemicals of Concern, Except Lead. No Import Material with one or more Chemicals of Concern at a concentration greater than the current San Francisco Bay Region Water Quality Control Board Environmental Screening Level (ESL) available at www.waterboards.ca.gov/sanfranciscobay/esl.htm shall be accepted (“Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater”, Table A).

2. Lead. No Import Material with total lead concentrations at or greater than ten times the Soluble Threshold Limit Concentration (STLC) published in Title 22 of the California Code of Regulations shall be accepted. (As of January 1, 2008, the acceptable total lead concentration is <50 mg/kg.)

3. Pathogens of Concern. No Import Material with one or more Pathogens of Concern at detectable levels shall be accepted.

SECTION 212 – LANDSCAPE AND IRRIGATION MATERIALS
ADD NEW SUBSECTION 212-1.1.1 TO READ:
212-0 GENERAL.

212-0.1 Reference Documents.
Model Bay-Friendly Landscape Maintenance Specifications: serves as a reference document to provide language as needed to improve the environmental standards of ongoing landscape maintenance contracts.

Bay-Friendly Landscape Guidelines: fully describes the seven Bay-Friendly principles, offering 55 practices in sustainable landscape design, construction, and maintenance.

Additional Bay-Friendly resources found at www.BayFriendly.org

212-0.2 Definitions.
Compost – Compost is the product of controlled biological decomposition of organic materials, often including urban plant debris and food waste. It is an organic matter resource that has the unique ability to improve the chemical, physical and biological characteristics of soils or growing media. It contains plant nutrients but is typically not characterized as a fertilizer. (Excerpted from US Compost Council, Field Guide to Compost Use)

Integrated Pest Management (IPM) – IPM is a holistic approach to mitigating insects, plant diseases, weeds, and other pests. It involves the use of many strategies for managing, but not eliminating pests. Integrated Pest Management uses cultural, mechanical, physical, and biological control methods before using pesticides to control pests and diseases in the landscape. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, the least toxic and the least persistent pesticide that will provide adequate pest control is applied.

The Organic Materials Research Institute (OMRI) – OMRI is a national nonprofit organization founded in 1997 to support the organic community. OMRI reviews products to determine their suitability for producing, processing and handling organic food and fiber under the USDA National Organic Program Rule (OMRI General Materials List)

Pesticide – As defined in Section 12753 of the California food and Agricultural Code, a pesticide includes any of the following: “(a) Any spray adjuvant. (b) Any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever”. Antimicrobial agents are excluded from the definition of pesticide.

Sheet mulching – Sheet mulching uses a layer of paper or cardboard underneath the mulch to enhance weed suppression and soil building benefits. This layered mulch system is often used during landscape construction to optimize mulch benefits and encourage plant establishment.

212-0.3 Material Quality Assurance. The Contractor shall assign to the project at least one employee who is a Certified Irrigation Contractor (Irrigation Association).

212-0.4 Materials Delivery and Storage. Manufactured materials shall be delivered in original containers with brand and manufacturer’s name marked thereon. Materials in broken containers or showing evidence of damage will be rejected and must be immediately removed from the site. Quantities necessary to complete the work shown on the Plans shall be furnished. Carefully check and verify dimensions and quantities and immediately inform the Engineer if any discrepancy between the Plans and/or Specifications and actual conditions is noted. No work shall be done in any area where there is such a discrepancy until approval for same has been given by the Engineer.

212-1 LANDSCAPE MATERIALS.

212-1.1 Topsoil.

ADD THE FOLLOWING TO THE FIRST PARAGRAPH:

All imported soil to be Class “A”. Imported Topsoil shall be a harvested soil from fields or development sites. The organic content and particle size distribution shall be the result of natural soil formation. Manufactured soils where Coarse Sand, composted organic material or chemical additives have been added to the soil to meet the requirements of this specification section shall not be acceptable. The Contractor shall designate their proposed import sources in advance and shall provide source samples and soils test of material to the Engineer.

The Contractor shall provide imported planting soil only if the existing site soil (Class “C” Soil) at curbside tree and in median planting areas is determined to be agriculturally unsuitable or if insufficient amounts of suitable native soil are available.

Imported topsoil shall have a minimum of 5% and up to 10% organic matter (with 20% or more compost content). All material shall be free of trash and debris, or any other deleterious materials. Imported topsoil shall be fertile, agricultural soil, free of impurities, plants, seeds, weeds and roots.
“A” topsoil shall have the same relative composition and structure, a friable sandy loam character, and be free of roots, sticks, clods and stones larger than 1 inch in greatest dimension, pockets of coarse sand, noxious weeds, seeds, brush, and other litter. It shall not be infested with nematodes or other undesirable insects and plant disease organisms. Soil shall contain sufficient quantities of nitrogen, phosphorus, potassium, calcium and magnesium to ensure a medium for sustained healthy plant growth and shall meet the following criteria:

The imported topsoil shall not contain any detectable concentration of chemicals analyzed for by EPA Method 8080, EPA Method 8240/8260, and EPA Method 8270; or any petroleum hydrocarbon identified by EPA Method 8015 modified for TPH as gasoline, diesel and oil and grease.

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Arsenic (As)</td>
<td>Total arsenic less than</td>
<td>7 mg/kg</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>Total cadmium less than</td>
<td>35 mg/kg</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>Total chromium less than</td>
<td>700 mg/kg</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>Total lead less than</td>
<td>200 mg/kg</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>Total mercury less than</td>
<td>4 mg/kg</td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>Total selenium less than</td>
<td>200 mg/kg</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>Total zinc less than</td>
<td>1,000 mg/kg</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Agricultural Suitability</td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Salinity (ECe x 10) (3))</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Sodium (SAR)</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Boron (PPM in Saturated Extract)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Reaction (pH of Saturated Paste)</td>
<td>5.5</td>
<td>7.5</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Particle Size</td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Silt</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>Clay</td>
<td>10%</td>
<td>25%</td>
</tr>
<tr>
<td>Coarse Sand</td>
<td>5%</td>
<td>20%</td>
</tr>
<tr>
<td>Gravel (Maximum Aggregate Size 13 mm)</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>Decomposed Organic Matter</td>
<td>5%</td>
<td>10%</td>
</tr>
</tbody>
</table>

CHANGE THE SECOND PARAGRAPH TO READ:

At least 15 days before scheduled use, a soil report for the proposed source of topsoil must be submitted to the Engineer for approval. The Contractor shall submit a written request for approval, which shall be accompanied by a written report of a testing agency registered by the State for agricultural soil evaluation, which states that the proposed source complies with these specifications. Topsoil shall not be incorporated in the landscape planting work until the Engineer has approved the Soil Analysis Report.

ADD THE FOLLOWING THIRD PARAGRAPH:

Contractor shall submit soil samples to Soil and Plant Laboratory, 1101 S. Winchester Blvd., Suite G-173, San Jose, CA 95128 (408) 727-0330 (or other laboratory approved by the Engineer). Laboratories that participate in the North American Proficiency Testing Program (NAPT) are recommended. See www.usual.usu.edu/napt/ for participating laboratories.

Request test No. A 05-2, including: soil fertility, pH, salinity, nitrate, ammonium, phosphate, calcium, magnesium; agricultural suitability, boron, sodium, absorption ratio (SAR); particle size appraisal, organic content, USDA particle size distribution; soil amendment and fertilizer recommendations. Contractor shall

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be responsible for providing the Soil Lab with the plant list for horticultural suitability and where such plants will be placed in relation to the soil sample sites.

In addition, request a noxious and invasive weed test.

Full compensation for providing soil analysis of imported topsoil, as specified in these special provisions, shall be considered as included in the contract lump sum price paid for Planting and no additional compensation will be allowed therefore.

**212-1.1.3 Class “B” Topsoil.**

DELETE THIS SUBSECTION

**212-1.1.4 Class “C” Topsoil.**

ADD THE FOLLOWING TO THE END OF THE LAST SENTENCE:

Class “C” Topsoil shall conform to the Agricultural Suitability and other criteria as specified in Class “A” specifications. Protect existing soil from compaction, contamination, and degradation during the construction process. Do not remove and store subsoil. Do not take topsoil from within drip line of existing trees to be retained.

Soil samples shall be taken to ensure that all representative soil types within planting areas are analyzed for agricultural suitability. Site soil shall not be amended and incorporated in the landscape planting work until the Engineer has approved the Soil Analysis Report.

Contractor shall submit soil samples of Class “C” site soils to Soil and Plant Laboratory, 1101 S. Winchester Blvd., Suite G-173, San Jose, CA 95128 (408) 727-0330 (or other laboratory approved by the Engineer). Laboratories that participate in the North American Proficiency Testing Program (NAPT) are recommended. See [www.usual.usu.edu/napt/](http://www.usual.usu.edu/napt/) for participating laboratories.

Request test No. A 05-2 for each location listed below, including: soil fertility, pH, salinity, nitrate, ammonium, phosphate, calcium, magnesium; agricultural suitability, boron, sodium, absorption ratio (SAR); particle size appraisal, organic content, USDA particle size distribution; soil amendment and fertilizer recommendations. Contractor shall be responsible for providing the Soil Lab with the plant list for horticultural suitability and where such plants will be placed in relation to the soil sample sites.

In addition, request a germination (bioassay) test for each location listed below to identify the presence of any organic or inorganic herbicides (NOTE: These trials require four to five weeks to complete).

Samples for the testing of native soil shall consist of core samples of representative site soil, which will be in contact with plant roots and import topsoil.

Contractor shall submit a plan with proposed sample locations for review and approval by the Engineer. Final sample locations shall be as directed by the City Engineer with additional sample locations required at the discretion of the City Engineer. Contractor’s proposed sample locations shall be based on the following criteria:

A. For tree planting in curbside locations take one representative sample each along the following corridor segments. Sample to be taken at actual curbside tree planting location.
   a. Broadway
   b. 12th Street
   c. 11th Street
   d. International Boulevard, between 1st and 15th Avenues
   e. E12th Street, between 1st and 15th Avenues

B. For tree planting in median locations take one representative sample each along the following corridor segments. Sample to be taken at actual median tree planting location.
   a. International Boulevard between 19th and Fruitvale Avenues
b. International Boulevard between Fruitvale and 36th Avenues

c. International Boulevard between 36th and 49th Avenues

C. One sample from a standard, not bioretention, planting area in the Fruitvale off-street parking lot.

D. If any imported topsoil is needed, analyze one representative sample for every 3,000 cubic yards of import soil.

Each sample of native soil shall be a core sample taken from the rooting depths of the proposed plantings. Typical rooting depths are as follows:

A. Turf and herbaceous groundcovers: 0-6"

B. Shrubs: 0-18"

C. Trees: 0-12" and 13-36" (obtain one sub-sample from each depth)

Samples shall not contain any plant or organic material from the soil surface.

ADD THE FOLLOWING:

Before grading remove the top 6 inches of Class "C" topsoil found to be horticulturally suitable. Stockpile in storage piles at the planting site, or a location designated by the Engineer. Construct storage piles no higher than six feet and to freely drain surface water. If required by the Engineer, cover storage piles to prevent windblown dust and erosion.

Remove noxious weeds, rocks over one inch in diameter, and debris from topsoil and dispose off site in accordance with local ordinances. Amend prior to reuse as specified in the soil analysis report to meet required organic matter content. Apply non-synthetic fertilizers and other amendments, including appropriate quantities of compost to bring soil organic matter content to a minimum of 5%, as specified in the soils analysis report, to the surface of the aerated soil/subgrade.

Utilize stockpiled, amended site soil as described in Section 308-2.3.1.6.

212-1.2 Soil Fertilizing and Conditioning Materials.

212-1.2.2 Manure.

DELETE THIS SUBSECTION

212-1.2.3 Commercial Fertilizer.

REPLACE TEXT UNDER SUBSECTION 212-1.2.3 WITH THE FOLLOWING:

Non-synthetic fertilizers as recommended by the soils report. Synthetic, quick-release fertilizers shall not be permitted. Shall be determined from soils analysis results with recommendations from soils lab and approval from the Engineer. Fertilizer to be organic and non-synthetic, following Bay Friendly Guidelines. For bidding purposes only, assume the use of feather, blood, and bone meal, fishmeal, kelp or compost tea (per Bay Friendly Landscape Guidelines, http://www.stopwaste.org/docs/bay-friendly_landscape_guidelines_-_all_chapters.pdf) Fertilizer shall be delivered to the site in containers labeled in accordance with the applicable State of California, Department of Agriculture, regulations, bearing the warranty of the producer for the grade furnished. It shall be uniform in composition, dry, and free flowing.

For bidding purposes provide fertilizer as follows:

1. Planted Areas: Pelleted type, with analysis of 6-20-20 (N-P-K), and granular type 16-6- 8 (N-P-K).


212-1.2.4 Organic Soil Amendment.

REPLACE TEXT UNDER SUBSECTION 212-1.2.4 WITH THE FOLLOWING:

Organic soil amendment shall be a well decomposed, stable and weed free compost. It shall be derived from one or more of the following materials: agricultural crop residues or herbivore animal manures or food waste or urban plant debris. It shall not contain mixed solid waste. The product shall contain no substances toxic to plants, will possess no objectionable odors and shall not resemble the
feedstock (the original material from which it was derived). Compost shall be tested through the US Composting Council's USCC Seal of Testing Assurance Program (STA). A lab analysis shall be performed by a STA certified laboratory using the test methods used in the Seal of Testing Assurance program found in the Test Methods for Examination of Compost and Composting Manual (TMECC). Verifying current participation in the STA program can be confirmed by logging onto the USCC website at www.compostingcouncil.com. The compost lab analysis shall be submitted as part of the "Compost Technical Data Sheet" before delivery of compost. The compost laboratory report shall confirm the following compost parameters
### Parameters[^1, ^6] | Reported as (units of measure) | General Range |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Soluble Salt Concentration</td>
<td>dS/m (mmhos/cm)</td>
<td>Maximum 10, less than 4 preferred</td>
</tr>
<tr>
<td>Boron</td>
<td>Ppm</td>
<td>Soluble shall be &lt;2.5</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% wet weight basis</td>
<td>30-60%</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>30-65%</td>
</tr>
<tr>
<td>Carbon Nitrogen Ratio</td>
<td>ratio of Carbon to nitrogen</td>
<td>25:1</td>
</tr>
<tr>
<td>Bulk Density</td>
<td>dry lbs/cubic yard</td>
<td>Between 500-1,100</td>
</tr>
<tr>
<td>Particle Size</td>
<td>% pass in a select mesh size, dry weight basis</td>
<td>98% pass through 3/4” screen or smaller</td>
</tr>
<tr>
<td>Stability[^3]</td>
<td>Carbon Dioxide Evolution Rate</td>
<td>Mg CO2-C per g OM per day</td>
</tr>
<tr>
<td>Maturity[^3] (Bioassay)</td>
<td>Seed Emergence and Seed Vigor</td>
<td>%, relative to positive control</td>
</tr>
<tr>
<td>Physical Contaminants (inerts)</td>
<td>% dry weight basis</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Chemical Contaminants[^4]</td>
<td>mg/kg (ppm)</td>
<td>Meet or exceed USEPA Class A standard, 40CFR: 503.13, Tables 1 and 3 levels</td>
</tr>
<tr>
<td>Biological Contaminants[^5]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select Pathogens</td>
<td>Fecal Coliform Bacteria, or Salmonella</td>
<td>MPN per gram per dry weight</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MPN per 4 grams per dry weight</td>
</tr>
</tbody>
</table>

(Table modified from the US Composting Council Landscape Architectural Specifications)

---

[^1]: Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council)

[^2]: It should be noted that the pH and soluble salt content of the amended soil mix is more relevant to the establishment and growth of a particular plant, than is the pH or soluble salt content of a specific compost (soil conditioner) used to amend the soil. Each specific plant species requires a specific pH range. Each plant also has a salinity tolerance rating, and maximum tolerable quantities are known. Most ornamental plants and turf species can tolerate a soil/media soluble salt level of 2.5 dS/m and 4 dS/m, respectively. Seeds, young seedlings and salt sensitive species often prefer soluble salt levels at half the afore mentioned levels. When specifying the establishment of any plant or turf species, it is important to understand their pH and soluble salt requirements, and how they relate to existing soil conditions.

[^3]: Stability/Maturity rating is an area of compost science that is still evolving, and as such, other various test methods could be considered. Also, never base compost quality conclusions on the result of a single stability/maturity test.

[^4]: US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3 levels = Arsenic 41ppm, Cadmium 39ppm, Copper 1,500ppm, Lead 300ppm, Mercury 17ppm, Molybdenum 75ppm, Nickel 420ppm, Selenium 100ppm, Zinc 2,800ppm.

[^5]: US EPA Class A standard, 40 CFR § 503.32(a) levels = Salmonella <3 MPN/4 grams of total solids or Fecal Coliform <1000 MPN/gram of total solids.

[^6]: Landscape architects and project (field) engineers may modify the allowable compost specification ranges based on specific field conditions and plant requirements.
212-1.2.5 Mulch.
DELETE PARAGRAPHS (b) THROUGH (f) UNDER THIS SECTION

Mulch must be provided from on-site chipping of demolished trees and vegetation (excluding self sowing weeds or seeds) and supplemented, as needed, by “Arborist Mulch” recycled from local, organic materials such as, tree trimmings, plant or clean wood waste free of manures, residential curbside pickup, biosolids, eucalyptus, resin, tannin, salts or other compounds detrimental to plant life. Other recycled mulch materials including peach pits, grape seeds can be found at www.BayFriendly.org and shall be approved by Owners Representative.

Contractor shall perform chipping operations and mulch storage at a site proposed by the Contractor and approved by the Engineer.

Sizes of chipped mulch shall be in the range of 3/4 to 2 inches. Sources of recycled mulches can be found at www.BayFriendly.org and shall be approved by the Engineer.

212-1.2.5.1 Composted Mulch for Bioretention Areas in Fruitvale Parking Lot

To alleviate concerns over floating mulch in bioretention areas, use the following composted mulch for bioretention areas in the Fruitvale Parking lot:

Composted mulch shall consist of organic green materials, yard trimmings, brush, and leaves. Mulch shall be free of manures, residential curbside pick-up, biosolids, eucalyptus, resin, tannin, salts or other compounds detrimental to plant life, such as “Midnight Mulch”, produced by Vision Recycling, or approved equal.

Material shall first be ground to 4-inch particles and then undergo a thermal composting process. After composting material shall be screened with three screens to consist of material ranging in size between 1/2-inch and 1 1/2-inch. Aged mulch shall be of a black to dark brown color. Resulting compost mulch shall meet Class A: Processes to Further Reduce Pathogens (PFRP) requirements for composting and have reached temperatures over 130 Degrees Fahrenheit for 15 days and been turned 5 times within those 15 days.

ADD THE NEW SUBSECTION 212-1.2.6 TO READ:

212-1.2.6 Integrated/Organic Pest Management.

Integrated Pest Management (IPM) practices shall be used to control pests and diseases in the landscape.

Pesticides that are not allowed by OMRI in its generic materials list are prohibited.

ADD THE NEW SUBSECTION 212-1.2.7 TO READ:

212-1.2.7 Pre-emergent. Pesticides: Synthetic pre-emergents are prohibited.

212-1.4 Plants.

212-1.4.1 General.

ADD THE FOLLOWING TO SUBSECTION 212-1.4.1 TO READ:

It is the intent of the plans and specifications to provide planting with trees in vigorous growth, ready for use.

Any items not specifically shown in the plans or called for in the specifications, but normally required to conform to such intent, are to be considered part of the work.

Certificates of inspection required by law for transportation shall accompany invoice for each shipment of trees. Submit five copies of certificates to the Engineer after acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of trees at project site.

Arrange to secure all plant material noted on the plans and have them available for inspection and approval by the Engineer.

Quantities: Plant materials shall be furnished in quantities required to complete the work as indicated on the plans and shall be of species, kinds, sizes, spacing, etc., specified in the plans and herein.
Plants shall be symmetrical, typical for variety and species, sound, healthy, vigorous, and free from plant disease and insect pests or their eggs.

Plants shall be nursery grown under climatic conditions similar to those of the job site.

All trees shall be container grown or established "boxed out" field grown materials unless otherwise specified.

Plants shall not be pruned prior to delivery, except as authorized by the Engineer.

212-1.4.2 Trees.

CHANGE THE LAST SENTENCE IN THE PARAGRAPH TO READ:
The Tree shall stand erect without support.

ADD THE FOLLOWING PARAGRAPHS TO SUBSECTION 212-1.4.2 TO READ:

Trees shall conform to American Association of Nurserymen’s specifications true to name and uniformly matched in size for the species/variety in the container sizes shown on the Plans and with a branching configuration recommended by ANSI Z60.1 for the genus, species and/or variety specified in the plant legend. Trees shall be first quality, with well-developed, firmly rooted (not rootbound) systems in their containers with normal, well-developed trunk, limbs, stems evenly and radially distributed (plant canopy) around the trunk and rootcrown. Plant material is required to be free of evidence of disease, insects, insect eggs, larvae and weeds.

Prior to planting, plant materials deemed unsuitable shall be rejected either during or after site delivery by the Engineer. Plant materials damaged during delivery, off-loading, or as a result of neglect or abuse while plant materials are in a pre-plant, on-site holding area shall be rejected. Plant material shall be rejected if their containers are cracked and/or broken. Plant materials shall be rejected if rootballs are lopsided or collapsed, dried out and/or rootballs determined by the Engineer to have been recently removed from their containers. Plant material shall be rejected if a substantial loss of rooting soil within the containers is present or substantial loss of foliage is present as a result of recent (pre-delivery) pruning by the nursery is evident. Trees shall be rejected if root-crown is observed to appear kinked, girdled or circled. Tree shall be rejected if no central leader exists, trunk is noticeable bowed, abraded and/or old or new scarring is present. Container sizes larger then what is specified on the plans may be used with approval by the Engineer, but at no extra cost.

Trees shall be measured when branches are in their normal position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Caliper measurements shall be taken at a point on the trunk 6 inches above natural ground line for trees up to 4 inches in caliper and at a point 12 inches above natural ground line for trees over 4 inches in caliper. Trees that meet the measurements specified, but do not possess normal balance between height and spread shall be rejected.

Trees shall not be pruned before delivery. Trees, that upon delivery have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots or fresh cuts of limbs over ¾” inch in diameter which have not completely callused will be rejected. Trees shall be able to stand on their own trunks once nursery stakes are removed.

Trees shall be subject to inspection and approval by Engineer at place of growth and upon delivery for conformity to the Contract Documents. Such approval shall not impair the right of inspection and rejection during progress of the work. Submit to Engineer a written request for inspection of trees at place of growth. Written request shall state the place of growth and quantity of trees to be inspected. Engineer reserves right to refuse inspection at this time if, in his judgment, a sufficient quantity of trees is not available for inspection.

Substitution of trees will not be permitted unless authorized in writing by Engineer. If proof is submitted that any tree specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. These provisions shall not relieve Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.
212.1.5 Headers, Stakes, and Ties

212.1.5.2 Headers and Stakes
REVISE THE FIRST SENTENCE OF SUBSECTION 212.1.5.2 TO READ:

Headers shall be made of redwood certified by the Forest Stewardship Council (FSC), 2 inches by 6 inches, except that three layers of 2 inches by 6 inches boards shall be supplied for laminations on turns and curves.

212.1.5.3 Tree Stakes
REVISE SUBSECTION 212.1.5.3 TO READ:

The type of tree stake shall be as required by the Caltrans Special Provisions and installed as noted on the Drawings except as follows:

1. For securing trees planted in tree wells with relocated tree grates, use a single, grate-attachable steel stake with adjustable height strap-bar, UV-resistant adjustable PVC strap with two sets of bolts/washers/nuts, such as the “Grate Stake Tree Stake System”, available from J.R. Partners, or approved equal. Stake shall be 6-foot tall, Schedule 40 pipe, 3/4" diameter (1.05-inch outside diameter), and 0.113-inch wall thickness, with a black powder-coat finish. Pipe shall conform to ASTM A53. Strap shall be 1/4-inch by 1-inch by 18-inch, flexible PVC with UV inhibitors.
2. For trees installed with tree guards, secure tree with ties made of 100% nylon and flexible nylon hose, such as manufactured by Zip-It tree ties, or approved equal.

212–1.6 Anti-desiccant
ADD THE NEW SUBSECTION 212–1.6 TO READ:

Anti-desiccants for retarding excessive loss of plant moisture and inhibiting wilt shall be non-toxic, non-aerosol spray, and water insoluble to produce a moisture-retarding barrier not removable by rain. Wilt-proof Formula NCF as manufactured by Nursery Specialty Products, Greenwich, Connecticut, or equal.

212–1.7 Drain Rock
ADD THE NEW SUBSECTION 212–1.7 TO READ:

Drain rock for drainage sumps at transplanted palm trees locations must be 3/4-inch to 1 1/2-inch hard, clean rock, free of organic matter and deleterious substances.

ADD THE NEW SUBSECTION 212–1.8 TO READ:

212–1.8 Weed Control Fabric
Weed control fabric under decomposed granite shall be manufactured from thermally spun bonded polypropylene fabric and shall conform to the following:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Standard</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Tensile Strength</td>
<td>ASTM D-4632</td>
<td>175 x 115 lbs.</td>
</tr>
<tr>
<td>Grab Tensile Elongation</td>
<td>ASTM D-4632</td>
<td>24 x 20%</td>
</tr>
<tr>
<td>Trapezoid Tear</td>
<td>ASTM D-4533</td>
<td>75 x 60 lbs.</td>
</tr>
<tr>
<td>UV Resistance</td>
<td>ASTM D-4355</td>
<td>70%</td>
</tr>
<tr>
<td>Water Flow Rate</td>
<td>ASTM D-4491</td>
<td>12 gal/min./SF</td>
</tr>
</tbody>
</table>

Staples shall be 2 inches wide, 8 inches in length, and 11 gauge wire.

Contractor shall provide a copy of the manufacturers’ product sheet together with instructions for installation shall be furnished to the Engineer 5 days before installation.

ADD THE NEW SUBSECTION 212–1.9 TO READ:

212–1.9 Decomposed Granite
Decomposed granite for installation in tree wells and medians shall be:

1. Uniform tan color
2. Clean and free from organic materials and other deleterious substances
3. From one source only
4. Crushed granite rock that complies with grading requirements shown in the following table:
The Contractor shall submit a 2-pound sample of decomposed granite and the manufacturer’s product sheet to the Engineer for approval prior to delivery of materials to the site.

ADD THE NEW SUBSECTION 212-1.10 TO READ:

212-1.10 Irrigation and Aeration Tube Assembly. Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or Shop Drawings indicating size, materials, and quantities of items being supplied.

Irrigation and aeration tube assembly shown on the Plans shall consist of:

1. 4-inch perforated, single wall high-density polyethelene (HDPE) pipe with soil-tight joint performance conforming to requirements of ASTM F 405 and AASHTO M 252;
2. 9-inch by 9-inch square, 9-inch deep housing spigot adapter, such as #931, manufactured by NDS, or approved equal and matching 9-inch square cover grate, made from structural foam polyolefin with UV inhibitor and open surface area of 39.50 square inches; and,
3. Corrugated, polyethylene (PE) snap tee fitting compatible with 4-inch perforated pipe and conforming to requirements of ASTM F667.

Assemble as shown on the Plans and per the manufacturer’s recommendations.

Irrigation, drainage and inspection tubes at palm tree locations:

1. Pipes and fittings for irrigation, drainage and inspection tubes shall be 4-inch diameter smoothwall, perforated, high-density polyethelene (HDPE) conforming to requirements of ASTM F810, such as manufactured by ADS, or approved equal.
2. Grate to cover 4-inch smoothwall pipe: Size to fit 4-inch smoothwall pipe listed above. Load capacity: Class A. Color: “Sand”. Material: polyolefin, such as manufactured by NDS, or approved equal.

Assemble as shown on the Plans and per the manufacturer’s recommendations.

ADD THE NEW SUBSECTION 212-1.11 TO READ:

212-1.11 Pea Gravel. Pea gravel for filling the void space under tree grates and in tree grate center opening where required on the Plans shall be clean and graded, washed river-run gravel conforming to ASTM C33, No. 7.

The Contractor shall submit a 2-pound sample of pea gravel and a product information sheet to the Engineer for approval prior to delivery of materials to the site.

ADD THE NEW SUBSECTION 212-1.12 TO READ:

212-1.12 Root Barrier. Submit for acceptance by the Engineer manufacturer’s product and installation information for root barriers indicating size, materials, and quantities being supplied.

Root barriers (tree root guides) shall be shall be black, injection molded polypropylene panels with UV inhibitors, of 0.085” wall thickness in modules 24-inches long by 18-inches deep, such as UB 18-2 as manufactured by Deep Root Partners, L.P., or approved equal.

ADD THE NEW SUBSECTION 212-1.13 TO READ:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>95–100</td>
</tr>
<tr>
<td>No. 8</td>
<td>75–80</td>
</tr>
<tr>
<td>No. 16</td>
<td>55–65</td>
</tr>
<tr>
<td>No. 30</td>
<td>40–50</td>
</tr>
<tr>
<td>No. 50</td>
<td>25–35</td>
</tr>
<tr>
<td>No. 100</td>
<td>20–25</td>
</tr>
<tr>
<td>No. 200</td>
<td>5–15</td>
</tr>
</tbody>
</table>

Grading Requirements (AASHTO T11-82 and T27-82)
212-1.13 Washed Plaster Sand
Backfill material for the transplant palm tree planting holes must be 100 percent commercial quality washed plaster sand.

ADD THE NEW SUBSECTION 212-1.14 TO READ:

212-1.14 Cardboard Weed Barrier. Cardboard for sheet mulch work shall be 100% recycled B Flute Cardboard Rolls. Rolls of recycled cardboard are available through:

1. North Bay Paper in Petaluma, (800) 734-2772;
2. Monahan Paper in Oakland, (510) 835-4670; or
3. Urban Farmer Store in Richmond, (510) 524-1604, or approved equal.

212-2 IRRIGATION SYSTEM MATERIALS
ADD THE FOLLOWING TO SUBSECTION 212-2 TO READ:
Irrigation components shall conform to the provisions of Section 212-2, “Irrigation Systems Materials” of the Standard Specifications and these Special Provisions and as specified on the drawings and details.

212-2.1 Pipe and Fittings
ADD NEW SUBSECTION 212-2.1.6 TO READ:

212-2.1.6 PVC Pressure Rated Pipe - type 1120 (PVC Class 200 and 315, Schedule 40).

a. Type I Grade II pressure rated pipe.
b. Materials shall meet requirements set forth in ASTM D1784 Class 12454-B.
c. Inside diameter of pipe shall be the same size as iron pipe.
d. Pipe shall be marked at intervals not to exceed 5 feet with the following information: Manufacturer's name, nominal pipe size; PVC type and grade (i.e., PVC 1220); S.D.R. rating class, and NSF approval.
e. PVC Type I shall not be threaded.
f. PVC fittings shall be PVC Type II, Schedule 40 NSF approved.
g. Caution shall be utilized in handling Type I pipe due to the possibility of cracking or splitting.
h. When connection is plastic to metal, male adapters shall be used unless otherwise noted or detailed. The Male adapter shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be non-lead base (Teflon paste or equal). Teflon tape may be substituted.

ADD NEW SUBSECTION 212-2.1.7 TO READ:

212-2.1.7 PVC High Impact Pipe - Type 1120 (PVC Schedule 80).

a. Type I Grade II High Impact Pipe.
b. Outside diameter of pipe shall be the same size as iron pipe.
c. Pipe shall be marked at intervals not to exceed 5 feet with the following information: Manufacturer's name, nominal pipe size, PVC type and grade (i.e., 1120), schedule, and NSF approval.
d. Fittings shall be PVC Schedule 80, Type II, NSF approved, as required.
e. All threaded PVC pipe shall be Schedule 80, Type 1120.

Solvent for all PVC pipe shall be #711 Gray, along with #P-70 primer, NSF approved.

Copper or Brass Pipe Fittings: If indicated on the plans, use copper or brass pipe fittings of the type required by local codes and/or agencies.

ADD NEW SUBSECTION 212-2.1.8 TO READ:

212-2.1.8 High Density Polyethylene Pipe. All irrigation sleeving shall be HDPE piping. HDPE Pipe shall be joined with the appropriate weld/melt, using the butt-electro-fusion processes.
Use when water line crossovers are shown on the plans.

212-2.1.9 Perforated PVC Pipe
ADD THE NEW SUBSECTION 212-2.1.9 TO READ:
   Perforated PVC deep water tubes at tree planting locations as per the plans, must be 3” diameter perforated PVC pipe in conformance with ASTM D 3033 or D 3034.

212-2.2 Valves and Valves Boxes.
212-2.2.1 General.
ADD NEW SUBSECTION 212-2.2.1.1 TO READ:

212-2.2.1.1 Definitions.
   Quick Coupling Valve: Quick coupling valve with locking cover. Upon completion of the Contract and prior to final acceptance, the Contractor shall supply the City and AC Transit with coupler keys and hose ells in the quantity called for on the plans. The coupler keys and hose ells shall be of the same manufacturer as the coupling valve.

   Remote Control and Ball Valves: Valves shall be of the manufacturer shown on the plans or approved equal.

   Valve Boxes: All remote control valves and ball valves shall be installed in suitable valve boxes as shown in Detail plans. Valve boxes shall be of the manufacturer shown on the plans or approved equal.

ADD NEW SUBSECTION 212-2.5 TO READ:

212-2.5 Driplines. Dripline to be continuous self-cleaning, pressure compensating with built-in check valve; and have integral and evenly spaced pressure compensating check valve emitters welded to the inside of the tubing that contains recycled content

Driplines shall be nominally sized to 17mm (½”) low-density linear polyethylene tubing with recycled content qualifying for maximum LEED credits. Driplines shall be constructed with pressure compensation, continuously self-cleaning, integral emitters with an internal check valve at these spacings (12”, 18”, or 24” centers). The exterior of the tubing shall be brown in color and conform to an outside diameter (O.D.) of 0.66 inches and an inside diameter (I.D.) of 0.56 inches. Individual pressure compensating emitters shall be welded to the inside wall of the tubing as an integral part of the manufacturing process. These emitters shall be constructed of a two (2) piece plastic emitter housing containing a continuously self-flushing molded silicone diaphragm. The emitter shall have a built-in check valve that will hold back a 4.6’ column of water. The emitter shall be installed into the tubing so that the inlet to the emitter is toward the center of the tubing cross section. The emitter shall also have a built-in physical root barrier whereby the water shall exit the emitter from one location and shall exit the tubing from a second location. This physical barrier shall create an air gap inside the exit path of the emitter.

Each emitter shall have the ability to independently regulate discharge rates, with an inlet pressure range of 14.5 - 58 pounds per square inch (psi), at a constant flow and with a manufacturer’s coefficient of variability (Cv) of 0.03 or less. Recommended operating pressure shall be between 14.5 - 50 psi. The emitter discharge rate shall be 0.26, 0.4, 0.6, or 0.9 gallons per hour (GPH) utilizing a combination of turbulent flow and reduced pressure compensation by molded silicone diaphragm. The emitters shall be capable of continuously cleaning themselves while in operation. The dripline utilizing a combination of turbulent flow and reduced pressure compensation by molded silicone diaphragm. The emitters shall be capable of continuously cleaning themselves while in operation. The dripline shall be available with 12”, 18”, and 24” spacing between emitters unless otherwise specified. For subsurface installation, Driplines pipe depth shall preferably be 5” with a minimum of 4” to a maximum of 6”. Maximum system pressure shall be 50 psi for maximum fitting integrity. Filtration shall be 120 mesh or finer. Bending radius shall not be smaller than 7” or tubing kinking may result.

For under mulch installations, 6” metal wire staples (TLS6) shall be installed 3’ - 5’ on center, (depending on soil type) and two staples shall be installed over every change-of-direction fitting.

212-2.5.1 Emitter Plug Ring
The Emitter Plug Ring shall be a pre-formed plastic ring with a rounded inside plug that can be used to plug a dripline or emitter outlet.

212-2.5.2 Construction
The Emitter Plug Ring shall be constructed of an injection-molded plastic of a diameter slightly larger than the outside diameter of the driplines tubing. The circular design shall be open on one end to enable it to be slipped over the tubing. Within the interior of this ring (opposite the open end) is a rounded plug made to press-fit into the water outlet of the emitter to prevent water emission.

Slip the Emitter Plug Ring over the dripline tubing and push the plug into the tubing outlet hole until it seats securely in the hole.

ADD NEW SUBSECTION 212-2.6 TO READ:

212-2.6 High Volume Control Zone Kits

High Flow 4.5 – 17.6 GPM:

The Low-Volume Control Zone Kit shall be a completely assembled assembly comprised of a 1” 24VAC valve, ¾” filter and low-flow pressure regulator. It shall be designed to operate zones ranging from 4.5 - 17.6 GPM, provide filtration of 140 mesh (115 microns), and downstream outlet pressure of 45 psi.

212-2.6.1 Construction

Valve: The valve shall be a 1” Electric Control Valve with 1” threaded inlet and outlet connections. The valve body shall be made of Glass Reinforced Polyamide. The diaphragm shall be made of Natural Rubber and the diaphragm seat made of Glass Reinforced Polyamide. Spring shall be made of SST302. Nuts, bolts and washers should be made of SST 304.

Filter: The filter shall be a multiple disc filter with color-coded filter elements indicating the mesh size of the element being used. The discs shall be constructed of chemical-resistant thermoplastic for corrosion resistance. The disc filter body shall be molded of black plastic with male pipe threads for both inlet and outlet. The disc filter shall be capable of periodic servicing by unscrewing a threaded cap or unlatching the band. The disc filter ring color-coding shall be Black (140 Mesh /115 Micron).

Pressure Regulator: The Pressure Regulator shall be a spring-operated piston-type regulator with an externally accessible regulation unit that can be serviced without removing the valve body from the piping. The body shall be molded of black plastic with ¾” FPT x FPT threaded inlet and outlet.

212-2.6.2 Operation

Valve: The valve shall be an electric on/off valve and shall be capable of opening when an electric signal is sent by a controller. The minimum operating pressure is 7 psi. The maximum operating pressure is 145 psi. The minimum operating flow is 0.01 GPM and the maximum operating flow is 44 GPM.

The solenoid shall operate within a plus minus 10% of the nominal voltage. For example, a 24VAC will be able to actuate between 22 and 26 volts. In addition, an inrush and holding currents are necessary to maintain the valve in open position, of 220 and 95 mA, respectively. The solenoid shall include a manual override that simulates activation of the controller, when the controller is not engaging the solenoid. If the controller is engaging the solenoid, the manual override is not functional.

For latching solenoid operation, in addition to a 9V battery operation, a minimum pulse length shall be required of 25 milliseconds.

A manual flow control stem shall be used to limit the maximum flow across the valve, and as a manual shutoff of the valve if necessary.

Valves shall be equipped with internal filters and a clog free labyrinth mechanism to assure that the top cap of the valve is receiving clean water at all times.

Water temperature shall not exceed 140 F.

Filter: The filter shall be capable of filtering suspended particles from water. The filter shall be capable of operating in a range of flows up to 17 GPM. Disc filters can be installed downstream of the remote control valve to allow for periodic servicing when the remote control valve is not operating. It can be installed upstream of the remote control valve if the disc filter is specified with manual shut-off valve or when a line-sized shut-off valve is also specified to allow for periodic servicing with a pressurized main line. Recommended installation of disc filters shall be as specified. It may be installed below grade positioned in a valve box large enough to remove the disk filter cap and internal disc element, or above grade. A gravel sump in the bottom of the valve box is recommended.
Pressure Regulator: The Pressure Regulator shall have a built-in indicator that indicates when it is operating. It shall be able to respond immediately to any inlet pressure variation. The regulator shall be capable of regulating downstream pressure to 45 psi. The Pressure Regulator shall operate in a flow range of 4.5 - 17.5 GPM. Maximum pressure at inlet shall be 145 psi.

ADD NEW SUBSECTION 212-2.7 TO READ:
212-2.7 Regulating

Pressure Regulator: HIGH FLOW

The purpose of the Pressure Regulator is to control downstream pressure at or below the specified system operating pressure. Unregulated pressures in excess of the recommended operating ranges can diminish and disable line flushing valves or cause the integrity of the Techline®/Techlite fittings connection to weaken and/or fail.

Construction

The Pressure Regulator shall be a Netafim spring-operated piston-type regulator with an externally accessible regulation unit that can be serviced without removing the valve body from the piping. The body shall be molded of black plastic with a combination of male/female pipe threaded inlet and outlet.

Operation

The Pressure Regulator shall have a built-in indicator that indicates when it is operating. It shall be able to respond immediately to any inlet pressure variation. The regulator shall be capable of regulating downstream pressure to 15 psi, 20 psi, 25 psi, 35 psi, or 45 psi in ¾" or 1½" configurations. The Pressure Regulator shall operate in a flow range of 4.5 - 17.6 GPM in the ¾" configuration and 11 - 35 GPM in the 1½" configuration. Maximum pressure at inlet shall be 145 psi.

Pressure Regulator: IN-LINE LOW FLOW

The purpose of the Pressure Regulator is to control downstream pressure at or below the specified system operating pressure. Unregulated pressures in excess of the recommended operating ranges can diminish and disable line flushing valves or cause the integrity of the dripline/emitter fittings connection to weaken and/or fail.

Construction

The Pressure Regulator shall be a spring-operated, in-line piston-type regulator. The body shall be molded of black plastic with ¾" female/female pipe threaded inlet and outlet. Directional arrows shall show flow direction of water.

Operation

The Pressure Regulator shall be able to respond immediately to any inlet pressure variation. The regulator shall be capable of regulating downstream pressure to 15 psi, 20 psi, 25 psi, 35 psi, or 42 psi. The Pressure Regulator shall operate in a flow range of 0.25 - 4.4 GPM. Maximum pressure at inlet shall not exceed 145 psi.

ADD NEW SUBSECTION 212-2.8 TO READ:
212-2.8 Manual Disc Filters

The purpose of the Disc Filter is to capture and retain water-transported debris or sediment.

Construction

The filter shall be a multiple disc filter with color-coded filter elements indicating the mesh size of the element being used. The discs shall be constructed of chemical-resistant thermoplastic for corrosion resistance. The disc filter body shall be molded of black plastic with male pipe threads for both inlet and outlet. The disc filter shall be capable of periodic servicing by unscrewing a threaded cap or unlatching the band. The ¾" DFV model shall have an integral manual shut-off valve. Disc filter ring color-coding shall be: Yellow (80 Mesh /200 Micron), Red (120 Mesh /130 Micron), Black (140 Mesh /115 Micron), or Green (200 Mesh /55 Micron).
Operation

Installation of the Disc Filter shall be as detailed. Disc filters can be installed downstream of the remote control valve to allow for periodic servicing when the remote control valve is not operating. It can be installed upstream of the remote control valve if the disc filter is specified with manual shut-off valve or when a line-sized shut-off valve is also specified to allow for periodic servicing with a pressurized main line. Recommended installation of disc filters shall be as specified. It may be installed below grade positioned in a valve box large enough to remove the disk filter cap and internal disc element, or above grade. A gravel sump in the bottom of the valve box is recommended.

Other Materials

All other materials not specifically described but required for a complete and proper irrigation system installation shall be new, first-quality of the respective kinds, and subject to the approval of the City.

ADD NEW SUBSECTION 212-2.9 TO READ:
212-2.9 Surface Conditions

Inspection: Prior to all work in this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that irrigation system may be installed in strict accordance with all pertinent codes and regulations, the original design, the referenced standards and the manufacturer's recommendations.

Discrepancies: In the event of discrepancy, immediately notify the City or its authorized representative. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

Preservation and Cleaning: The Contractor shall clean up the work as it progresses. At frequent intervals and at all times when directed by the City, the Contractor shall remove and dispose of accumulations of rubbish and debris of all kinds. At the time of completion, the entire site shall be cleared of tools, equipment, rubbish, etc., all of which shall be removed from the site; and the entire project, including surrounding premises, shall be left in proper, clean condition ready for acceptance.

ADD NEW SUBSECTION 212-2.10 TO READ:
212-2.10 Field Measurements

Make all necessary measurements in the field to ensure precise fit of items in accordance with the plans.

ADD NEW SUBSECTION 212-2.11 TO READ:
212-2.11 Trenching and Backfilling

Trenching: Excavation shall be open vertical construction sufficiently wide to provide free working space around the work installed and to provide ample space for backfilling and compacting. Depth of trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:
   a. Lateral line: 12-15” inch cover in planting areas, 24 inch cover under paving.
   b. Main line: 18 inch cover in planting areas, 24 inch cover under paving.

When two pipes are to be placed in the same trench, maintain a six-inch space between pipes as minimum. No pipe shall be installed directly over another.

Backfilling: Backfill materials shall be approved soil. Unsuitable material, including clods and rocks over 2-1/2 inches in size shall be removed from the premises by Contractor and disposed of legally at no cost to the City. All backfilling shall be properly compacted so as to avoid future settlement. Surplus earth remaining after backfilling shall be disposed of on the premises as directed by the City.

REVISE SUBSECTION 212-3.2.1 TO READ:
212-3.2.1 Conduit. Conduit for low voltage irrigation control wire shall be a minimum of one and one-half inch (1-1/2") diameter, UL standard for Rigid Non-Metallic conduit (Publication UL 651). Low voltage, as used in this Section shall mean 36 volts or less. Conduit shall increase in size per National Electric Code as required to allow for easy pulling of wire bundles through conduit sections without hang-ups. Install a pull rope and spire wire in addition to remote control valve conductor in each section of conduit run between boxes. Conduit runs shall terminate in a valve box installed next to remote control valve boxes.

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Conduit for all other purposes shall conform to the provisions of Section 212-3.2.1 of the Standard Specifications.

Sand for sand envelope shall be course, clear, river run sand.

REVISE SUBSECTION 212-3.3 TO READ:

**212-3.3 Automatic Controllers and Related Equipment.** Automatic controllers and related equipment shall be as indicated on the plans and as stated in these special provisions.

Controller(s) shall be as indicated on the plans, and shall be installed per manufacturer's specifications, as shown on the plans, and as specified herein.

The irrigation system controller shall be of a modular architecture, capable of fully automatic, semi-automatic, and manual operation. The controller will be housed in a weatherproof, lockable powder coat painted steel cabinet suitable freestanding stainless steel, pedestal mounting.

The controller shall operate on an input of 120 VAC, 60 Hz, 1.0A and a 40VA transformer with output of class 2, rated 24 VAC, maximum total load 1.5A and be capable of actuating up to five .25A solenoids plus a master valve or pump start relay. The controller shall operate three (3) stations plus the master valve simultaneously.

The controller shall have 7 regular irrigation programs plus a syringe/propagation program, with individual station Cycle & Soak watering, and be able to calculate the actual finish times in AM or PM for each program. The controller shall be capable of stacked or simultaneous program operations.

The controller shall have a water budget feature that provides monthly water volume budgets proportionate to historical ET and interactive with all programs, and able to alert user when controller’s water usage is more than a user set water budget.

The controller shall have programming based on a 7, 14, 21 or 28 day scheduling and be able to irrigate in minutes, inches, and percent of ETo and/or soil moisture content.

The controller shall have the capability to have a full year master schedule to allow 12 month programming.

The controller shall have the ability to display area, plant and/or equipment descriptions for each station.

The controller shall be capable of programming all or a group of stations with the same run time and soak-in time by using a Copy key.

The controller shall be capable of operating a test program without affecting the controller’s normal program station times or without terminating a regular watering schedule.

There shall be a complete English and Spanish operator’s manual built in the controller and viewed in the controller's display.

The controller shall have internal non-volatile memory capable of lifetime program memory retention without the use of batteries.

The controller shall be capable of reading a flow sensor and automatically "learn" each station's average GPM flow rate on a continuous basis.

There shall be a built-in amperage meter to accurately measure and diagnose valve solenoid electrical problems such as 'No Current', 'Station Short', 'Under Current', 'Over Current', etc.

The controller shall be capable of receiving on site, daily ET weather data and automatically determine station run times without the use of central software.

The controller operating as a satellite shall be capable of irrigating the program entered by the central (base computer) or by programming at the satellite location, without having to go back to the central to accept the change. The controller shall allow individual station operation of any field satellite units. Controller shall also be capable to remotely perform all satellite keystroke operation from the central (base computer) utilizing an on-screen graphics replica of the satellite controller panel.

a. The controller shall be able to log for each station for the last 30 watering days the following
information:
b. Time and date irrigation ran
c. Number of repeat cycles run
d. Programmed minutes and actual minutes run
e. Programmed inches and actual inches applied
f. Manual & Test minutes
g. No Water days programmed
i. Hold-Over Time
j. Actual GPM flow rate that night compared to Learned or Limit value
k. Alert Flags

The controller shall have an operator-set water window. Irrigation will not continue past a set end time. Remaining run-times will be carried over in a hold-over table to be applied at next scheduled irrigation.

Multi-level password protection settable using central software. Controller will log when user signed in and when user signed out.

Radio Remote receiver board, shall be built-in the controller and a hand-held radio remote transmitter will be supplied so that the end user can trouble shoot valves remotely without having to go to the controller itself.

Controller shall have a detailed water usage report categorizing for each month the usage during scheduled irrigation, during test and manual key operation, and when valves are bled manually or quick couplers are used.

The controller shall communicate with a central computer using an Ethernet network designed to connect the controller with serial interface to an existing network using the TCP/IP protocol. The Ethernet option shall be integrated into the controller and shall not require a separate power source. The controller shall be model –EN when one controller is sharing one Ethernet connection, and shall be model –MEN when the controller is connected to the Ethernet jack and is also sharing this jack with –ME option controllers. The user shall supply an Ethernet (RJ45) connection at the controller location with the network set to have access to the connection. The Ethernet network shall be set to assign a static IP address to the irrigation controller.

212-3.3.2 Irrigation Controller Enclosures. Enclosure shall be of the type and manufacturer shown on the plans.

212-3.3.3 Weather Monitoring. The central control system shall include a remote connected ET gage (model ETG) where shown on the plans and specifications. The ET measuring device shall be powered by the selected field controller designated as a –G model. ET is measured directly in 0.01" increments and pulses from the gage are sent directly to the field controller. The daily, on-site ET data is then stored in a 28-day table in the controller.

Paige P-7171-D cable installed in conduit is run from the location of the ET gage back to the controller designated as the –G model. Maximum length of one chain is 1,000 feet. Runs are to be direct pulls without underground splices.

Top surface of the gage should be 3’4” above grade. The location should be representative of the area to be irrigated, free of any obstructions to sunlight and wind. The location of the gage should be located in an area where water from bubbler heads does not hit the top surface of the gage. A factory-direct field service technician shall verify correct placement of the ET gage.

A vandal-resistant stainless-steel enclosure, model ETGE, shall be used to protect the ET gage. The ET gage shall be mounted on a poured concrete base 18”x18”x 6” with the enclosure metal base and stake imbedded into the slab with horizontal plate 1” below the poured concrete, with finish grade 2” below top of concrete base.

The central control system shall include a remote connected Rain Bucket (model RB-1) where shown on the plans and specifications. The rain-measuring device shall be wired using the 60’ of 2-conductor cable supplied with the Rain Bucket to the selected field controller designated as a -RB model. The cable should be installed in conduit and the connections are to be made at a terminal strip inside the enclosure.
Maximum length of cable run is 200 feet.

The Rain Bucket shall accurately measure rainfall in 0.01” increments by means of a tipping and emptying device mounted below the center of the collection dish.

The RB controller shall provide programming parameters for rain as recommended by the manufacturer and the City Maintenance Staff.

The same manufacturer as the irrigation control system shall supply the ET Gage and the Tipping Rain Bucket.

212-3.3.4 Flow Monitoring. The Model FM flow meter shall use two #14 AWG, one red, and one black in 1” PVC conduit to connect to the irrigation controller. The maximum wire run between flow meter and controller shall be 2000 ft. The flow meter sends low voltage digital pulses back to the controller and therefore all electrical connections must be waterproof and resist any moisture entry.

It is intended that all wire runs between the controller and flow meter be direct pulls and have no splices. If wire splices are unavoidable, they must be installed in a valve box with Spears DS-100 connectors with Spears sealant or 3M Scotchlok No. 3570 connector sealing pack used.

A. Each flow meter shall have the following characteristics:
   1. Housing to be a Sch 80 polyvinyl chloride tee or bronze tee
   2. Have a pulsing output that operates at 9VDC and a pulse rate that is proportionate to the GPM
   3. Fully compatible with the internal interface at each field controller
   4. Powered by the controller
   5. Replaceable metering insert
   6. Shall feature a six-bladed design with a proprietary, non-magnetic sensing mechanism
   7. Be by the same manufacturer as the irrigation controller.

B. Single controller shall be able to receive up to three separate flow meter inputs on projects consisting of more than one water source for irrigating landscape. The controller shall sum up the readings of all flow sensors connected. The irrigation controller is specified as a –F controller. The first flow meter shall be wired to the irrigation controller using standard red and black flow meter wires from controller. The second and third flow meters shall be wired using additional wire harness supplied when controller is specified as a –F option.

C. Multiple Controllers Sharing One or Multiple Points of Connection
   1. Several controllers up to eight can share one or multiple points of connection with multiple flow sensors when each controller has been specified with the –FL option and with the appropriate hardwire link (-M, -MD, ML, etc.) will allow the user to link several controllers with the standard 4 conductor communication cable.
   2. This option allows several controllers to share the irrigation programs and flow information between themselves for:
      a. Monitoring of system flows
      b. Avoiding water window by maximizing number of valves on without exceeding system flow capacity
      c. Turning OFF valves with excessive flow rates due to broken lateral lines.
      d. Tracking water usage and comparing to a water budget
      e. Elimination of relays when sharing pumps and master valves
      f. All this is done in the field without the need for a central computer

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3. Several controllers up to eight can share one or multiple points of connection with multiple flow sensors when each controller has been specified with the –FL option and with radio link capability known as the –SR communication option when hardwire is not feasible or cost effective. This allows the user to link several controllers with unlicensed frequency hopping radios.

SECTION 213 - ENGINEERING FABRICS

213-1 PAVEMENT FABRIC.
NO 3 PAVEMENT FABRIC SHALL BE USED, DELETE SUBSECTION
PART 3 - CONSTRUCTION METHODS

Part 3 of the Special Provisions shall conform to Part 3 of the Standard Specifications except as modified herein.

SECTION 300 - EARTHWORK

300-1 CLEARING AND GRUBBING.

300-1.1 General

ADD THE FOLLOWING TO THE END OF THIS SUBSECTION TO READ:

Clearing and grubbing shall include, but not limited to, the following items and shall be performed as directed by the Engineer:

- a) Removal of bollards
- b) Removal of chain link fence
- c) Removal of light pole
- d) Removal of concrete barrier (type K)
- e) Removal of telephone booth
- f) Removal of business sign
- g) Removal of vegetation, shrubs, weeds, tree roots, and landscaping plants
- h) Removal and salvaging of roadside signs (includes removal and salvaging of sign panels to be replaced)
- i) Removal of drums (50 gallon)
- j) Removal of irrigation facilities
- k) Removal of landscaping and landscaping lighting
- l) Removal of chain
- m) Removal of guy wire protection
- n) Protecting existing facilities to remain
- o) Other vegetation and debris removal as shown on the plans, and
- p) Grading, hauling, and disposal of waste material

300-1.3 Removal and Disposal of Materials.

ADD THE FOLLOWING PARAGRAPH TO THE BEGINNING OF SUBSECTION 300-1.3:

Sawcuts through bituminous pavement shall be six inches. Sawcuts through concrete pavement shall be full depth. No stomping of concrete pavement will be allowed. Where bituminous pavement overlies concrete pavement, the sawcut depth shall be to the bottom edge of the concrete.

300-1.3.2 (a) Bituminous Pavement.

DELETE THE SECOND SENTENCE OF THE SUBSECTION.

300-1.3.2 (b) Concrete Pavement.

DELETE THE SECOND SENTENCE OF THE SUBSECTION.

300-1.3.2. (c) Concrete Curb, Walk, Gutters, Cross Gutters, Driveways, and Alley Intersections.

REPLACE THE FIRST SENTENCE OF THE PARAGRAPH WITH THE FOLLOWING:

Concrete shall be removed to neatly sawed edges.

REPLACE THE LAST SENTENCE OF THE PARAGRAPH WITH THE FOLLOWING:

Curb and gutter shall be sawed on a neat line at right angles to the curb.

ADD THE FOLLOWING SENTENCE TO THE END OF THE SUBSECTION:

Sawcutting for curb ramps shall be to the exterior dimensions of the proposed ramp only. No demolition work for sidewalks or curb ramps may be performed on a Friday.

ADD NEW SUBSECTION TO READ:

300-1.3.3 Removal of Traffic Striping and Pavement Markings. Traffic striping and pavement markings shall be removed before any change is made in the traffic pattern. Traffic Striping and pavement markings shall be removed to the fullest extent possible from the pavement by abrasive methods.
Any "shadows" left after the removal of pavement arrows, STOP legends or YIELD legends shall form a rectangle perpendicular to the street's center line. This rectangle shall be of sufficient size to encompass the totality of the pavement arrows and legends removed. Sand or other material deposited on the pavement shall be removed as the work progresses. Accumulations that might interfere with drainage or constitute a hazard to traffic will not be permitted.

Removal of traffic striping will be measured and paid for by the linear foot. Double or triple traffic stripes will be measured as two or three traffic stripes, respectively. Each square foot pavement markings removed will be considered as three liner feet of traffic stripe. In measuring traffic striping, a deduction will be made for gaps in broken striping. All paint evident in these gaps shall be removed to the fullest extent possible as part of the traffic striping removal.

ADD NEW SUBSECTION TO READ:

300-1.3.4 Removal of Parking Space Meters and Parking Pay Stations. The Contractor shall only remove parking space meters and parking pay stations at locations directed by the Engineer in the field. At least 42 calendar days prior to all activities that will affect an existing parking space meter or an existing parking pay station; the Contractor shall notify the Engineer that said meters or pay stations require removal. The City of Oakland will remove the parking space meter head mechanism and revenue vault from existing post, and remove the parking pay stations. The City of Oakland will perform said removal no later than 7 calendar days prior to start of construction of that specific location. The Contractor shall remove the parking space meter’s head housing, post and foundation, and remove the parking pay station’s foundation. If ordered by the Engineer, salvaged parts shall be delivered to the City of Oakland’s storage yard. The Contractor shall reconstruct the sidewalk to existing grade. The sidewalk shall comply with Division 2.1, Section 303-5 and contract drawings. Additional removals for parking space meters and parking pay stations may be ordered by the Engineer, the cost of these additional removals will be paid for at the same unit price as bid items Remove Parking Space Meter and Remove Parking Pay Station, and no additional compensation will be provided.

300-1.4 Payment

ADD NEW PARAGRAPHS TO THE END OF THE SUBSECTION TO READ:

The contract Lump Sum price paid for Clearing and Grubbing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in clearing and grubbing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Removal of the following items will be measured and paid for separately. Removed materials shall be disposed of in accordance with the provisions in 300-1.3.

a. The contract price paid per linear foot for Remove Concrete Curb shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing concrete curb, including sawcutting and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

b. The contract price paid per linear foot for Remove Concrete Curb and Gutter shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of curb and gutter, including sawcutting and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

c. The contract price paid per square foot for Remove Concrete Sidewalk and Driveway shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of concrete sidewalk, curb ramps, and driveway, including sawcutting and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

d. The contract price paid per square foot for Remove Concrete Island Paving shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of concrete island paving, including sawcutting and
water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

e. The contract price paid per square foot for **Remove Decorative Crosswalk** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of concrete decorative crosswalk, including sawcutting and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

f. The contract price paid per square yard for **Remove Asphalt Concrete Pavement** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of asphalt concrete pavement, including sawcutting and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

g. The contract price paid per square yard for **Remove Concrete Pavement** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of concrete pavement, including sawcutting and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

h. The contract price paid per square foot for **Remove Painted Pavement Marking** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of painted pavement markings, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

i. The contract price paid per linear foot for **Remove Thermoplastic Traffic Stripe** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of thermoplastic traffic stripes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

j. The contract price paid per square foot for **Remove Thermoplastic Pavement Marking** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of thermoplastic pavement marking, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

k. The contract price paid per square foot for **Remove Painted Pavement Marking** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of painted pavement marking, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

l. The contract price paid for each **Remove Pavement Marker** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of pavement markers, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

m. The contract price paid for each **Remove Roadside Sign** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of roadside signs, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

n. The contract price paid for each **Remove Roadside Sign (Strap and Saddle Bracket Method)** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in removing and disposing of roadside signs (strap and saddle bracket method), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.
o. The contract price paid for each **Salvage Remove Parking Space Meter** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in coordinating with City Oakland for removal of existing parking space meter head; removing and disposal of parking space meter's head housing, post and foundation; reconstruction of sidewalk at the locations specified by the Engineer; delivery of salvaged items, and disposal of debris and non-salvaged items, removing, storing, and hauling parking space meters excluding the pole to location specified by Engineer, repairing sidewalk back to its original condition, and disposal of debris, as shown on the plans, as specified in the Standard Specifications and these special provisions; and as directed by the Engineer.

p. The contract price paid for each **Salvage Remove Parking Pay Station** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in coordinating with City Oakland for removal of existing parking pay station unit; removing and disposal of parking pay station foundation; reconstruction of sidewalk at the locations specified by the Engineer; disposal of debris, removing, storing, and hauling parking pay station to location specified by Engineer, repairing sidewalk back to its original condition, and disposal of debris, as shown on the plans, as specified in the Standard Specifications and these special provisions; and as directed by the Engineer.

300-2 UNCLASSIFIED EXCAVATION.

300-2.1 General

ADD NEW PARAGRAPH TO THE END OF THE SUBSECTION TO READ:

The work in this section shall include the removal of aggregate base, subbase, native material, and asphalt concrete curbs to the required depth to place the final aggregate base, subbase, native material and asphalt concrete curbs, at the locations shown on the plans and as required by the Engineer. Removal of asphalt concrete pavement, portland cement concrete from the roadway, curb and gutter, sidewalk, and driveways are measured and paid for separately. Surplus excavated material shall be disposed of outside the right-of-way in accordance with the provisions in Section 300-1.3, "Removal and Disposal of Materials," and Section 300-2.6, "Surplus Material," of the Greenbook.

ADD TO END OF SUBSECTION 300-2.9 TO READ:

300-2.9 Payment.

The contract price paid per cubic yard for **Unclassified Excavation** shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all the work involved in performing unclassified excavation and fill, including removal and disposal of excavated material, grading, shaping, compacting or consolidating, or other required under the subsection, and water pollution control, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. The quantities used in determining the payment for unclassified excavation shall be those of the completed excavation and fill within the limits shown on the plans or as directed by the Engineer.

300-4 UNCLASSIFIED FILL

ADD TO END OF SUBSECTION 300-4.1 TO READ:

At locations where the R-value of the existing subgrade is less than 10, the Contractor shall stabilize subgrade using a Class B1 Geotextile. Class B1 Geotextile shall comply with State Standard Specification section 19-8 and 88-1.02B.

Prior to excavation, the Contractor shall pothole utilities beneath new structural section and determine the exact location and depth of utilities.

At locations directly above the utilities and 3 feet on either side of the utility where the grading plane is less than 2 feet above the existing utilities, the Contractor shall place and compact the base material as follows:

1. Base material less than a 12 inch clearance from the utility, the Contractor shall place and compact the base material with hand tools (jumping jacks, walk behind rollers, etc.).
2. Base material greater than a 12 inch clearance and less than a 24 inch clearance from the utility, the Contractor may compact with conventional equipment, but vibrators shall not be activated on rollers within this zone.

The Contractor may place a 6 inch section of controlled low-strength material in lieu of hand compaction. No additional compensation will be provided for placing controlled low-strength material. Controlled low-strength material shall comply with State Standard Specification section 19-3.02F and 19-3.03I. The Contractor shall compact the base material above the 6 inch section of controlled low-strength material per section 300-4.

REPLACE SUBSECTION 300-4.9 WITH:
300-4.9 Measurement and Payment. The Contract Unit Price bid for Subgrade Enhancement Geotextile (Class B1) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and doing all work involved placing subgrade enhancement geotextile, including preparation of subgrade, placing of geotextile as shown on the plans, as specified in the Standard Specification and these special provision, and as directed by the Engineer.

SECTION 301 - TREATED SOILS, SUBGRADE, PREPARATION, AND PLACEMENT OF BASE MATERIAL

301-1 SUBGRADE PREPARATION.

301-1.1 General
REVISE SUBSECTION 301-1.1 TO READ:
This section shall govern the preparation of natural, filled, or excavated roadbed material prior to the placement of subbase or base material, pavement, curbs and gutters, driveways, sidewalks, island paving, or other roadway structures.

On paving jobs, the Contractor shall lower all structures (e.g. manholes, water valves, etc.) to the grading depth if it is expected that the surface will be graded and remain unpaved for more than five working days.

301-1.3 Relative Compaction.
REVISE SUBSECTION 301-1.1 TO READ:
Except in alleys, when pavement is to be placed directly on subgrade material, the top 6 inches (150 mm) of subgrade material shall be compacted to a relative compaction of 95 percent. When base or subbase material, curb, gutter, alley pavement, driveways, sidewalks, or island paving are to be placed on the subgrade material, the top 6 inches (150 mm) of such subgrade material shall be compacted to a relative compaction of 90 percent.

After compaction and trimming, the subgrade shall be firm, hard, and unyielding.

301-1.6 Adjust Manhole Frame and Cover Sets to Grade.
ADD THE FOLLOWING PARAGRAPH TO THE END OF SUBSECTION 301-1.6:
Concrete grade rings for extensions shall be a maximum of six inches thick. Extensions will be limited to a maximum height of 18 inches. All structures shall be clearly marked or referenced, covered with building paper, and paved over. Adjustment of manholes shall be made after overlay resurfacing has been completed. The price paid for each Adjust Manhole Frame and Cover to Grade shall include all costs associated with removing and adjusting the manhole frame and cover to final grade and no additional compensation shall be provided therefor.

ADD NEW SUBSECTION 301-1.8 TO READ:

301-1.8 Adjust Fire Hydrant to Grade.

Existing fire hydrants, as shown on the plans and as directed by the Engineer, shall be adjusted to finish grade. The price paid for each Adjust Fire Hydrant to Grade shall include all costs associated with removing and adjusting the fire hydrant to final grade and no additional compensation shall be provided therefor. The Contractor shall coordinate with agencies including the City, East Bay Municipal District.
and the local Fire Department prior to any construction activities that may impact fire safety equipment including fire hydrants. Not Used.

ADD NEW SUBSECTION 301-1.9 TO READ:
301-1.9 Adjust Water Valve to Grade.
Existing water valve, as shown on the plans and as directed by the Engineer, shall be adjusted to finish grade. The price paid for each Adjust Water Valve to Grade shall include all costs associated with removing and adjusting the water valve to final grade and no additional compensation shall be provided therefor. The Contractor shall coordinate with agencies including the City, East Bay Municipal District, and the local Fire Department prior to any construction activities that may impact fire safety equipment including fire hydrants. Adjustment of water valves shall be made after overlay resurfacing has been completed. Not Used.

ADD NEW SUBSECTION 301-1.10 TO READ:
301-1.10 Adjust Sanitary Sewer Cleanout to Grade.
Existing sanitary sewer cleanout, as shown on the plans and as directed by the Engineer, shall be adjusted to finish grade. The price paid for each Adjust Sanitary Sewer Cleanout to Grade shall include all costs associated with removing and adjusting the sanitary sewer cleanout to final grade and no additional compensation shall be provided therefor. Adjustment of sanitary sewer cleanouts shall be made after overlay resurfacing has been completed. Not Used.

ADD NEW SUBSECTION 301-1.11 TO READ:
301-1.11 Adjust Utility Cover to Grade.
Existing utility covers, as shown on the plans and as directed by the Engineer, shall be adjusted to finish grade. The price paid for each Adjust Utility Cover to Grade shall include all costs associated with removing and adjusting the utility cover to final grade and no additional compensation shall be provided therefor. Adjustment of utility cover shall be made after overlay resurfacing has been completed. Not Used.

ADD NEW SUBSECTION 301-1.12 TO READ:
301-1.12 Adjust Hand Hole to Grade.
Existing hand hole, as shown on the plans and as directed by the Engineer, shall be adjusted to finish grade. The price paid for each Adjust Hand Hole to Grade and Adjust Electric Hand Hole to Grade shall include all costs associated with removing and adjusting the water valve to final grade and no additional compensation shall be provided therefor. The Contractor shall coordinate with agencies including the City and PG&E prior to any construction activities that may impact fire safety equipment including fire hydrants. Adjustment of hand holes shall be made after overlay resurfacing has been completed. Not Used.

ADD NEW SUBSECTION 301-1.13 TO READ:
301-1.13 Adjust Water Meter to Grade.
Existing water meter, as shown on the plans and as directed by the Engineer, shall be adjusted to finish grade. The price paid for each Adjust Water Meter to Grade shall include all costs associated with removing and adjusting the water meter to final grade and no additional compensation shall be provided therefor. The Contractor shall coordinate with agencies including the City, East Bay Municipal District, and the local Fire Department prior to any construction activities that may impact fire safety equipment including fire hydrants. Adjustment of water meters shall be made after overlay resurfacing has been completed. Not Used.

301-2 UNTREATED BASE.
REVISE SUBSECTION 301-2.1 TO READ:
301-2.1 General. Untreated base shall be constructed of materials conforming to 200-2.

Unless directed otherwise by the Engineer, a 4-inch layer of compacted crushed aggregate base (PMB) shall be placed beneath every concrete surface, such as concrete sidewalk, concrete curb and gutter, concrete curb ramps, concrete driveway, stamped concrete, concrete curb, concrete island paving, miscellaneous concrete work, and at locations as required by the Engineer.
Contractor shall water untreated base per State Standard Specification 17-3.

301-2.1.1 Subgrade. Base shall comply with State Standard Specification 26-1.03B. Subbase shall comply with State Standard Specification 25-1.03B.

REVISE SUBSECTION 301-2.2 TO READ:


REVISE SUBSECTION 301-2.3 TO READ:


REVISE SUBSECTION 301-2.4 TO READ:

301-2.4 Measurement and Payment. Quantities of untreated base will be measured as shown in the Bid. The volumetric quantities of base material shall be those compacted in place within the limits of the dimensions shown on the Plans.

Crushed Aggregate Base Payment: The contract price paid per cubic yard for Crushed Aggregate Base shall include full compensation for furnishing all labor, materials, tools equipment, and incidentals, and for doing all work involved in furnishing and placing crushed aggregate base, complete in place, including compaction, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Processed Miscellaneous Base Payment: The contract price paid per cubic yard for Processed Miscellaneous Base shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all work involved in furnishing and placing processed miscellaneous base, complete in place, including compaction, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Select Subbase Payment: The contract price paid per cubic yard for Select Subbase shall include full compensation for furnishing all labor, materials, tools equipment, and incidentals, and for doing all work involved in furnishing and placing select subbase, complete in place, including compaction, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

301-5 LIME TREATED SOIL.
301-5.1 General.
REVISE SUBSECTION 301-5.1 TO READ:

301-5.2 Lime.
REVISE SUBSECTION 301-5.2 TO READ:
Lime shall comply with State Standard Specification 24-2.02.

301-5.4 Preparation.
REVISE SUBSECTION 301-5.4 TO READ:
Lime shall comply with State Standard Specification 24-2.03A and 24-2.03B.

301-5.5 Spreading Lime.
REVISE SUBSECTION 301-5.5 TO READ:
Lime shall comply with State Standard Specification 24-2.03A and 24-2.03C.

301-5.6 Mixing.
REVISE SUBSECTION 301-5.6 TO READ:
Lime shall comply with State Standard Specification 24-2.03A and 24-2.03D.

301-5.7 Spreading and Compacting.
REVISE SUBSECTION 301-5.7 TO READ:
Lime shall comply with State Standard Specification 24-2.03A, 24-2.03C, 24-2.03E, and 24-2.03F.
301-5.8 Curing.
REVISE SUBSECTION 301-5.8 TO READ:
Curing shall comply with State Standard Specification 24-2.03G.

301-5.10 Measurement and Payment.
REVISE SUBSECTION 301-5.10 TO READ:
Lime-treated soil is measured from horizontal measurements of the planned surface of the Lime-treated soil.

Curing seal quantity is determined under section 94. The amount of curing seal used is determined from the gauge on the curing equipment.

Quantities of lime wasted or disposed of in a manner not specified, or remaining on hand after completion of the work, will not be paid for. If you use a partial load of lime, weigh the truck and the remaining lime on a scale and submit a weighmaster certificate.

If the dispute resolution ITP determines the Engineer’s test results are correct, the Engineer deducts the ITP’s testing costs from payments and pays the ITP. If the ITP determines your test results are correct, the Department pays the ITP testing costs without deduction.

Lime-treated soil will be paid for by the square yard as shown on the Plans or as directed by the Engineer. The price paid per square yard shall include payment for breaking up, mixing, spreading, compacting, trimming, and curing treated soil. Payment of lime treated soil shall include the furnishing and spreading of lime.

SECTION 302 - ROADWAY SURFACING

302-1 COLD MILLING OF EXISTING PAVEMENT.
REVISE SUBSECTION 302-1.1 TO READ:
302-1.1 General. Contractor shall cold mill existing pavement as specified in the Division 2.2 Section 15-2.02B(3) Cold Planing Asphalt Concrete Pavement.

302-1.2 Payment.
The Contract Unit Price for cold mill asphalt concrete pavement shall be measured by the square yard as shown on the plans. The amount of asphalt concrete shall be measured separately. Asphalt pavement shall be milled to the depth shown on the plans.

Payment for removal of pavement markers, thermoplastic traffic stripe, painted traffic stripe, and pavement marking within the area of cold planing is included in the payment for cold mill asphalt concrete pavement of the types shown in the Bid Item List.

302-4.3.2 Spreading.
ADD THE FOLLOWING TO SUBSECTION 302-4.3.2:

Spreading shall conform to the requirements of Section 302-4.3.2 of the Standard Specification and these Special Provisions.

The slurry seal shall not be applied when either atmospheric or pavement temperature is 60 degrees Fahrenheit and falling but may be applied when either the atmospheric or pavement temperature is 55 degrees Fahrenheit and rising. The slurry seal shall not be applied during periods of abnormally high relative humidity. Slurry seals shall not be applied when raining or foggy.

The slurry seal mixture shall not be applied prior to 8:00 am and shall cease by 3:00 pm, except if approved by the Engineer. Approval of application after 3:00 pm will only be for the purpose of completing the section of work. No more than 25,000 square yards (225,000 square feet) of slurry seals shall by placed per crew per day.

No application of slurry mixture shall be permitted when the temperature of the pavement to be surface is below 50°F or when the air temperature is below 60°F in the shade or when in the opinion of the Engineer, road conditions, road temperatures, imminence of rain, wetness or dampness are not conducive to successful results.
The surface shall be fogged with water directly preceding the spreader. The slurry mixtures shall be of
the desired consistency when deposited on the surface. Total time of mixing shall not exceed four (4)
minutes. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that
complete coverage is obtained. No lumping, balling or unmixed aggregate shall be permitted. No
 segregation of the emulsion and aggregate fines from the course aggregate will be permitted. If coarse
aggregate settles to the bottom of the mix, slurry will be removed from the pavement. No excessive
breaking of the emulsion will be allowed in the spreader box. No streaks such as caused by oversized
aggregate will be left in the finished pavement. Ridges (especially at existing raised pavement markers) and
washboarding in the finished product will not be allowed.

The slurry seal shall be placed at an average rate of 15 pounds per square yard. Actual rate to be
determined by the surface being sealed and the aggregate gradation. The Engineer will monitor and
approve the application rate throughout the project.

The slurry seal mixture shall be applied so that the joint between the asphalt and the concrete gutter is
filled but not overlapping. Any application or spillage beyond this joint shall be removed or cleaned up by
the Contractor to the Engineer’s satisfaction. Gutter spills shall be cleaned immediately.

All termination lines of slurry sealing shall be neat and straight. The Contractor shall accomplish this by
providing and installing roofing paper, or an approved equal header material at all limits of work.
Longitudinal joints shall be at the crown of the street or at the edge of travel lines.

No excessive buildup or unsightly appearance shall be permitted on longitudinal or transverse joints.
Burlap drags shall be used.

Approved squeegees shall be used to spread slurry in non-accessible areas to the slurry mixer. Care
shall be exercised in leaving no unsightly appearance from handwork.

At any time the quality of the mix or workmanship is not to the Engineer’s satisfaction, the job shall be
discontinued until a correction is made which is satisfactory to the Engineer.

Wheel tracks in the slurry shall be repaired to the Engineer’s satisfaction.

Gutters, curbs, sidewalks, driveways and other structures adjacent to the pavement to be slurry sealed
shall be cleaned of excess slurry seal to the Engineer’s satisfaction.

All incidental work such as surfacing of driveway aprons and returns shall be done concurrently with the
surfacing of the street proper. Slurry seals shall not overlap the concrete gutter but shall leave a neat,
straight edge. The edges of the limits of the slurry seal application on both sides of the street shall be
maintained in a neat and uniform line. Care will be taken to avoid leaving ridges at the lap joints between
adjoining center of the lane. In no case will ridges be allowed in the normal wheel track of vehicles. The
forward speed of the slurry spreader shall be adjusted to eliminate corrugations or surface irregularities in
the slurry coat that are caused by excessive speed.

The Contractor shall furnish and maintain in good operating condition all tools and equipment necessary
to do the work with a minimum of inconvenience to the public and shall employ sufficient personnel to
operate all equipment efficiently and skillfully.

The Contractor shall remove any excess slurry from concrete gutters, sidewalks, driveways, etc., before
the end of the workday. The Contractor shall not continue work on the following day until all excess slurry is
removed as determined by the Engineer.

302-4.3.2.1 Rolling. The finished surface of the slurry seal shall be rolled by a self-propelled 10 ton
pneumatic roller with a tire pressure of 50 PSI and equipped with a water spray. The rolling shall
commence as soon as the slurry seal has cured sufficiently so as not to pick up on the tires of the roller.
302-4.3.2.2 Sweeping. All streets shall be swept within 24 hours and 48 hours after placing the seal and as often as necessary to remove loose aggregate from the roadway. The use of any sweeper that causes damage to the seal coat shall not be permitted. The sweepers shall be self-propelled vacuum, regenerative air, or rear broom pickup, with water spray bars to reduce dust. If necessary, more than one type of sweeper shall be used. Sidewinder sweepers or brooms that windrow material and do not remove it shall not be used. Completion of sweeping shall be evidenced by the absence of loose aggregate in gutters and driveways. Attention is directed to the sweeping of areas with excessive raveling as directed by the Engineer. Special attention (blowers, hard sweeping, etc.) shall be required in sweeping driveways and under and around parked vehicles clear of loose aggregate. The Contractor shall also be responsible for removal of all aggregate from sidewalks and other affected areas. The Contractor shall provide a minimum of three (3) sweepers per slurry application crew to sweep all streets within 24 hours after spreading slurry application solely dedicated to post application sweeping separate and in addition to surface preparation sweepers.

The slurry seal shall be swept a minimum of five times as follow:

- Two times within 8 hours
- One time prior to striping
- One time immediately prior to project acceptance

The Contractor shall refrain from using fuel or solvent of any kind for cleaning tool and equipment in such a manner as to permit spillage of diesel fuel or solvent on the pavement, curbs, gutters, parkways or other adjoining area.

REPLACE SUBSECTION 302-4.5 TO READ:

302-4.5 Measurement and Payment (Slurry Seal). Aggregate and polymer modified asphaltic emulsion for Slurry Seal shall be paid for at the Contract Unit Price per square yard of slurry seal. The Contract Unit Price per square yard for slurry seal shall include full compensation for furnishing materials, water, retardant, aggregate and polymer modified asphaltic emulsion, surface preparation, traffic striping removal, rolling and sweeping, labor, materials, tools, equipment and incidentals, spreading, finishing work, and for meeting all requirements of the Special Provisions for installation of slurry seal complete in place as shown on the plans and specified in these Special Provisions, or as directed by the Engineer.

302-5 ASPHALT CONCRETE PAVEMENT.
REVISE SUBSECTION 302-5.1 TO READ:


Asphalt Concrete Pavement shall be Type A Hot Mix Asphalt.

REPLACE Conuncanion 302-5.2 TO READ:


REVISE SUBSECTION 302-5.3 TO READ:

302-5.3 Prime Coat. Prime coat shall comply with State Standard Specification Section 92 and 94 specifications, State Revised Standard Specification Section 39, 92, and 94 specifications and Division 2.2 Section 39 specification producing and placing slow-setting asphaltic emulsion. Prime coat shall comply with Division 2.2 Section 39-1.03C(3).

REVISE SUBSECTION 302-5.4 TO READ:

302-5.4 Tack Coat. Tack Coat shall comply with State Standard Specification Section 92 and 94 specifications, State Revised Standard Specification Section 39, 92, and 94 specifications and Division 2.2 Section 39 specification for producing and placing asphaltic emulsion. Tack coat shall comply with State Revised Standard Specification 39-1.03C(6).

REVISE SUBSECTION 302-5.5 TO READ:
302-5.5 Distribution and Spreading. Distribution and spreading shall comply with State Standard Specification Section 92 and 94 specifications, State Revised Standard Specification Section 39, 92, and 94 specifications and Division 2.2 Section 39 specification for distribution and spreading of Type A Hot Mix Asphalt.

REVISE SUBSECTION 302-5.6 TO READ:

302-5.6 Rolling.
302-5.6.1 General. Asphalt concrete shall comply with State Standard Specification Section 92 and 94 specifications, State Revised Standard Specification Section 39, 92, and 94 specifications and Division 2.2 Section 39 specification for rolling and compacting of Type A Hot Mix Asphalt.

302-5.6.2 Density and Smoothness. Density and smoothness of asphalt concrete shall comply with State Standard Specification Section 92 and 94 specifications, State Revised Standard Specification Section 39, 92, and 94 specifications and Division 2.2 Section 39 specification for density and smoothness of Type A Hot Mix Asphalt.

REVISE SUBSECTION 302-5.7 TO READ:

302-5.7 Joints. Asphalt concrete pavement joints shall comply with State Standard Specification Section 92 and 94 specifications, State Revised Standard Specification Section 39, 92, and 94 specifications and Division 2.2 Section 39 specification for Type A Hot Mix Asphalt joints.

302-5.9 Measurement and Payment.
ADD THE FOLLOWING TO END OF THIS SUBSECTION:

Asphalt concrete pavement will be measured by the Ton.

If tack coat, asphalt binder, and asphaltic emulsion are paid as separate bid items, their bid items are measured under State Standard Specification section 92 or section 94.

The Owner does not adjust the unit price for an increase or decrease in the tack coat quantity.

Asphalt Concrete Pavement is measured based on the combined mixture weight. If recorded batch weights are printed automatically, the bid item for Asphalt Concrete Pavement is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weigh master and submitted.

The Owner does not adjust the unit price for an increase or decrease in the prepaving grinding day quantity.

The Owner reduces payment for noncompliance of HMA density based on the factors shown in the following table:
Reduced Payment Factors for Percent of Maximum Theoretical Density

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The contract price paid per ton for Asphalt Concrete Pavement shall include full compensation for furnishing all labor, materials, tools equipment, and incidentals, and for doing all work involved in constructing asphalt concrete pavement, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per ton for Tack Coat shall include full compensation for furnishing all labor, materials, tools equipment, and incidentals, and for doing all work involved in placing tack coat, complete in place, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

302-6 PORTLAND CEMENT CONCRETE PAVEMENT.
REVISE SUBSECTION 302-6.1 TO READ:

Portland Cement Concrete Pavement shall be Jointed Plain Concrete Pavement.

REVISE SUBSECTION 302-6.2 TO READ:

REVISE SUBSECTION 302-6.3 TO READ:
302-6.3 Placing Concrete. Portland cement concrete pavement shall comply with State Revised Standard Specification Section 40-1.03H and 40-1.03I specifications and State Standard Plans for placing concrete.

REVISE SUBSECTION 302-6.4 TO READ:

REVISE SUBSECTION 302-6.5 TO READ:


REVISE SUBSECTION 302-6.6 TO READ:


REVISE SUBSECTION 302-6.7 TO READ:

302-6.7 Protecting Concrete Pavement. Portland cement concrete pavement shall comply with State Revised Standard Specification Section 40-1.03L and Section 40-1.03M specifications and State Standard Plans for protecting concrete pavement and early use of concrete pavement.

REVISE SUBSECTION 302-6.8 TO READ:

302-6.8 Measurement and Payment. The contract price paid per cubic yard for Portland Cement Concrete Pavement shall include full compensation for furnishing all labor, materials, tools equipment, and incidentals, and for doing all work involved in constructing portland cement concrete pavement including placing and removal of forms, placing of reinforcement, placing of concrete, finishing, joints, curing, protecting concrete pavement, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payment for reconstruction or adjusting manholes to grade will be made as a separate item as provided on 301-1.7. If no such item is provided, payment will be deemed included in the other items of work.

302-7 PAVEMENT FABRIC.
302-7.2 Placement.
302-7.2.2 Tack Coat.
CHANGE THE FIRST SENTENCE OF THE FIRST PARAGRAPH TO READ:
The tack coat shall be PG 64-10 paving asphalt.

SECTION 303 – CONCRETE AND MASONRY CONSTRUCTION

303-5 CONCRETE CURBS, WALKS, GUTTERS, CROSS GUTTERS, ALLEY INTERSECTIONS, ACCESS RAMPS, ISLAND PAVING, AND DRIVEWAYS.
ADD THE FOLLOWING TO THE END OF SECTION 303-5:

Concrete for sidewalks, curb and gutters, access ramp, curb ramps, island paving, and driveways shall conform to 201-1, "Portland Cement Concrete." Sawcutting for curb ramps shall be to the exterior dimensions of the curb ramp.

Expansion joints, 1/4 inch wide, shall be installed in curb, gutter, and sidewalks at each side of a structure (e.g. curb ramps) and at the ends of curb returns. Weakened plane joints 1-inch deep shall be placed in the curb, gutter and sidewalks at 10-foot intervals.

303-5.1 Requirements.
303-5.1.1 General.
REVISE SUBSECTION 303-5.1.1 TO READ:

Concrete curbs, walks, gutters, cross gutters, alley intersections, access ramps, island paving, and driveways shall be constructed of portland cement concrete of the class and other requirements prescribed in 201-1. The finish coat to be applied to curbs shall consist of Class "B" mortar prepared as prescribed in 201-5.1. Subgrade preparation shall conform to the requirements of 301-1.

Unless otherwise specified on the Plans, and except as otherwise prescribed in 303-5.1.3 under the heading "Driveway Entrances", the minimum thickness of walks shall be 3 inches (75 mm). The thickness of gutters, cross gutters, alley intersections, access ramps, island paving, and driveway aprons shall be as shown on the Plans.

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If the sidewalk curb return area is disturbed by the Contractor's operations, a curb ramp in accordance with the latest State of California, Department of Transportation, Standard Specifications and Standard Plans shall be constructed with the Engineer's approval. It shall be the Contractor's responsibility to coordinate the relocation or readjustment of interfering utility boxes.

Installation of underground facilities, such as building sewer, water and gas services, utility boxes, etc., shall be completed in the sidewalk area before constructing sidewalks, driveways, curbs, curb and gutters, or curb ramps.

Installation of underground facilities, such as building sewer, water and gas services, utility boxes, etc., shall be completed in the median area before constructing island paving, curbs, or curb and gutters.

At locations where sidewalk, island paving, and driveways are to be constructed having unsatisfactory subbase material as determined by the Engineer, said material shall be removed to a depth of four inches (4"") minimum and replaced with ATSM C 131 Test Grading B crushed miscellaneous base conforming to the Standard Specifications and no separate payment shall be made. Crushed miscellaneous base shall be compacted in accordance with the Standard Specifications. The Contractor shall remove unsuitable subbase material as part of demolition operations and no separate payment shall be made.

Sidewalk, island paving, curb and gutter construction or repairs may be required at locations adjacent to project curb ramps. All repairs will be performed within City's right-of-way, unless directed otherwise by the Engineer.

The Contractor shall construct or repair concrete sidewalk, island paving, curb, and gutter at various locations as directed by the Engineer. Unless directed otherwise by the Engineer, the Contractor shall remove defective concrete by saw cutting along existing score lines, and as marked in white paint by the Engineer. Concrete shall be cut full depth with a power driven concrete saw acceptable to the Engineer as hereinafter specified and removed so as to have a vertical joint between the existing and new concrete. Demolition, removal and disposal of material required to complete the work is included in the price bid for the various bid items of work and no additional compensation shall be allowed therefore. Existing concrete, not scheduled for removal but damaged by the contractor's operations shall be replaced in accordance with these Specifications and no separate payment shall be made.

Where roof drains are found during sidewalk construction, the Contractor shall connect existing roof drains to the proposed sidewalk gutter. At locations where trench drains are proposed, existing roof drains shall be connected to the proposed trench drains as shown on the plans. Payment for roof drain connections, including all labor, materials, removal and disposal of material required to complete the work is included in the price bid for sidewalk construction.

Areas next to new sidewalk, back of curb and driveway where forms have been removed shall be back filled with Class “A” imported topsoil as specified in Section 212-1 and 308-2 of the Standard Specifications and these Special Provisions and mechanically compacted to ninety percent (90%) relative compaction to the level of existing sidewalk, driveway and curb. Class “A” imported topsoil shall be included as part of concrete curb and gutter work and no separate payment shall be made.

Expansion joints shall be constructed in the concrete curb and gutter at each side of driveways, returns and structures. Expansion joint material shall be the same as for sidewalk expansion joint filler material. Weakened plane joints 3/4" deep and 1/4" wide shall be constructed at regular intervals not to exceed ten (10) linear feet. The exposed surfaces of the curb and gutter shall be troweled to a smooth surface and shall be scored transversely and broom finished to the Engineer's satisfaction.

Number 4 steel rebars shall be doweled into existing curb and gutter at saw-cut locations and no separate payment shall be made.

At driveways, the Contractor shall provide steel reinforcement consisting of Number 4 rebar at 24 feet on center in both directions. Steel reinforcing shall have 3 inches of cover.

Concrete for concrete sidewalk, curb ramps and driveways shall contain one-pound lampblack per cubic yard concrete.

The minimum thickness of sidewalk and curb ramps shall be 3.5 inches.
PROVIDE NEW SUBSECTION 303-5.1.1.1 TO READ:

**303-5.1.1.1 Curb Ramp Requirement for Contractor-Damaged Curb Return Areas.** If the sidewalk or median curb return area is disturbed by the Contractor's operations for trenching or other work not related to sidewalk repair or curb ramp installation, a curb ramp in accordance with City Standards shall be constructed under the Engineer's direction. It shall be the Contractor's responsibility to coordinate the relocation or readjustment of interfering utility boxes. The cost of this curb ramp shall be included in the price paid for the related work, and no additional payment shall be made.

PROVIDE NEW SUBSECTION 303-5.1.1.2 TO READ:

**303-5.1.1.2 Detectable Warning Surfaces.** The detectable warning surface shall provide sound attenuation different than the adjacent paving and be federal yellow in color no. 33538 of FED-STD-595. The material used to provide color shall be an integral part of the walking surface. Detectable warning surface shall be made of polymer plastic or approved equal. The closest corner of the bottom left and bottom right truncated dome tile shall be set 6" from flow line. Utility Boxes shall be relocated if in conflict with detectable warning surfaces.

PROVIDE NEW SUBSECTION 303-5.1.1.3 TO READ:

**303-5.1.1.3 Replacement of Damaged Utility Boxes for Curb Ramp Work.** The Contractor is responsible for coordinating with the various utilities for relocation or readjustment of the various utility boxes within the new curb ramp locations. Should the Contractor choose to readjust existing utility boxes within the plane of the new curb ramp, the Contractor shall protect the existing improvements as required by 7-9.

The "Request for Replacement Utility Box for Curb Ramp Work" form (Attachment 4 at the end of these Special Provisions) lists utility companies that have agreed to provide free replacement utility boxes for those previously damaged or unavoidably broken during construction of curb ramps. Existing utility boxes damaged as a result of the Contractor's negligent construction activities will not be replaced free of charge. The Contractor shall complete and sign this form, and provide it (and a photocopy) to the Engineer for signature for each requested utility box replacement. The Contractor is then responsible for transmitting this form to the respective utility. This form provides written certification to the utility companies that a free replacement box is requested because either the existing utility box was broken, or the Contractor exercised due diligence when excavating for the new curb ramp and the existing box was unavoidably damaged.

In certain cases the replacement boxes may be delivered to the curb ramp site. In that case the Contractor shall coordinate with the utility company in order to be present when the box is delivered. In other cases the Contractor may be able to pick up replacement boxes from the utility yard. Because it may take up to one or two days for the Contractor to receive replacement boxes, the Contractor shall properly barricade the excavated curb ramp in accordance with 7-10.

**Payment:** Full compensation for providing the labor and materials for the replacement of damaged utility boxes shall be considered as included in the price paid for the bid items of work involved, and no additional compensation will be allowed therefor.

PROVIDE NEW SUBSECTION 303-5.1.1.4 TO READ:

**303-5.1.1.4 Extra Wide Ramps to Accommodate City Utility Boxes within Curb Ramp Areas.** Many City utility boxes are located within the curb return area at intersection corners. To facilitate curb ramp construction, it is intended that as many City utility boxes as possible remain in the curb ramp area and be incorporated into the new curb ramps. In order to accomplish this objective, existing City utility boxes may remain if their lids can be reset in the plane of the new ramps. Similarly, the central ramp portions of curb ramps may be constructed wider than the required four feet in order that existing City utility boxes may remain in place with their lids reset in the plane of the new ramps. (In this case, the width of the detectable warning surface shall equal the width of the revised ramp.) With the Engineer’s approval, vertical obstructions may remain in the two “wings” of the type E ramp, provided there is a four-foot path of travel behind the curb ramp. (See also 307-2.4.1 for relocation of City utility boxes in curb ramp areas.)
Payment: The unit price for each curb ramp includes up to 125 square feet of concrete pavement as described in Subsection 303-5.9g. The Contractor shall be compensated for the additional cost of constructing curb ramps with more than 125 square feet of concrete ramp area. The unit prices for sidewalk, curb gutter and detectable warning surface shall be used for additional quantities of these items because of the larger ramp areas needed to accommodate City utility boxes within curb return areas.

ADD NEW SUBSECTION 303-5.1.1.5 TO READ:

303-5.1.1.5 Ancillary Work for Concrete Sidewalk, Driveway, and Curb and Gutter Construction.

All repairs will be performed within City’s right-of-way, unless directed otherwise by the Engineer.

The Contractor shall repair or construct concrete sidewalk, curb, and gutter at various locations as directed by the Engineer. Unless directed otherwise by the Engineer the Contractor shall remove defective concrete by saw cutting along existing score lines, and as marked in white paint by the Engineer. Concrete shall be cut full depth with a power driven concrete saw acceptable to the Engineer as hereinafter specified and removed so as to have a vertical joint between the existing and new concrete. Demolition, removal and disposal of material required to complete the work is included in the price bid for the various bid items of work and no additional compensation shall be allowed therefore. Existing concrete, not scheduled for removal but damaged by the contractor’s operations shall be replaced in accordance with these Specifications and no separate payment shall be made.

a. Concrete Saw Cutting: Defective sidewalk, driveway, curb and gutter marked for removal shall be first cut with a power driven concrete saw acceptable to the Engineer. The concrete shall be saw cut in a straight line along existing score lines to the full depth of the existing concrete section. Sawcutting shall be full depth. No stumping shall be allowed.

Cutting of concrete with picks or pneumatic pavement breakers will not be permitted. If for any reason the concrete does not break on the line marked out by the Engineer, the Contractor shall saw out the broken portion and new concrete shall be placed in this area without payment. The Contractor shall not allow silt-laden water, generated from his saw cutting operations to flow into the public storm system or be deposited into the public right-of-way. The Contractor shall be responsible for removing silt material from the job site.

b. 1'-Wide Asphalt Concrete Plug: Removal of one feet of adjacent AC pavement will be necessary in order to construct the forms for concrete curb ramps and gutters. After the concrete forms have been removed, the Contractor shall provide a 1'-wide AC plug between the new concrete gutter, curb ramp construction, the existing asphalt concrete roadway, or a combination thereof. The contractor may elect to provide a temporary AC Plug with cutback and provide permanent plugs for many locations at a subsequent date. The Asphalt concrete plug pavement shall be a minimum of six inches in thickness. The asphalt concrete mix for permanent AC plugs shall be ½” Maximum Aggregate, Medium Type A Bituminous Pavement Mixture PG64-10 with 15% reclaimed asphalt pavement (RAP). The Contractor shall furnish originals of certified weigh master certificates indicating the actual net weight of asphalt concrete placed on the job site at the end of each workday.

c. Asphalt Concrete Pavement Regrading More than Three Feet from Flow line: Where directed by the Engineer, AC pavement adjacent to curb ramps shall be regraded so as to provide a maximum grade of five percent (5%) within the four feet next to the flow line of the curb ramp. This work may entail grinding of the existing AC pavement to meet the ADA required grades should the work quality be acceptable to the Engineer. Alternatively, this work may entail sawcutting and excavating to remove AC pavement and regrading with sufficient AC to meet the required ADA grade. The permanent asphalt concrete mix for this AC regrading shall be ½” Maximum Aggregate, Medium Type A Bituminous Pavement Mixture PG64-10 with 15% reclaimed asphalt pavement (RAP). The Contractor shall furnish originals of certified weigh master certificates indicating the actual net weight of asphalt concrete placed on the job site at the end of each workday.
In some areas the adjacent AC pavement may be underlain with portland cement concrete (PCC) pavement. In most cases it will be sufficient to remove the overlying AC pavement layers to permit regrading with new AC pavement overlay to the required ADA slopes. Should it be required to remove PCC pavement to provide the required ADA slopes, payment for the PCC removal shall be paid for with a negotiated change order.

d. **Unclassified Excavation for Concrete Work:** Material that is unsuitable beyond a depth of four inches (4") for sidewalk, driveway, curb and gutter repairs shall be excavated and disposed of as directed by the Engineer. The Engineer shall determine the limits and depth of excavation in the field.

e. **Processed Miscellaneous Base for Concrete Work:** Where directed by the Engineer or at locations where unsuitable material was excavated, the Contractor shall place processed miscellaneous base. Processed miscellaneous base material shall conform to Section 200-2.5 of the Standard Specifications. Processed miscellaneous base shall be compacted in accordance with Sections 301-1.3 and 306-1.3.2 of the Standard Specifications.

f. **Concrete Wheel Stop:** Wheel stops shall be 4’ wide as shown on the plans or as approved by the Engineer.

   Concrete wheel stops shall be precast.

   Wheel stops shall be constructed of portland cement concrete conforming to 201 and shall conform to the following provisions:

   1. The maximum size of aggregate used shall be at the option of the Contractor, but in no case larger than 3/8-inch
   2. The cement content of the concrete shall be not less than 5000 psi
   3. Reinforced with two #4 rebars, 10” in length
   4. Contain two ¾” diameter thru-holes for anchoring

   Wheel stops shall be anchored to the pavement using two dowels.

g. **Relocate Fire Hydrant:** Existing fire hydrants, as shown on the plans and as directed by the Engineer, shall be relocated. The Contractor shall coordinate with agencies including the City, East Bay Municipal District, and the local Fire Department prior to any construction activities that may impact fire safety equipment including fire hydrants.

h. **Relocate Roadside Sign:** Existing signs, as shown on the plans and as directed by the Engineer, shall be relocated. Relocate the existing posts and sign panels. If an existing post is deteriorated or broken, notify the Engineer. If ordered, use a new post and provide the breakaway feature as shown on plans. If a new post is ordered other than damaged caused by the Contractor’s activities, the post is change order work.

i. **Pre/Post Construction Survey:** For each location shown on the plans, perform a preconstruction survey to verify that forms and site constraints will allow the design dimensioning and slope requirements to be achieved. Upon completing construction of these facilities, perform a post construction survey and verify that design dimensioning and slope requirements were achieved. The post construction survey must include a minimum of 3 measurements for each dimension and slope requirement shown. Individual measurements must be equally distributed across the specified slope or dimensional surface. Before placing concrete, verify that forms and site constraints allow the required dimensioning and slopes shown. Immediately notify the Engineer if you encounter site conditions that will not accommodate the design details. Modifications ordered by the Engineer are change order work. Within 2 business days of performing the surveys, submit preconstruction and post construction surveys signed and sealed by one of the following:

   i. Land surveyor registered in the State
   ii. Civil engineer registered in the State
j. **Parking Space Meters - Meter Post:** At least 42 calendar days prior to the Contractor installing striping for permanent or temporary parking, the Contractor shall provide notice to Engineer. The Engineer will determine if parking meters are required and will notify the City of Oakland amount required. Where shown on the plans or as directed by the Engineer, the Contractor shall install the parking space meters post per Attachment 12. Parking space meters, except where noted on plans, shall be XXXX, or approved equal. Parking space meters meter posts shall not be installed at the locations specified by the Engineer in the field, in part of a driveway, curb ramp, or other travel way unless otherwise specified or approved on the plans. Existing features not being affected shall be replaced to their original conditions. The Contractor shall test and verify the meter is operational. The Contractor shall notify the Engineer once the parking meter posts are completed in plans. The City of Oakland will install each parking meter onto parking meter post installed by the Contractor. Additional parking meter post may be ordered by the Engineer, the cost of these additional installations shall be paid for at the same unit price as the bid item Parking Meter Post, and no additional compensation will be provide.

k. **Roof Drains:** Where roof drains are encountered in the field, the Contractor shall replace them in kind per the direction of Engineer.

l. **Pedestrian Barricades:** Where shown on the plans or as directed by the Engineer, the Contractor shall install the pedestrian barricades per State Standard Plan ES-7Q to length specified on the plans.

m. **Existing Bike Racks:** Where bike racks are encountered in the field and are within the limits of excavation, the bike racks shall be removed without damaging the bike rack. If the bike rack is deteriorated or broken, notify the Engineer. If a new bike rack is ordered other than damaged caused by Contractor’s activities, then the bike rack is change order work. The bike racks shall be installed per the direction of the Engineer. The Contractor shall assume all responsibility for bike racks, until final acceptance of the work by the Engineer. Contractor shall furnish all materials needed to reinstall the bike racks and disposal of all excess materials.

303-5.4 Joints.

303-5.4.2 Expansion Joints.

ADD NEW PARAGRAPH TO THE END OF SUBSECTION 303-5.4.2:

One-quarter inch (6.4mm) expansion joints shall be placed in the curb and gutter at each side of structures, driveways and curb returns. Expansion joints shall also be placed in the sidewalks on each side of driveways. If slipform equipment is used in curb and gutter construction, weakened plane joints 1-inch deep at 10-foot intervals may be substituted for expansion joints, if approved by the Engineer.

303-5.4.3 Weakened Plane Joints.

REVISE ITEM a) IN SUBSECTION 303-5.4.3 TO READ:

a) **General.** Weakened plane joints shall be straight and constructed in accordance with Subsections b) or c) below, unless otherwise shown on the Plans.

In walks and island paving, joints shall be transverse to the line of work and at regular intervals not exceeding 10 feet (3 m). At curves and walk returns, the joint shall be radial.

In gutter, including gutter integral with curb, joints shall be at regular intervals not exceeding 20 feet (6 m). Where integral curb and gutter is adjacent to concrete pavement, the joint shall be aligned with the pavement joints where practical.

303-5.5 Finishing.

303-5.5.2 Curb.

ADD THE FOLLOWING TO THE END OF SUBSECTION 303-5.5.2:

Concrete curb shall be constructed or repaired where directed by the Engineer. Unless otherwise directed by the Engineer, the defective concrete shall be sawed with a concrete saw as hereinafter specified and removed in sections so as to have a vertical joint between the old and the new concrete.

At locations where sidewalk, island paving, and driveways are to be constructed having unsatisfactory subbase material as determined by the Engineer, said material shall be removed to a depth of four inches (4") minimum and replaced with ATSM C 131 Test Grading B crushed miscellaneous base conforming to
the Standard Specifications and no separate payment shall be made. Crushed miscellaneous base shall be compacted in accordance with the Standard Specifications. The Contractor shall remove unsuitable subbase material as part of demolition operations and no separate payment shall be made.

Areas next to new sidewalk, back of curb and driveway where forms have been removed shall be back filled with Class “A” imported topsoil as specified in Section 212-1 and 308-2 of the Standard Specifications and these Special Provisions and mechanically compacted to ninety percent (90%) relative compaction to the level of existing sidewalk, driveway and curb. Class “A” imported topsoil shall be included as part of concrete curb and gutter work and no separate payment shall be made.

Expansion joints shall be constructed in the concrete curb and gutter at each side of driveways, returns and structures. Expansion joint material shall be the same as for sidewalk expansion joint filler material. Weakened plane joints 3/4” deep and 1/4” wide shall be constructed at regular intervals not to exceed ten (10) linear feet. The exposed surfaces of the curb and gutter shall be troweled to a smooth surface and shall be scored transversely and broom finished to the Engineer’s satisfaction.

No. 4 steel rebars shall be doweled into existing curb and gutter at saw-cut locations and no separate payment shall be made.

If replaced curbs featured color painted curbs, the Contractor shall paint new curbs to match previous paint color.

303-5.5.3 Walk and Island Paving.
ADD THE FOLLOWING TO THE END OF SUBSECTION 303-5.5.3:

Where integrated new concrete sidewalk, concrete island paving, and concrete driveway is constructed, the transverse slope of the sidewalk and island paving shall be downward toward the curb at the rate of 1/4 inch per foot, except at street intersections where the intersecting streets have different sidewalk widths or different curb grades at the curb returns, in which case, the slope shall be varied as directed by the Engineer. In all cases, the transverse slope shall be such that if continued to the curb, the walk will meet the grade at the top of the curb. Where a portion of the existing concrete sidewalk, concrete island paving, and concrete driveway is to remain in place, the areas to be removed will be marked out by the Engineer. The new sidewalk and island paving shall be constructed between the existing concrete sidewalk and the new curb as directed by the Engineer.

The sidewalk and island paving surface shall be scored as directed by the Engineer so that the area within scored sections does not exceed 15 square feet (1.39 square meter) and fine-hair broom finished to the Engineer’s satisfaction. Score lines and surface treatments constructed in concrete sidewalks, concrete island paving, driveways, or a combination thereof shall match existing score lines and surface treatments contiguous to the new and replacement work.

Concrete sidewalk and concrete island paving may be constructed monolithically with curb or with curb and gutter only if indicated on the plans or in the Special Provisions or upon written approval of the Engineer. The concrete mix for the entire monolithic construction shall contain lampblack in the amount of one pound (0.45kg.) per cubic yard (.765 cubic meter). A score line parallel to the curb face shall be made at normal locations such as the back of curb. Templates acceptable to the Engineer shall be used to set curb face forms and to check grading. The Contractor shall provide templates for the Engineer for use, if so requested. If in the opinion of the Engineer, unsatisfactory results are obtained, monolithic construction shall be discontinued and the remaining sidewalk shall be constructed separately from the curb and gutter using lampblack in the concrete for sidewalk, curb and gutter.

Expansion joint material 1/4” thick conforming to the Standard Specifications shall be placed at each side of driveways, returns and structures. Expansion Joint filler materials shall be fiber matrix, saturated with bitumen previously cut to proper dimensions and contours. Weakened plane joints 3/4” deep and 1/4” wide shall be constructed at regular intervals not to exceed ten (10) linear feet.

Installation of underground facilities, such as building sewers, water and gas services, etc., shall be completed in the sidewalk and median area before constructing concrete sidewalk, concrete island paving, concrete driveways, and curb ramps.

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The Contractor shall protect all completed work from acts of vandalism, damage and, in particular, guard against damage to the pavement edge of recently constructed concrete gutter. Vandalized, damaged work, or a combination thereof shall be replaced by the Contractor at no cost to the City.

**303-5.5.4 Gutter.**

ADD THE FOLLOWING TO THE END OF SUBSECTION 303-5.5.4:

Concrete gutter shall be constructed or repaired where directed by the Engineer. Unless otherwise directed by the Engineer, the defective concrete shall be sawed with a concrete saw as hereinafter specified and removed in sections so as to have a vertical joint between the old and the new concrete.

At locations where sidewalk and driveways are to be constructed having unsatisfactory subbase material as determined by the Engineer, said material shall be removed to a depth of four inches (4") minimum and replaced with ATSM C 131 Test Grading B crushed miscellaneous base conforming to the Standard Specifications and no separate payment shall be made. Crushed miscellaneous base shall be compacted in accordance with the Standard Specifications. The Contractor shall remove unsuitable subbase material as part of demolition operations and no separate payment shall be made.

Areas next to new sidewalk, back of curb and driveway where forms have been removed shall be back filled with Class “A” imported topsoil as specified in Section 212-1 and 308-2 of the Standard Specifications and these Special Provisions and mechanically compacted to ninety percent (90%) relative compaction to the level of existing sidewalk, driveway and curb. Class “A” imported topsoil shall be included as part of concrete curb and gutter work and no separate payment shall be made.

Expansion joints shall be constructed in the concrete curb and gutter at each side of driveways, returns and structures. Expansion joint material shall be the same as for sidewalk expansion joint filler material. Weakened plane joints 3/4” deep and 1/4” wide shall be constructed at regular intervals not to exceed ten (10) linear feet. The exposed surfaces of the curb and gutter shall be troweled to a smooth surface and shall be scored transversely and broom finished to the Engineer’s satisfaction.

No. 4 steel rebars shall be doweled into existing curb and gutter at saw-cut locations and no separate payment shall be made.

ADD NEW SUBSECTION 303-5.1.1.5 TO READ:

**303-5.5.6 Retaining Curb.**

The front forms may be stripped as soon as the concrete has set sufficiently. Class “B” mortar, as prescribed in 201-5.1 and thinned to the consistency of grout, shall be immediately applied to the top and face of the curb. If monolithic curb and gutter is being constructed, this mortar shall be applied to the full exposed curb face; otherwise, it shall extend 2 inches (50 mm) below the gutter surface.

The face and top of the curb shall then be carefully troweled to a smooth and even finish; the top being finished to a transverse slope of 1/4 inch (5 mm) toward the gutter, with both edges rounded to a radius of 1/2 inch (15 mm). The troweled surface shall be finished with a fine-hair broom applied parallel with the line of the work. The edge of the concrete at all expansion joints shall be rounded to a 1/4 inch (5 mm) radius. The surface of the work shall be finished as prescribed; after which the name of the Contractor, together with the year in which the improvement is constructed, shall be stamped therein to a depth of ¼ inch (5 mm) in letters not less than 3/4 inch (19 mm) high, at the BC and EC of curb returns.

Joints shall conform to 303-5.4.

Concrete retaining curb shall be constructed or repaired where directed by the Engineer. Unless otherwise directed by the Engineer, the defective concrete shall be sawed with a concrete saw as hereinafter specified and removed in sections so as to have a vertical joint between the old and the new concrete.

At locations where sidewalk, island paving, and driveways are to be constructed having unsatisfactory subbase material as determined by the Engineer, said material shall be removed to a depth of four inches (4") minimum and replaced with ATSM C 131 Test Grading B crushed miscellaneous base conforming to the Standard Specifications and no separate payment shall be made. Crushed miscellaneous base shall be compacted in accordance with the Standard Specifications. The Contractor shall remove unsuitable subbase material as part of demolition operations and no separate payment shall be made.
Areas next to new sidewalk, back of curb and driveway where forms have been removed shall be back filled with Class “A” imported topsoil as specified in Section 212-1 and 308-2 of the Standard Specifications and these Special Provisions and mechanically compacted to ninety percent (90%) relative compaction to the level of existing sidewalk, driveway and curb. Class “A” imported topsoil shall be included as part of concrete curb and gutter work and no separate payment shall be made.

303-5.9 Measurement and Payment.
CHANGE SUBSECTION 303-5.9 TO READ:

a. Measurement for concrete sidewalk, driveways, curbs, gutters, island paving, and curb ramps shall be made in horizontal planes.

b. These payment sections include two payment methods for curbs and gutters. Item Concrete Curb, Concrete Gutter, Concrete Curb and Gutter below pays for curb, gutter, and curb and gutter by the cubic yard.

c. Unless a separate item is included in the bid sheet for concrete saw cutting, the payment for Concrete Saw Cutting shall be included in the price paid for related concrete items, and no additional payment will be made.

c. Unclassified Excavation for Concrete Work shall occur only at locations shown on the plans or where the Engineer determines the sub-base material to be unsuitable. Unclassified Excavation shall be measured for payment by the cubic yard. The price paid per cubic yard for unclassified excavation to remove unsuitable material, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in excavation operation, and including, loading and off-hauling of excavated material, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

d. Processed Miscellaneous Base for Concrete Work shall occur only at locations shown on the plans or where the Engineer determines the sub-base material to be unsuitable. Processed miscellaneous base shall be measured for payment by the cubic yard. The price paid per cubic yard for processed miscellaneous base shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved, and compaction, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

e. Concrete Curb Ramps, All Types shall be constructed as shown on the latest State of California, Department of Transportation, Standard Specifications, Standard Plans, and contract drawings.

Where curb ramps are to be constructed within new concrete curb and gutter and concrete sidewalk areas that require replacement due to the Contractor’s trenching or other operations, full compensation shall be considered as included in the unit prices paid for the various items of work involved and no additional compensation will be allowed therefor.

New or replacement curb ramps not constructed as a result of the Contractor’s trenching or other operations shall be paid for by the unit price paid per cubic yard. The bid price shall include full payment for all materials, labor, equipment and incidentals required to construct the curb ramps in accordance with the latest State of California, Department of Transportation, Standard Specifications, Standard Plans, and contract drawings. The price per cubic yard of curb ramp shall include concrete pad, concrete ramp, 1’ wide border, adjacent wings, and retaining curb.

The contract price paid per cubic yard of concrete curb ramp shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals for doing all the work involved in constructing concrete curb ramps including placing embankment, compacting embankment, formwork, roof drains if required, stripping of formwork, adjusting cleanout to grade, utility box realignment or replacement, relocating signs, preparation of subgrade. These concrete curb ramps shall be constructed as designed on the project plans, complete in place, as specified in the Standard Specifications and these Special provisions, or as directed by the Engineer.

Refer to Subsection 303-5.1.1.1 for curb ramps installed to mitigate the effects of the Contractor’s
trenching or other operations in the curb return area.

f. Construct Concrete Sidewalk and Driveway only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete sidewalk and driveway shall be measured for payment by the cubic yard. The price paid per cubic yard for constructing new concrete sidewalk and driveway, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in placing embankment, compacting embankment, constructing concrete sidewalk and sidewalk, including formwork, adjusting cleanout to grade, utility box realignment or replacement, concrete placement, stripping of formwork, and backfilling behind forms, roof drain if required, and removal and reinstallation of existing bike racks, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

g. Construct Concrete Island Paving only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete island paving shall be measured for payment by the cubic yard. The price paid per cubic yard for constructing new concrete island paving, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in placing embankment, compacting embankment, constructing concrete island paving, and including, and formwork, adjusting cleanout to grade, utility box realignment or replacement, concrete placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

h. Construct new or remove and replace Concrete Alley Sections only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete alley sections shall be measured for payment by the square foot. The price paid per square foot for concrete alley sections, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in removing and replacing or constructing new concrete alley sections, and including all demolition work, off-hauling of concrete, and formwork, adjusting cleanout to grade, utility box realignment or replacement, concrete placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

i. Construct Concrete Curb and Gutter shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete Curb and Gutter shall be specified on the plans as to type per City Standard Detail S-1 and shall be measured for payment by the cubic yard. Concrete curb and gutter shall be combined as a unit as shown on bid items and will be measured for payment by the cubic yard.

The price paid per cubic yard for concrete curb and gutter, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in placing embankment, compacting embankment, constructing concrete curb and gutter, and including formwork, utility box realignment or replacement, roof drain if required, concrete placement, stripping of formwork, backfilling behind forms and painting curbs to match color of previous curbs, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

j. Construct Concrete Curb shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete curb shall be measured for payment by the cubic yard. The price paid per cubic yard for concrete curb, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in placing embankment, compacting embankment, constructing concrete curb and gutter, and including formwork, utility box realignment or replacement, concrete placement, roof drain if required, stripping of formwork, backfilling behind forms and painting curbs to match color of previous curbs, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

k. Construct Concrete Station Platform Curb shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete station platform curb shall be
measured for payment by the cubic yard. The price paid per cubic yard for concrete station platform curb, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in placing embankment, compacting embankment, constructing concrete station platform curb, and including formwork, utility box realignment or replacement, concrete placement, roof drains if required, stripping of formwork, backfilling behind forms and painting curbs to match color of previous curbs, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

l. Construct **Concrete Retaining Curb** shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete retaining curb shall be included in cost for **Concrete Sidewalk and Driveway** and **Concrete Curb Ramp**.

m. Construct **Concrete Gutter** shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete gutter shall be measured for payment by the cubic foot. The price paid per cubic foot for concrete gutter, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in placing embankment, compacting embankment, constructing concrete gutter, and including formwork, concrete placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

n. **Detectable Warning Surface** shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Existing ramps without dome pavers may require retrofitting with Detectable warning surface. The price paid per square foot to provide detectable warning surface at existing curb ramps shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in installing detectable warning surface, complete in place, as specified in the Standard Specifications, these Special Provisions and the Project Plans, or as directed by the Engineer.

o. **Concrete Wheel Stops** shall occur only at locations shown on the plans or approved and marked in the field by the Engineer. Concrete wheel stops shall be specified on the plans as **Concrete Wheel Stop** and shall be measured for payment by each concrete wheel stop.

The price paid for each concrete wheel stop, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals required for doing all work involved in constructing and placing the wheel stops, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

p. **Relocate Fire Hydrant** shall occur only at locations shown on the plans or approved and marked in field by the Engineer. Relocate Fire Hydrant shall be specified on the plans as **Relocate Fire Hydrant** and shall be measured for payment by each fire hydrant relocated.

The price paid for each Relocate Fire Hydrant shall include full compensation for furnishing all labor, material, tools, equipment, appurtenances, and incidentals required for doing all work involved with removing and relocating the fire hydrant to final grade and no additional compensation shall be provided therefor.

q. **Relocate Roadside Sign** shall occur only at locations shown on the plans or approved and marked in field by the Engineer. Relocate Roadside Sign shall be measured for payment by each roadside sign relocated.

The price paid for each Relocate Roadside Sign shall include full compensation for furnishing all labor, material, tools, equipment, appurtenances, and incidentals required for doing all work involved with removing and relocating the fire hydrant to final grade and no additional compensation shall be provided therefor.

r. **Pre/Post Construction Survey** shall occur at locations specified on the plans or as marked in the field by the Engineering. Pre/Post Construction Survey shall be measured for payment by each ramp surveyed.
The price paid for each Pre/Post Construction Survey shall include full compensation for furnishing all labor, material, tools, equipment, appurtenances, and incidentals required for doing all work involved with pre-construction and post construction survey of each curb ramp and no additional compensation shall be provided therefor.

s. **Parking Space Meters** **Meter Post** shall occur only at locations shown on the plans or approved and marked in field by the Engineer. Parking **space meters** **meter posts** shall be measured for payment by each parking **space meter post** installed.

The price paid for each Parking **Space-Meter Post** shall include full compensation for furnishing all labor, material, tools, equipment, appurtenances, and incidentals required for doing all work involved in installing parking **space meters** **meter post**, disposal of debris, coordination with City of Oakland to install parking meter head, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

t. **Pedestrian Barricade (Type I)** shall occur only at locations shown on the plans or approved and marked in field by the Engineer. Type I pedestrian barricades shall be measured for payment by each.

The price paid for each Pedestrian Barricade (Type I) shall include full compensation for furnishing all labor, material, tools, equipment, appurtenances, and incidentals required for doing all work involved in installing pedestrian barricades, disposal of debris, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

u. **Pedestrian Barricade (Type II)** shall occur only at locations shown on the plans or approved and marked in field by the Engineer. Type II pedestrian barricades shall be measured for payment by linear foot.

The price paid for linear foot of Pedestrian Barricade (Type II) shall include full compensation for furnishing all labor, material, tools, equipment, appurtenances, and incidentals required for doing all work involved in installing pedestrian barricades, disposal of debris, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

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**303-6 COLORED STAMPED CONCRETE**

**303-6.1 General.**

ADD THE FOLLOWING TO SUBSECTION 303-6.1:

Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or Shop Drawings indicating size, materials, finishes, color and quantities of items being supplied.

The Contractor or subcontractor performing the BOMANITE imprinted paving, or approved equal, shall provide conclusive proof of qualifications and has previously produced BOMANITE imprinted paving, or approved equal, over a period of no less than 20 years. Proof shall be in three high quality installations, similar in scope, and located within a 50 mile radius of the City of project location. Evidence that the Contractor or subcontractor is qualified to comply with the requirements specified shall be submitted to and be subject to the approval of the Engineer.

All coloring and curing compounds must be from the same manufacturer.

REPLACE SUBSECTION 303-6.3 TO READ AS FOLLOWS:

**303-6.3 Pattern.** The pattern for areas shown as stamped concrete on the Plans shall be achieved using BOMANITE stamped concrete imprinting tools for the "Running Bond Pattern", "Coquina Pattern", and "Rock Pattern", as manufactured by BOMANITE, or approved equal. Use BOMANITE installation tools, or approved equal, to achieve the specified patterns. Install all materials and use all stamping tools and patterns following the manufacturer’s instructions.

Contractor shall construct a 48-by-48 inch test panel for each texture, pattern and color combination of stamped concrete shown on the Plans. Contractor shall construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a
specific treatment and pattern. Contractor shall construct additional test panels at no additional cost until a test panel for each type of stamped concrete has been accepted and approved by the Engineer. Contractor shall only proceed with the construction of stamped concrete after having received final approval by the Engineer of a successfully executed test panel for each type of stamped concrete or combination of adjacent treatments. Note that test panel of approved “Running Bond” and “Coquina Pattern”, or approved equal, shall be coordinated with the test panel for “Precast Architectural Pavers” as described in Section 315. All executed stamped concrete applications throughout the project shall match their corresponding approved test panel.

The alignment of the “Running Bond Pattern”, or approved equal, shall follow the pattern alignment details shown on the Plans.

Expansion joints and control joints shall be located so as not to disrupt the pattern.

Reinforcement shall be installed per the manufacturer’s instructions.

Do not pattern or grout grooved area and detectable warning surface on a curb ramp.

REPLACE SUBSECTION 303-6.3 TO READ AS FOLLOWS:
303-6.4 Curing. Curing shall comply with subsection 303-7.4.

ADD NEW SUBSECTION 303-6.5 TO READ AS FOLLOWS:
303-6.5 COLOR. Color Stamped Concrete shall comply with subsection 303-7.

ADD NEW SUBSECTION 303-6.5 TO READ AS FOLLOWS:
303-6.6 Measurement and Payment. Colored Stamped Concrete shall be paid at the contract unit price for each cubic yard of colored stamped concrete. The Contract Unit Price shall include for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in constructing colored concrete, stamped concrete paving, and including color hardener, pattern tools, crushed aggregate base for concrete, curing compound, and other materials and work associated with preparing stamped concrete in color as per 303-7.3 as well as formwork, utility box realignment or replacement, concrete placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

303-7 COLORED CONCRETE
303-7.1 General.
REPLACE THE FIRST SENTENCE OF SUBSECTION 303-7.1 TO READ AS FOLLOWS:
Colored concrete shall be produced by Method B as specified below.

Crushed aggregate base for colored concrete shall comply with requirements of Section 200-2.2 – Crushed Aggregate Base.

Color pigments for dry-shake method must comply with ASTM C 979.

REPLACE SUBSECTION 303-7.3 TO READ AS FOLLOWS:
303-7.3 Method B (Integral Color).
   a) Color Conditioning Admixture. For Stamped Concrete: Color shall be ready-to-use, dry shake BOMANITE color hardener, or approved equal, and shall use streak-free hard graded aggregate as manufactured by the BOMANITE, or approved equal. The colors shall be BOMANITE “GRANOLA” or approved equal, BOMANITE “AUTUMN BROWN” or approved equal, and BOMANITE “SALMON” or approved equal.

303-7.4 Curing.
ADD THE FOLLOWING AFTER THE FIRST SENTENCE OF SUBSECTION 303-7.4:
Curing compound shall comply with ASTM C 309 and shall be used as a curing membrane that conforms with all applicable air pollution regulations. Curing compound shall be “Clear-Cure” material, or approved equal.

ADD NEW SUBSECTION 303-7.5 TO READ AS FOLLOWS:
303-7.5 Measurement and Payment. Colored Stamped Concrete shall be paid at the contract unit price for each cubic yard of colored stamped concrete. The Contract Unit Price shall include for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in constructing colored concrete, stamped concrete paving, and including color hardener, pattern tools, crushed aggregate base for concrete, curing compound, and other materials and work associated with preparing stamped concrete in color as per 303-7.3 as well as formwork, utility box realignment or replacement, concrete placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

ADD NEW SUBSECTION 303-9 TO READ AS FOLLOWS:

303-9 INSTALLATION OF MANHOLES, CLEANOUTS AND APPURTEYNANCES.

303-9.1 General.
303-9.1.1 Structure Excavation and Backfill. Structure excavation and backfill shall conform to the applicable requirements of 300-3 and 306-1.

303-9.1.2 Rock Base. Prior to placing the concrete manhole base, a minimum of eight inches of rock base or crushed rock approved by the Engineer shall be placed upon the earth subgrade and compacted to 90 percent (90%) relative compaction by mechanical means.

303-9.1.3 Concrete Manhole Base. Concrete manhole base shall be constructed as shown on the Plans and Standard Details and shall conform to the applicable requirements of Section 303. The concrete shall be vibrated to density and screened so that the first precast manhole section will be placed on a level uniform bearing surface for the full circumference. An approved metal forming ring shall be used to form a level joint groove in the fresh concrete of the manhole base to receive the first precast manhole section. Sufficient mortar or Ramnede shall be deposited on the base to assure a watertight seal between base and manhole wall or the first precast manhole section shall be placed on the concrete base before the concrete has set. The first section shall be properly located and plumbed.

303-9.1.4 Placing Precast Manhole Sections. Precast manhole sections shall be carefully inspected prior to installation. Sections with chips or cracks in the tongue shall not be used. The ends of precast manhole sections shall be cleared of foreign materials.

The precast sections shall be installed in a manner that will result in a watertight joint. Rubber “O” Ring gaskets or preformed flexible joint sealant shall be installed in strict conformance with the manufacturer’s recommendations. Only pipe primer furnished by the gasket manufacturer will be approved. If leaks appear in the manholes, the inside joint shall be caulked with non-shrink epoxy mortar to the satisfaction of the Engineer.

303-9.1.5 Manhole Channels. Manhole channels shall be constructed as shown on the Plans and Standard Details and with smooth transitions to ensure unobstructed flow through the manhole. All sharp edges or rough sections that tend to obstruct flow shall be removed. Where a full section of pipe is laid through a manhole, a neatly cut half pipe shall be laid to form the channel. The exposed edge of the pipe shall be completely covered with mortar. All mortar surfaces shall be troweled smooth. Breaking out the top half section of pipe after installation is not acceptable.

303-9.1.6 Drop Manholes/Drop Connection Manholes. Drop manholes and drop connection manholes shall be constructed at locations indicated and as shown on the plans. The drop assembly shall be connected to the sewer pipe with an approved adapter. The lower elbow shall be supported by concrete poured monolithically with the manhole base.

303-9.1.7 Flexible Joints. Flexible joints shall be provided not more than 1-1/2 feet from manhole walls. Pipes entering manholes shall be laid out on firmly compacted base rock or crushed rock approved by Engineer.

303-9.1.8 Pipe Stubouts For Future Sewer Connections. Manhole stubouts for future sewer connections shall be installed as shown or required by the Engineer. Maximum and minimum length outside the manhole wall shall be shown on the Standard Details. Pipes in precast walls or manhole base shall be constructed in accordance with details shown on the Plans. Compacted base rock or crushed rock approved by Engineer as specified herein before shall be placed upon the earth under all stubouts.
Semi-permanent plugs shall be installed in the stubout ends with gasket joints similar to the sewer pipe being used. Plugs shall be capable of withstanding all internal or external pressures without leakage. All plugs shall be adequately braced to prevent blowoffs.

**303-9.1.9 Permanent Plugs.** Interior contact surfaces of all pipes to be cut off or abandoned shall be cleaned. Concrete plugs shall be constructed in the end of all pipe 18 inches or less in diameter. Minimum length of concrete plugs shall be 8 inches. For pipe 21 inches and larger, the plugs may be constructed of common brick or concrete block. The exposed face of block or brick shall be plastered with mortar. All plugs shall be watertight and capable of withstanding all internal and external pressures without leakage.

**303-9.1.10 Manhole Extensions.** Extensions shall be installed in conformance with the details shown on the Plans and to a height to match finished grade. Grade rings shall be lined in mortar with the sides plumb and tops level. Joints shall be sealed as specified for manhole sections. Extensions shall be watertight.

**303-9.1.11 Manhole Frames and Covers.** Frames and covers shall be installed on top of manholes to prevent all infiltration of surface water or groundwater into manholes. Frames shall be set in a bed of mortar with mortar carried over the flange of the ring as shown on the Plans. Frames shall be set so cover tops are flush with surface of adjoining pavement or ground surface, unless otherwise shown or directed. Concrete manhole collars shall be provided and installed as shown on the Standard Details.

**303-9.1.12 Watertight Manholes.** Watertight manholes shall be constructed where shown or specified. Watertight manhole frames and covers shall be prevented from blowing off during sewer surcharging by installation of watertight manhole frames with bolted lids as shown. Bearing surfaces shall be sealed with a neoprene gasket.

**303-9.1.13 Manhole Steps.** Manhole steps shall be installed as shown on the Standard Details.

**303-9.1.14 Manhole Over Existing Sewers.** Manholes shall be constructed over existing operating sewer lines at locations indicated. Excavation shall be as specified. Flow through existing sewer lines shall be maintained at all times. New concrete and mortar work shall be protected for a period of seven days after concrete has been placed. The Contractor shall advise Engineer of plans for diverting sewage flow and obtain the Engineer's approval before starting. The Engineer's approval shall not relieve the Contractor of the responsibility for maintaining adequate flow capacity at all times and adequately protecting new and existing work. The new manhole base shall be constructed under and around the existing sewer as specified herein. The top half of the existing pipe shall be neatly removed within the new manhole, the edges covered with mortar, and troweled smooth.

**303-9.1.15 Connection to Existing Manholes.** Sewers shall be connected to existing manholes at locations indicated. The Contractor shall provide all diversion facilities and perform all work necessary to maintain sewage flow in existing sewers during connection to the manholes. The Contractor shall break out existing manhole bases or grouting as necessary and regrout to provide smooth flow into and through existing manholes.

**303-9.1.16 Special Manholes.** Special manholes shall be constructed in conformance with the applicable requirements of Section 303 and as shown on the Plans.

**303-9.1.17 Sewer Cleanouts.** Cleanout construction shall be as shown on the Plans and Standard Details. The cleanout shall be the same material as the main line sewer unless approved otherwise by the Engineer.
303-9.2 Structure Testing.

303-9.2.1 Vacuum Testing. All project manholes shall be vacuum tested. The Contractor shall furnish all materials, equipment and labor for making a vacuum test. Vacuum test procedures and requirements shall be as follows:

1. After completion of the manhole barrels but prior to backfilling and grade ring installation, all manhole openings shall be sealed with plugs and a rubber ring “donut” type plug inserted inside the cone opening.
2. A small vacuum pump shall be attached to a hose connected to the plug and 4 psi of vacuum shall be applied.
3. The vacuum shall be permitted to stabilize at 3.5 psi for one minute; then the test shall begin.
4. The manhole shall maintain vacuum such that no greater than 0.5 psi of vacuum shall be lost during the specified test period.
5. The specified test period is as follows:

<table>
<thead>
<tr>
<th>Manhole Depth (Ft.)</th>
<th>Test Period (Min.)</th>
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<tbody>
<tr>
<td>0-5</td>
<td>4.5</td>
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<tr>
<td>5-10</td>
<td>5.5</td>
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<td>10-15</td>
<td>6.0</td>
</tr>
<tr>
<td>Greater than 15</td>
<td>6.5</td>
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</table>
6. Manholes failing the test shall be patched as required and re-tested.
7. A vacuum regulator shall be provided on the vacuum pump such that no pressure greater than 10 psi can be applied to the manhole during the test. All manholes not meeting the leakage test or are unsatisfactory from a visual inspection shall be repaired to the Engineer's satisfaction.

303-9.2.2 Hydrostatic Testing. At the Contractor's option and with the Engineer’s approval, hydrostatic testing may be substituted for vacuum testing. The test shall consist of plugging all inlets and outlets and filling the manhole with water to a height determined by the Engineer. Leakage in each manhole shall not exceed 0.1 gallon per hour per foot of head above the invert. All manholes that do not meet the leakage test or are unsatisfactory from a visual inspection shall be repaired to the Engineer's satisfaction.

303-9.3 Payment. All new manhole covers and metal frames shall be ordered by the City of Oakland and furnished by the District City of Oakland. The Contractor shall submit to the Engineer for approval the proposed schedule for number and type of manhole covers and frames required at each location and dates the manhole covers and frames are needed for each location. The schedule shall reflect the following requirements:

1. City shall not store any manhole frames and covers.
2. A manhole cover and frame can take 6 weeks to fabricate.

The schedule and quantity shall be confirmed each month and revised as necessary. Revised schedules must be approved by the Engineer. The Engineer will order the manhole covers and frames according to the approved schedule. The Contractor shall pick up the manhole covers and frames from the supplier as directed by the Engineer.

The unit prices in the Bid shall include full compensation for furnishing all labor, incidentals, materials except excluding manhole covers and metal frames (but shall including all costs related to the pickup/delivery of the manhole frame and covers), tools and equipment for doing all work, including any rework, involved in, or appurtenant to each item as shown on the Plans or in the Specifications.

The Contractor shall purchase the new manhole covers and metal frames from the City of Oakland. The Contractor shall maintain records of manhole covers and metal frames purchased (material, tax, and delivery cost), and submit them to the AC Transit for reimbursement.

Manholes, including new manholes or replacement of existing manholes, regardless of depth, will be paid for at the unit price bid for each installation of manhole complete in place. Such payment
shall include excavation; removal of existing manholes; replacing or installing drop connection manhole; the disposal of excavated material and debris; the removal and disposal of contaminated material not paid by separate item; supplying and placement of backfill material or special backfill material; constructing inverts; installing manhole covers and metal frames; HDPE manufactured or in-placed lining whenever specified in the plans; trench shoring; providing sewer by-pass flow; saw-cutting; reconnection work to existing or new pipe or conduit; restoration of the street surface, including permanent and temporary resurfacing; traffic striping not paid by separate item and all other work necessary to complete the work.

**Drop connections for manholes**, regardless of size and depth, constructed complete, in place, will be paid for at the unit price bid for each.

**Sewer cleanouts or lampholes**, regardless of size and depth, constructed complete, in place will be paid for at the unit price bid for each.

**Remove manhole**, regardless of size and depth will be paid for at the unit price bid for each.

ADD NEW SUBSECTION 303-10 TO READ:

### 303-10 TACTILE CONCRETE PAVEMENT STRIP WITH ETCHED FINISH

**303-10 CROSS REFERENCES**

Tactile Concrete Pavement Strip with Etched Finish ……………….. 201-9

#### 303-10.1 General.

Materials for Tactile Concrete Pavement Strip with Etched Finish shall comply with 201-9.

The Contractor shall construct the tactile concrete paving in accordance with the project plans, the Standard Specifications, and these special provisions and as directed by the Engineer.

Adjacent paving, curbs, plantings, rock, mulch, and other surfaces that are not to receive retarded finish shall be protected prior to application of retarders.

The Contractor shall pour colored concrete, float and lightly trowel finish; no trowel, edger or jointer ridge marks. Apply retarders uniformly per manufacturer's requirements. Do not delay the application of the surface retarder beyond the loss of the initial bleed water especially in warmer temperatures for best results. Refer to manufacturer's recommendations and requirements for additional information regarding application of retarders.

Retarder removal intervals depend on strength of mix, level of finish etching desired, climatic conditions, and desired washing techniques. Surface removal timing after application shall follow manufacturer's directions. For removal, wash with water rinse/light broom or pressure wash with power equipment per manufacturer’s recommendation. Verify methods in test panels. Do not over-finish and/or delay application beyond the initial bleeding on the light finishes.

Run-off resulting from retarder removal shall be controlled in accordance with local, state, and federal regulations.

Immediately following placement, concrete shall be protected from premature drying, hot and cold temperatures, rain, flowing water and mechanical injury per manufacturer's recommendations.

Standard, uncolored concrete pavement placed adjacent to tactile concrete pavement strips with etched finish shall be placed as a separate pour to avoid staining of the plain concrete border with the color hardener and retarder.

Admixture: Do not add calcium chloride to mix as it causes mottling and surface discoloration and may interfere with chemical interaction of retarder. Supplemental admixtures shall not be used unless approved by manufacturer. Do not add water to the mix in the field. Observe all manufacturers installation instructions regarding the use of the admixture.

#### 303-10.2 Curing.

Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 Plastic Shrinkage Cracking published by the National Ready Mixed Concrete Association. Observe all manufacturers installation instructions regarding the use of the admixture.
Curing shall be the sole responsibility of the contractor and shall be conducted in such a manner and using such materials so as to provide quality concrete and prevent the formation of cracks while not adversely effecting the finish or color of the concrete tactile paving.

**303-10.3 Measurement and Payment.** Tactile Concrete Pavement Strip with Etched Finish work will be paid at the contract unit price for each square foot of tactile concrete pavement strip with etched finish. Contract Unit Price shall include full compensation for doing all the work involved in the tactile concrete pavement strips with etched finish complete in place. No separate payment shall be made for mock-up panels.

ADD NEW SUBSECTION 303-11 TO READ:

**303-11 Unclassified Sidewalk.** Contractor shall analyze and document the structural section, materials, patterns and other treatments associated with each type of existing unclassified sidewalk found at the locations identified on the plans. Documentation shall include sampling, pictures, City-provided specifications, or other necessary evidence of the existing conditions.

Contractor shall provide completed documentation for each type of unclassified sidewalk for review and approval by the Engineer. Contractor shall provide additional information and documentation at the request of the Engineer.

Contractor shall provide to the Engineer for approval a plan set for construction of unclassified sidewalk that includes construction limits, transitions to existing unclassified sidewalk to remain, layout, construction details, and typical sections as well as specifications for materials, colors, patterns, manufactured products and other required information to replace in kind each type of existing unclassified sidewalk at the locations identified on the plans and in Contractor’s approved documentation.

Contractor shall construct a 48-by-48 inch test panel for each applicable type of texture, color, and material or texture/color/material combination of unclassified sidewalk identified in Contractor’s approved list of applications. Contractor shall construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a specific treatment. Contractor shall construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer for each type of unclassified sidewalk identified in Contractor’s approved documentation. Contractor shall only proceed with the construction of unclassified sidewalk areas after having received final approval by the Engineer of a successfully executed test panel for each type of unclassified sidewalk. Unclassified sidewalk constructed at the identified locations shall match the approved sample.

Workers assigned to this work must be tooled and trained to perform the installation of the types of sidewalk treatments identified in Contractor’s approved documentation. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.

Materials must be as per Contractor’s approved plans and specifications for the in-kind replacement of unclassified sidewalks and as directed by the Engineer.

Contractor shall construct unclassified sidewalk in locations identified on the plans and as directed by the Engineer to a structural, durability and visual quality that matches conditions of the approved test panel.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of unclassified sidewalk.

If placing unclassified sidewalk around new or remaining curb ramp, do not texture or grout the grooved area and detectable warning surface of the curb ramp.

If placing unclassified sidewalk around or adjacent to miscellaneous structures (i.e. manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the unclassified sidewalk is finished beyond the miscellaneous structure.

Leave forms in place for a minimum of 12 hours after surface finishing.

If unclassified sidewalk is constructed using extruded or slip form method, comply with State
Standard Specification section 73-1.03D.

Clean any discolored concrete or other surface material to remain adjacent to the area of construction of unclassified sidewalk at no additional cost by abrasive blast cleaning or other method authorized by the Engineer.

**Payment:** Remove and replace in kind **Unclassified Sidewalk** only at locations shown on the plans or approved and marked in the field by the Engineer. Unclassified sidewalk shall be measured for payment by the square foot and no additional payment shall be made for depth of pavement section and type of materials or construction methods involved. The price paid per square foot for remove and replace in kind unclassified sidewalk, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in replacing in kind unclassified sidewalk, including test panels, formwork, adjusting cleanout to grade, utility box realignment or replacement, placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

**ADD NEW SUBSECTION 303-12 TO READ:**

303-12 **Unclassified Crosswalk.** Contractor shall analyze and document the structural section, materials, patterns and other treatments associated with each type of existing unclassified crosswalks found at the locations identified on the plans. Documentation shall include sampling, pictures, City-provided specifications, or other necessary evidence of the existing conditions.

Contractor shall provide completed documentation for each type of unclassified crosswalk for review and approval by the Engineer. Contractor shall provide additional information and documentation at the request of the Engineer.

Contractor shall provide to the Engineer for approval a plan set for construction of unclassified crosswalks that includes construction limits, edging or transitions at adjacent new roadway pavement, layout, construction details, and typical sections as well as specifications for materials, colors, patterns, manufactured products, systems and other required information to replace in kind each type of existing unclassified crosswalk at the locations identified on the plans and in Contractor’s approved documentation.

Contractor shall construct a 48-by-48 inch test panel for each identified type of unclassified crosswalk, including texture, color, and material or texture/color/material combination. Contractor shall construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a specific treatment. Contractor shall construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer for each type of unclassified crosswalk identified in Contractor’s approved documentation. Contractor shall only proceed with the construction of unclassified crosswalks after having received final approval by the Engineer of a successfully executed test panel for each type of unclassified crosswalk. Unclassified crosswalks constructed at the identified locations shall match the approved sample.

Workers assigned to this work must be tooled and trained to perform the installation of the types of sidewalk treatments identified in Contractor’s approved documentation. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.

Materials must be as per Contractor’s approved plans and specifications for the in-kind replacement of unclassified sidewalks and as directed by the Engineer.

Contractor shall construct unclassified crosswalks in locations identified on the plans and as directed by the Engineer to a structural, durability and visual quality that match preconstruction conditions of the approved test panel.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of unclassified crosswalk.

If placing unclassified crosswalks around a new or remaining curb ramp, do not texture or grout the grooved area and detectable warning surface of the curb ramp.
If placing unclassified crosswalks around or adjacent to miscellaneous structures (i.e., manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the unclassified crosswalk is finished beyond the miscellaneous structure.

If unclassified crosswalk is constructed using extruded or slip form method, comply with State Standard Specification section 73-1.03D.

If unclassified crosswalks are constructed using a stamped asphalt or asphalt imprinting system, the asphalt paving prior to application of the system shall conform to Revised State Standard Specification section 39 for Type A Hot Mix Asphalt.

If unclassified crosswalk is constructed using a color or stamped concrete, the concrete paving prior to application of the system shall conform to Revised State Standard Specification section 40 for Jointed Plain Concrete Pavement.

Clean any discolored concrete or other surface material to remain adjacent to the area of construction of unclassified crosswalk at no additional cost by abrasive blast cleaning or other method authorized by the Engineer.

Payment: Replace in kind Unclassified Crosswalk only at locations shown on the plans or approved and marked in the field by the Engineer. Unclassified crosswalk shall be measured for payment by the square foot and no additional payment shall be made for depth of pavement section and type of materials or construction methods involved. The price paid per square foot for remove and replace in kind unclassified crosswalk, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in replacing in kind unclassified crosswalk, including test panels, formwork, utility box realignment or replacement, placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

ADD NEW SUBSECTION 303-12 13 TO READ:

303-12 13 Unclassified Island Paving. Contractor shall analyze and document the structural section, materials, patterns and other treatments associated with each type of existing unclassified island paving found at the locations identified on the plans. Documentation shall include sampling, pictures, City-provided specifications, or other necessary evidence of the existing conditions.

Contractor shall provide completed documentation for each type of unclassified island paving for review and approval by the Engineer. Contractor shall provide additional information and documentation at the request of the Engineer.

Contractor shall provide to the Engineer for approval a plan set for construction of unclassified island paving that includes construction limits, transitions to existing unclassified island paving to remain, layout, construction details, and typical sections as well as specifications for materials, colors, patterns, manufactured products and other required information to replace in kind each type of existing unclassified island paving at the locations identified on the plans and in Contractor’s approved documentation.

Contractor shall construct a 48-by-48 inch test panel for each applicable type of texture, color, and material or texture/color/material combination of unclassified island paving identified in Contractor’s approved list of applications. Contractor shall construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a specific treatment. Contractor shall construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer for each type of unclassified island paving identified in Contractor’s approved documentation. Contractor shall only proceed with construction of unclassified island paving after having received final approval by the Engineer of a successfully executed test panel for each type of unclassified island paving. Unclassified island paving constructed at the identified locations shall match the approved sample.

Workers assigned to this work must be tooled and trained to perform the installation of the types of sidewalk treatments identified in Contractor’s approved documentation. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.
Materials must be as per Contractor’s approved plans and specifications for the in-kind replacement of unclassified sidewalks and as directed by the Engineer.

Contractor shall construct unclassified island paving in locations identified on the plans and as directed by the Engineer to a structural, durability and visual quality that matches conditions of the approved test panel.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of unclassified island paving.

If placing unclassified island paving around a new or remaining curb ramp, do not texture or grout the grooved area and detectable warning surface of the curb ramp.

If placing unclassified island paving around or adjacent to miscellaneous structures (i.e. manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the unclassified island paving is finished beyond the miscellaneous structure.

Leave forms in place for a minimum of 12 hours after surface finishing.

If unclassified island paving is constructed using extruded or slip form method, comply with State Standard Specification section 73-1.03D.

Clean any discolored concrete or other surface material to remain adjacent to the area of construction of unclassified island paving at no additional cost by abrasive blast cleaning or other method authorized by the Engineer.

Payment: Replace in kind **Unclassified Island Paving** only at locations shown on the plans or approved and marked in the field by the Engineer. Unclassified island paving shall be measured for payment by the square foot and no additional payment shall be made for depth of pavement section and type of materials or construction methods involved. The price paid per square foot for remove and replace in kind unclassified island paving, shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in replacing in kind unclassified island paving, including test panels, formwork, utility box realignment or replacement, placement, stripping of formwork, and backfilling behind forms, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

**SECTION 304 – METAL FABRICATION AND CONSTRUCTION**

ADD NEW SUBSECTION 304-5 TO READ

**304-5 CATCH BASIN INSERT.**

**304-5 CROSS REFERENCES**

Catch Basin Insert ..................... 206-8

**304-5.1 General.** Materials for catch basin insert shall conform to 206-8.

**304-5.2 Insert Construction.** Mounting frame members shall be welded. Structural support frame members shall be welded. Insert screens shall be welded onto structural support frames. Mounting frames shall be bolted onto the catch basin wall at the outlet opening. Mounting frames shall be anchored at all four corners with HILTI expansion anchors or approved equivalent. Inserts shall be installed vertically onto the mounting frame directly in front of the outlet opening. Inserts shall be completely removable by lifting it off the mounting frame.

**304-5.3 Measurement and Payment.** Catch Basin Insert will be paid for at the Contract Unit Price for each model of insert required by the Plans, Contract Unit Price shall include full compensation for surveying and verifying the height of inserts, and doing all the work involved in installing the insert complete in place for new and existing inlets as indicated on the Plans and in accordance with these Special Provisions. No additional compensation shall be provided due to change in elevation of inverts and top of grate.

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ADD NEW SUBSECTION 304-6 TO READ:
304-6 ARCHITECTURAL FENCE.

304-6 CROSS REFERENCES
Architectural Fence .................. 206-9

304-6.1 General
304-6.1.1 Description. Work under this item shall consist of fabricating, transporting and installing complete and in place architectural fence on curbside BRT platforms as shown on the Plans and in accordance with these Special Provisions.

304-6.1.2 Cross Reference. Architectural Fence work shall follow the specifications described in Division 3.1, Section 05 52 00 – Metal Railings.

304-6.1.3 Measurement and Payment. Architectural Fence work will be paid at the Contract Unit Price for each linear foot of architectural fence. Contract Unit Price shall include full compensation for doing all the work involved in installing the architectural fence complete in place as indicated on the Plans and in accordance with these Special Provisions.

ADD NEW SUBSECTION 304-7 TO READ:
304-7 INSTALLATION OF ARTISTICALLY ENHANCED HANdRAIL AND WINDSCREENS PANELS

304-7.1 General. Work under this item consists of the installation of separately procured artistically enhanced handrail panels and windscreens, including Work includes the secure transportation of handrail panels and windscreens from the location of their fabrication to a secure storage area to be provided by the Contractor, secure transportation to the jobsite based on a detailed installation schedule approved by the Engineer, and installation of the handrail panels and windscreens at station platforms as shown on the Plans (A and AE drawing series), in accordance with these Specifications, and as directed by the Engineer. Fabrication of the artistically enhanced rail panels and windscreens as well as the installation hardware are procured under a separate contract and are not part of this contract.

The fabrication of artistically enhanced rail panels and windscreens and the procurement of hardware for their installation are not part of this contract. Artistically enhanced rail panels and windscreens and the required hardware will be provided to the Contractor as described in these Special Provisions.

Fabrication of the artistically enhanced rail panels and windscreens is procured by AC Transit under a separate contract with a Team of Artists and is not part of this contract. Along with the separately procured artistically enhanced handrail panels the Contractor will receive bolts, washers, and sleeves needed for the panels’ installation. All other installation hardware shown on the Architectural Plans (A Sheets) are the responsibility of the Contractor, including the following:

1. 2-inch by 2-inch back plates (four per artistically enhanced handrail panel) as shown on the Architect’s Plans.
2. 7 1/2-foot tall by 4 1/4-inch or 6-inch wide coverplates and metal filler strips at all posts that are to receive artistically enhanced windscreen panels as shown on the Architect’s Plans.
3. Stainless steel, self tapping screws, neoprene gaskets and other miscellaneous items needed for attachment of the artistically enhanced windscreen panels as shown on the Architect’s Plans.

Hardware shall comply with Division 3.1, Section 05 50 00.

304-7.1.1 Quality Control. Installer shall meet the following minimum qualifications and provide Engineer with evidence of such qualifications.

Installer’s Qualifications:
Installer regularly engaged in the installation of artistically enhanced metal work and screens similar in type to those shown on the Plans. Contractor to provide evidence of such experience by providing the Engineer with descriptions of Contractor’s work on past projects that involved the installation of artistically enhanced metal work and screens as well as references and their contact information.

2. 

Employ persons trained for installation of artistically enhanced metal work and screens.

304-7.1.2 Submittals. Contractor to submit the following documents at least 3 months prior to installation of artistically enhanced handrail panels and windscreens for acceptance by the Engineer:

4. 

Submit proposed pick-up, storage and site delivery schedule: Schedule with dates for proposed pick-up and secure transportation of artistically enhanced handrail panels and windscreens from the location of fabrication to a secure storage area and secure transportation to the jobsite for installation.

5. 

Submit description of Contractor’s proposed secure short-term storage site for artistically enhanced handrails and windscreens between pick up and installation date. Security and environmental conditions at Contractor’s proposed storage site are based on requirements listed below and subject to Engineer’s approval.

6. 

Submit Step-by-Step Installation Procedure: Submit for review and approval by the Engineer a step-by-step installation procedure that outlines how the Contractor will ensure that artistically enhanced panels and windscreens remain undamaged after arrival at the jobsite and throughout the installation process.

304-7.1.3 Delivery, Storage and Handling.

304-7.1.3.1 Delivery Requirements. Contractor shall be responsible for:

1. 

Pick up and transportation of artistically enhanced panels and windscreens from fabricator’s site of fabrication in Livermore, CA.

2. 

Delivery of artistically enhanced panels and windscreens to Contractor’s secure storage site in artist’s original, unopened containers and packaging on pallets loaded by Contractor. Fabricator may assist Contractor in loading at Fabricator’s discretion and after coordination with Contractor.

Contractor is responsible for protecting Fabricator’s identification labels attached to Fabricator’s materials and for ensuring that labels remain attached to the materials they identify through handrail and windscreen panel ID numbers and platform names.

Transfer of ownership to Contractor will occur once materials have been transferred to Contractor’s truck at the time of pick-up. The Contractor will be responsible for secure storage once transfer of ownership has occurred.

Note that as an option, the Fabricator has agreed to make the artistically enhanced handrail panels, windscreens and hardware available to the Contractor on an as-needed basis. This option would require a separate agreement between the Contractor and Fabricator concerning costs and logistics associated with this option.

304-7.1.3.2 Storage and Handling Requirements. Handrail and windscreen panels will be stored by the Fabricator up to 1 year after fabrication. Contractor shall be responsible for the secure and environmentally appropriate storage of handrail and windscreen panels beyond Fabricator’s storage period. Contractor shall observe the following requirements for storage and handling of artistically handrail and windscreen panels:

1. 

Place of storage shall be lockable and secured against theft of artistically enhanced handrail and windscreen panels. Contractor shall be liable for damage and theft of panels after transfer of materials from the Fabricator to the Contractor has occurred.

2. 

Store materials in clean and dry indoor location. Fenced and locked outdoor storage areas are not acceptable.
3. Store materials on flat, level surface, raised above floor, with adequate support to prevent sagging.


5. Keep materials in original, unopened containers and packaging until installation.

6. Protect materials and finish during storage, handling, and installation to prevent damage at all times.

7. Take measures to protect panels after installation in accordance with Contractor's step-by-step procedure approved by the Engineer.

Contractor shall be responsible for the cost of extended storage at the Fabricator’s location if delays in the approved installation schedule occur that are under Contractor's reasonable control.

304-7.2 Construction.

304-7.2.1 Preparation. Contractor shall request review and approval of its own step-by-step installation and artwork protection procedure. Proceed with installation only after approval by the Engineer or after adjustments to the procedure have been made based on the Engineer’s review.

Examine areas to receive artistically enhanced handrail and windscreen panels. Verify surfaces to support panels are clean, dry, flat, plumb, level, square, stable, rigid, and capable of supporting the weight.

Notify Engineer of conditions that would adversely affect installation or subsequent use. Proceed only after unsatisfactory conditions have been corrected.

304-7.2.2 Installation. Install artistically enhanced handrail and windscreen panels in accordance with Contractor’s approved installation procedure.

Contractor shall be responsible for the cost of extended storage at the Fabricator’s location if delays in the approved installation schedule occur that are under Contractor’s reasonable control.

Handrail Panels: Ensure the establishment of proper clearances between handrail posts by using the post spacing template shown on the Plans.

Handrail panels are fabricated to receive holes based on field-verified locations of connection points attached to handrail posts per the Architect’s Plans. Contractor to field verify hole locations for each panel. Carefully drill holes to receive provided hardware and gaskets in field verified hole locations. Ensure complete protection of panel surfaces from damage during the drilling process. A Tnemec approved primer, or approved equal, should be applied to the newly drilled holes to protect against general and dielectric corrosion. Further alteration of the artistically enhanced handrail and windscreen panels is prohibited.

Install handrail and windscreen panels accurately aligned and to proper elevation as per the Plans.

Secure handrail and windscreen panels with fasteners and other hardware provided with the artistically enhanced handrail panels and windscreens. All fasteners are to be coated with Duroloc or approved equal to prevent dielectric corrosion.

Do not install bent, bowed, or otherwise damaged panels or posts. Remove damaged components from site to a location identified by the Engineer.

Attention is directed to tolerances shown on the Plans applicable to the vertical alignment of windscreen posts that are to receive artistically enhanced panels. A master windscreen panel template will be provided to the Contractor.

304-7.2.3 Installation. Adjusting and Cleaning. Repair minor damages to finish in accordance with artist's instructions and as approved by the Engineer.

Remove and replace, at the Contractor’s expense, with newly fabricated handrail or windscreen panels or hardware, any damaged handrail and windscreen panels or hardware that cannot be successfully repaired, as determined by the Engineer. Replacement costs include design setup,
fabrication, crating and shipping.

Clean all handrail and windscreen panels promptly after installation in accordance with instructions that will be provided to the Contractor with the panels. The use of harsh cleaning materials or methods that could damage the finish is prohibited.

Protect installed artistically enhanced handrail and windscreen panels as necessary to preclude damage to panels and finish, including vandalism, until final acceptance by the Engineer.

304-7.3 Measurement and Payment. Installation of artistic enhancement handrail panels and windscreens complete and in place, including secure transportation, secure short-term storage, drilling and preparation of holes, installation using provided hardware and protection after installation is paid for as a lump sum.

SECTION 306 - UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS.
306-1.1 Trench Excavation.
306-1.1.1 General.
ADD THE FOLLOWING PARAGRAPH TO THE END OF SUBSECTION 306-1.1.1:

Contractor shall pothole to verify the depths of underground utility crossings and relay this depth information to the Resident Engineer prior to construction of any sewer system or drainage system to determine any conflicts. Unless there is a bid schedule shown for this work, payment for this work shall be considered included in sewer pipe rehabilitation work or storm drain pipe installation. No additional payment shall be made.

The work for pothole shall include full compensation for signage, traffic control, excavation, backfill with standard compaction, temporary and permanent resurfacing, etc., and providing all labor, equipment and materials incidental to this work.

REPLACE SUBSECTION 306-1.1.2 WITH THE FOLLOWING:
306-1.1.2 Maximum Length of Open Trench. Except with the Engineer’s written permission, the maximum length of open trench at any one time shall be 300 feet (91 meters).

REPLACE SUBSECTION 306-1.1.3 WITH THE FOLLOWING:
306-1.1.3 Maximum and Minimum Width of Trench.
   a) Rigid Pipe. For rigid pipe, the minimum and maximum width of trench permitted shall be as indicated on the Plans or Standard Details.
   Additional payments or deductions from the Contract Unit Price for trench excavation for conduits will be based upon a calculated volume. The width used in calculating the excavation volume for prefabricated conduit will be the maximum width of trench shown on the Plan and measured at the top of pipe. In the case of sewers or storm drains formed and cast in place, such excavation volume will be based upon the outside width of the structure being constructed plus three feet (0.9m).
   Additional payment or deductions from Contract Price for trench resurfacing will be based upon an area determined by the maximum trench width as specified herein.
   If the maximum trench width is exceeded, the Contractor shall provide additional bedding, another bedding type, or higher pipe strength, as shown on Plans or approved by the Engineer, at no additional cost to the Agency.
   b) Flexible Thermoplastic Pipe. For flexible thermoplastic pipe, trench width shall be in accordance with ASTM D 2321 or as indicated on the Plans.

306-1.1.5 Removal and Replacement of Surface Improvements.
ADD THE FOLLOWING THREE PARAGRAPHS TO THE END OF THE SUBSECTION 306-1.1.5:
The existing pavement (i.e. asphalt concrete, concrete, or a combination thereof) within the area of a sanitary sewer trench may be greater in thickness or of different materials than the trench resurfacing section specified in 306-1.5. No extra payment will be made for removal of asphalt concrete that differs in thickness by 2" (plus or minus) from the approximate existing pavement thickness shown on the plans.

Bituminous pavement, concrete pavement, curbs, gutters, sidewalks or driveways shall be sawcut prior to trenching and excavation for point repairs, sewer rehabilitation, sewer replacement and relief sewer installation. Sawcutting shall be 6" deep for bituminous pavement and full depth for concrete. Stomping of concrete pavement will not be allowed.

Where approved by the Engineer to extend a point repair excavation, the Contractor may precut the pavement edge for the excavation with a jackhammer. Prior to replacement of surface improvements, the pavement edges shall be neatly trimmed by saw cutting.

ADD NEW SUBSECTION 306-1.1.7 TO READ:
306-1.1.7 Removal and Replacement of Building Sewers. Building sewers conflicting in grade with the construction of pipe conduits shall be re-laid to clear the pipe conduit in accordance with applicable provisions of the Standard Specifications or the Special Provisions or as directed by the Engineer. Payment shall be made at the unit price bid per linear foot of building sewer.

ADD NEW SUBSECTION 306-1.1.8 TO READ:
306-1.1.8 Payment for Contaminated Material Disposal.
   a. Class I Material Disposal: The unit price provided in the Bid Schedule for handling, transporting and disposing of Class I material shall be considered full compensation for all labor, material, tools, equipment, and incidentals necessary to handle, transport and dispose of Class I material as specified herein, including, but not limited to, all supervision, permits and licenses, insurance, preparing and implementing a health and safety plan, preparing and implementing a work plan, staging, safety equipment, environmental monitoring, and dust control measures.
   b. Class II Material Disposal: The unit price provided in the Bid Schedule for handling, transporting and disposing of Class II material shall be considered full compensation for all labor, material, tools, equipment, and incidentals necessary to handle, transport and dispose of Class II material as specified herein, including, but not limited to, all supervision, permits and licenses, insurance, preparing and implementing a health and safety plan, preparing and implementing a work plan, staging, safety equipment, environmental monitoring, and dust control measures.
   c. Class III Material Disposal: The unit price provided in the Bid Schedule for handling, transporting and disposing of sludge shall be considered full compensation for all labor, material, tools, equipment, and incidentals necessary to handle, transport and dispose of sludge as specified herein, including, but not limited to, all supervision, permits and licenses, insurance, preparing and implementing a health and safety plan, preparing and implementing a work plan, staging, safety equipment, environmental monitoring, and dust control measures.

306-1.2 Installation of Pipe.
306-1.2.1 Bedding.
REPLACE THE THIRD PARAGRAPH OF SUBSECTION 306-1.2.1 WITH THE FOLLOWING:
   Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe to a minimum of two-fifths times the outside diameter of the barrel. If the pipe is to be laid in a rock cut, at least four inches (100mm) of bedding shall be provided below the pipe before the remainder of the bedding is placed. Bedding shall be compacted by hand or mechanical tampers prior to backfilling per 306-1.3.2. Unless the sheeting or shoring is to be cut off and left in the place, densification of pipe bedding shall be accomplished after the sheeting or shoring has been removed from the bedding zone. The material in the compaction zone shall be placed and densified by mechanical compaction. Jetting will not be permitted.

DELETE THE FOURTH PARAGRAPH OF SUBSECTION 306-1.2.1.

REPLACE THE FIFTH PARAGRAPH OF SUBSECTION 306-1.2.1 WITH THE FOLLOWING:
• Except where otherwise specified, bedding material shall be crushed rock in accordance with Section 200-1.2, Crushed Rock and Rock Dust, Table 200-1.2 (A), 3/4" Sieve Size. Except where otherwise specified, bedding material shall be crushed rock in accordance with 200-1.2 or broken/crushed portland cement concrete. Bedding material shall be free from organic matter and other deleterious substances such as brick, glass, metal, etc and shall conform to the quality requirements of Table 200-1.2 (B).

• The maximum size for bedding material shall be as follows:
  a. 3/8-inch or ¾-inch for HDPE or coated pipe.
  b. 3/4-inch maximum for other pipe with the following gradation:

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>% Passing Sieve ¾&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 1/2&quot;</td>
<td>---</td>
</tr>
<tr>
<td>1&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>80-100</td>
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<tr>
<td>1/2&quot;</td>
<td>20-60</td>
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<tr>
<td>3/8&quot;</td>
<td>0-20</td>
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<tr>
<td>No. 4</td>
<td>0-5</td>
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<td>No. 8</td>
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</tbody>
</table>

• The maximum asphalt content shall not exceed two percent (2%) by weight of the material.

• For bedding for metallic or concrete pipe, the water-soluble chloride content shall not exceed 300 ppm and the water-soluble sulfate content shall not exceed 1,000 ppm. Resistivity shall be greater than 3,000 ohm-cm and the pH shall be greater than 6.0. Testing shall be done in accordance with the following:
  a. Water-Soluble Chloride: Caltrans Method 532/EPA 300.0
  b. Water-Soluble Sulfate: Caltrans Method 532/EPA 300.0
  c. Resistivity: ASTM 657/Caltrans Method 532
  d. pH: SW 9045.

• Bedding concrete shall be Class 450-B-2500 as specified in 201-1.

306-1.2.2 Pipe Laying.
CHANGE THE LAST SENTENCE OF THE SECOND PARAGRAPH OF SUBSECTION 306-1.2.2 TO READ:
Any adjustments in line or grade that may be necessary to accomplish the intent of the plans will be made.

ADD ONE SENTENCE TO THE END OF THE EIGHTH PARAGRAPH TO READ:
The Engineer shall approve the method used to control the pipe prior to start of construction.

306-1.2.3 Field Jointing of Clay Pipe.
ADD NEW SUBSECTION 306-1.2.3 (d) TO READ:
(d) Special Joints. Type "D" joints shall be used to join sections of pipe of dissimilar material.

306-1.2.6 Field Jointing of Iron Pipe.
DELETE THE ENTIRE PARAGRAPH 306-1.2.6 (b) Cement Joints.

306-1.2.9 Field Jointing of Solvent-Welded ABS and PVC Pipe.
DELETE ALL REFERENCES TO PVC PIPE.

306-1.2.10 Field Jointing of Gasket-Type ABS and PVC Pipe.
DELETE ALL REFERENCES TO PVC PIPE.

306-1.2.11 Field Jointing of Injection-Sealed PVC Pipe.
DELETE THE SUBSECTION.

306-1.2.12 Field Inspection for Plastic Pipe and Fittings.
DELETE ALL REFERENCES TO PVC PIPE.

ADD THE FOLLOWING PARAGRAPH TO THE END OF SUBSECTION 306-1.2.12:
Proof rings for verification of mandrel diameters shall be available at all times during mandrel tests. These rings shall be a standard product of the mandrel manufacturer. The Contractor shall correct all mandrel obstructions at no cost to the Agency. The Contractor’s method to correct obstructions shall be subject to the Engineer’s approval prior to implementation. The use of a re-rounder to force pipe into round is prohibited. Any pipe that has been re-rounded shall be removed and replaced.

306-1.2.13 Installation of Plastic Pipe and Fittings.
DELETE ALL REFERENCES TO PVC PIPE AND FITTINGS.

306-1.2.14 Installation of HDPE Pipe and Fittings.
ADD NEW SUBSECTION 306-1.2.14 TO READ:
HDPE pipe shall be joined by the electrofusion method recommended by the conduit manufacturer, and with equipment approved for the purpose. A minimum of 2 test fusions, by each fusion operator, must be demonstrated to the Engineer prior to performing fusion operations on any HDPE conduit to be installed.

306-1.2.15 Identification Pipe
ADD NEW SUBSECTION 306-1.2.15 TO READ:
A non-detectable 3" green tape, black imprinted with "CAUTION - BURIED LINE BELOW" shall be installed approximately, but not less than, 1 foot above and along the centerline of the installed sanitary sewer HDPE pipe. If the tape is not continuous, the tape ends shall be overlapped by 2 feet. Identification tape shall comply with ASTM D2103, D882, D2582, and D2578.

306-1.3 Backfill and Densification.
306-1.3.1 General.
REPLACE THE 7TH THROUGH 11TH PARAGRAPHS OF SUBSECTION 306-1.3.1 WITH THE FOLLOWING:
Trench backfill material shall consist of either crushed aggregate base conforming to 200-2 or broken/crushed portland cement concrete conforming to the requirements of Section 26 of the State of California Standard Specification for 3/4 inch, Class 2, aggregate base. Trench backfill material shall be free from organic material, trash, debris, rubbish, and other deleterious substances such as brick, glass, metal, etc. The maximum asphalt content shall not exceed two percent (2%) by weight of the material. Whenever practical, the contractor is required to use trench-excavated material for trench backfill, provided that such excavated material meets the above requirements. For restriction on storage of excavated material refer to 7-10.3.

306-1.3.2 Mechanically Compacted Backfill.
DELETE THE LAST SENTENCE OF THE FIRST PARAGRAPH OF SUBSECTION 306-1.3.2.

306-1.3.3 Jetted Backfill.
ADD THE FOLLOWING PARAGRAPH TO THE BEGINNING OF SUBSECTION 306-1.3.3:
Flooding or jetting of backfill shall be allowed only when indicated on the drawings or specifically provided for in the Special Provisions. Resurfacing of a jetted or flooded trench shall not be done until the day after water densification, unless otherwise approved by the Engineer.

REPLACE SUBSECTION 306-1.3.6 WITH THE FOLLOWING:
306-1.3.6 Mechanical Compaction Requirements. Except as specified otherwise, trench backfill material shall be densified to the following minimum relative compaction:

90 Percent Relative Compaction:

a. From the pipe bedding zone upwards to the finish grade within native material or unimproved areas.

b. From the pipe-bedding zone upwards to three feet below the pavement surface (or finish grade where there is no pavement), within the existing or future traveled way, shoulders, sidewalks, and other paved areas (or areas to receive pavement).

c. Within engineered embankments.

d. Where lateral support is required for existing or proposed structures.
95 Percent Relative Compaction for three feet below the pavement surface (or finish grade where there is no pavement), within the existing or future traveled way, shoulders, sidewalks, and other paved areas (or areas to receive pavement).

306-1.3.7 Imported Backfill.
CHANGE THE FIRST PARAGRAPH OF SUBSECTION 306-1.3.5 TO READ:

306-1.3.7 Imported Backfill. The Contractor will use imported backfill materials at those locations and limits where the Engineer determines the use of native excavated material would not be to the best interest of the City. Imported backfill material shall consist of material conforming to 306-1.3.1

ADD NEW SUBSECTION 306-1.3.9 TO READ:
306-1.3.9 Special Backfill. Special backfill shall be in those areas as shown on the plans, as directed by the Engineer, or as specified herein, and shall be imported backfill in accordance with the provisions of 306-1.3.7. Where the construction areas of pipe conduit are in reserves on the downhill side of an existing building foundation, or where such pipe conduit construction is 10 feet (3.05m) or closer to an existing building foundation, the Contractor shall use the following special backfill procedure:

a. Trench excavation, pipe conduit laying, and backfill compaction to the original ground surface shall be completed in the same working day;

b. Backfill material shall be placed in uniform layers not to exceed four inches (101mm) before compaction;

c. Sufficient water shall be applied to compact the 4-inch (101mm) layer readily with mechanical compaction equipment approved by the Engineer;

d. Ponding or jetting of the backfill material in areas of special backfill will not be allowed;

The City shall take at least one compaction test in each area of special backfill. All special backfill herein described shall be compacted to not less than ninety-five percent (95%) relative compaction as determined by California Test Method No. 216 or California Test Method No. 231.

Measurement and Payment. Measurement of pipe conduit with special backfill shall be by the linear foot and measured in accordance with the provisions of 306-1.6 for pipe and conduit. Payment for pipe and conduit with special backfill shall be made at the unit price bid per linear foot of pipe or conduit with special backfill. Such payment shall include full compensation for all material, labor, tools, equipment, and doing all the work necessary to construct the pipe or conduit with special backfill complete in place as specified herein.

ADD NEW SUBSECTION 306-1.3.10 TO READ:
306-1.3.10 Controlled Density Fill.
Controlled density fill shall comply with 200-3.

The excavation width may be reduced so that the clear distance between the outside of the pipe culvert and the side of the excavation on each side of the pipe culvert is at least 9 inches.

The Contractor shall mix materials thoroughly by machine. The Contractor shall use a pugmill, rotary drum, or other authorized mixer. The Contractor shall mix until cement and water are thoroughly dispersed.

The Contractor shall place controlled density fill material as shown on the plans.

For rigid pipe culverts, the minimum height of controlled density fill material relative to the pipe culvert invert shall be 0.5 times the pipe culvert diameter or 0.5 times the pipe culvert height.

Whenever controlled density fill material is placed within the travelled way or covered by paving or embankment materials, the controlled density fill material shall achieve a maximum indentation diameter of 3 inches as determined under ASTM D 6024 before covering and opening to traffic.

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Measurement and Payment. Measurement of controlled density fill shall be by the cubic yard. Payment for controlled density fill shall be made at the unit price bid per cubic yard of controlled density fill. Such payment shall include full compensation for all material, labor, tools, equipment and incidentals for doing all the work necessary to construct the controlled density fill, complete in place, as shown on the plans as specified herein.

306-1.4 Testing Pipelines.
REPLACE SUBSECTION 306-1.4.1 WITH THE FOLLOWING:

306-1.4.1 General. All project pipelines shall be tested for leakage as specified herein. Before any pipelines are tested, they shall be cleaned in accordance with 306-1.4.7 All leakage tests shall be completed and approved prior to placing of permanent resurfacing.

For pipelines with building sewer connection(s), where lower lateral replacement is not required, leakage testing shall also encompass stub-outs and connection tees, wyes, taps, saddles, etc. A tee connector may be installed to facilitate testing. All connections made by the Contractor shall be considered temporary until all leakage testing has been completed and approved. Leakage tests shall be completed and approved prior to backfilling the building sewer connections.

When leakage or infiltration exceeds the amount allowed by the specifications, the Contractor at its expense shall locate the leaks and make the necessary repairs or replacements in accordance with the Specifications to reduce the leakage or infiltration to the specified limits. Any individually detectable leaks shall be repaired, regardless of the test results. Leakage tests shall be made on completed pipelines as follows:

- **Storm Drains**: Not required unless called for on Plans or in Specifications.
- **Gravity Sanitary Sewers 24 inches (or 600mm) or less in diameter where difference in elevation between inverts of adjacent manholes is 10 feet (3m) or less**: Water exfiltration test or air pressure test as directed by Engineer.
- **Gravity Sewer 24 inches (or 600mm) or less in diameter where difference in elevation between inverts of adjacent manholes is greater than 10 feet (3m)**: Air pressure test.
- **Gravity Sewer greater than 24 inches (or 600mm in diameter)**: Air pressure test or water exfiltration test, as directed by Engineer.
- **Pressure Sewer (force mains)**: Water pressure test at 150 percent of maximum operating pressure.
- **Water Pipelines** - Water pressure test: Pipe specified by pressure classification, 50 psi (350 kPa) over pressure classification. Other type of pipe, 120 percent of maximum operating pressure.

Contractor shall notify Engineer at least 3 working days in advance of testing.

Contractor shall clean sanitary sewer pipes at the following location prior to acceptance from the city and perform a dye test to determine if laterals present at these locations are in use (active) or abandoned.

Dye test will be required for these location between the limits of the upstream and downstream sanitary sewer manholes as shown on plans.

**Locations**

- 19th and Broadway (NB) - (1)
- 20th and Broadway (SB) - (1)
- E12th and 7th (SB) - (8)
- E12th and 11th Ave (SB) - (10)
- E14th and Georgia (SB) - (21)
- E14th and Euclid (NB) - (21)
306-1.4.4 Air Pressure Test.
REPLACE THE 5TH THROUGH 7TH PARAGRAPHS WITH THE FOLLOWING:

1. Sewer flow control, as required, shall be provided in accordance with 500-1.1.4.

2. The pressure exerted on the pipe by the average adjacent groundwater shall be determined as specified in 500-5.2. Air shall be introduced into the pipeline until 4.0-psi (27kPa) gage pressure has been reached or if groundwater is present, 4.0 psi (27kPa) above the computed pressure exerted by the average adjacent groundwater. Reduce the flow of air and maintain the air pressure within plus or minus 0.5 psi (3kPa) for at least two minutes to allow the internal air pressure to reach equilibrium.

3. The pipeline pressure shall be constantly monitored by a gage and hose arrangement separate from the hose used to introduce air into the line. A blow-off valve shall be provided on the test apparatus to prevent over pressurizing the pipeline.

4. After the temperature has stabilized and no air leaks at the plugs have been found, the air pressure shall be permitted to drop until the internal pressure has reached 3.5 psi (24kPa) gage pressure or when groundwater is present, 3.5 psi (24kPa) above the computed pressure exerted by the average adjacent groundwater. A stopwatch or sweep-second-hand watch shall be used to determine the time lapse required for the air pressure to decrease an additional 1.0-psi (7kPa).

5. If the time (T) in seconds required for the air pressure to decrease the additional 1.0-psi (7kPa) exceeds that shown in Table 306-1.4.4 (A), the pipe shall be presumed to be within acceptance limits for leakage. (Reference to pipe diameter in the table is to the inside diameter. For pipe or liner diameters not shown in this table, the time requirement for the next larger diameter pipe listed in the table shall be met.)

6. If the time lapse is less than that shown in the table, the Contractor shall make necessary corrections to reduce the leakage to acceptance limits without additional compensation.

ADD NEW SUBSECTION 306-1.4.7 TO READ:

306-1.4.7 Sewer Line Cleaning. Prior to construction, the Contractor shall clean sanitary sewer mainline pipes that are downstream of the proposed work at the following locations.

Locations

20th and Broadway (NB) - (approximately 300 feet from SSMH 52-902-75 to 52-902-74)
20th and Broadway (SB) - (approximately 300 feet from SSMH 52-902-37 to 52-902-36)
E12th and 7th (SB) - (approximately 150 feet from SSMH 54-103-13 to SSMH 54-103-11)
E12th and 11th (SB) - (approximately 300 feet from SSMH 58-002-11 to SSMH 58-002-10)

After all backfilling is complete and structure frames and covers have been set, and prior to the performance of leakage tests, closed circuit television inspection, and acceptance of the work, the Contractor shall, in the presence of the Engineer and in a manner approved by the Engineer, clean and flush all pipe sewers.

A temporary sand trap of a design approved by the Engineer shall be securely placed within the outlet pipe of the next lower manhole of the pipe sewer section to be flushed and cleaned. The sand trap shall catch all debris flushed and cleaned. The sand trap shall catch all debris flushed downstream and prevent it from being carried into the pipe sewer below. The Contractor shall carefully remove all debris collected by the sand trap from the manhole.

The Contractor shall not remove any sand trap installation without first receiving the Engineer's approval. Where sewers have been flushed without a sand trap, the City will inspect and clean existing downstream public sewers to an extent necessary to remove material and debris at the Contractor's expense.

Cleaning and flushing shall be done either by a rubber ball or by means of a high-pressure jet of water fed through the entire length of the line. The rubber ball manufactured for this purpose shall be inflated to fit snugly into the pipe, and propelled through the line only by flush water introduced into the structure in back of the ball.
The Contractor shall conduct a closed circuit television (CCTV) inspection of all storm and sanitary sewer pipe installation, replacement and pipe rehabilitation projects in accordance with 500-1.1.5. Such DVD(s) shall clearly show the post-construction condition of project pipelines and sewer structures. Manholes shall show the manhole walls plus the sewer inflow and outflow pipe-to-manhole connections. Pipeline cleaning shall be performed prior to CCTV inspection in accordance with 500-1.1.4. The original DVD(s) and accompanying video log reports of the CCTV inspection shall be submitted to the Engineer. The project shall not be deemed complete and acceptance granted until the video and log reports have been reviewed and their contents approved by the Engineer.

306-1.5 Trench Resurfacing.
306-1.5.1 Temporary Resurfacing.

REPLACE THE SECOND PARAGRAPH OF SUBSECTION 306-1.5.1 TO READ:

Temporary resurfacing shall conform as to materials, mixing and testing with applicable provisions of 400-4, Asphalt Concrete for Type III, Class F, Grade SC 800, except the asphalt percent shall be 6.0% to 7.0% of the dry aggregate weight.

Section 12.12.110, C, 4 of the Oakland Municipal Code requires that "the replacement of permanent paving shall be effected within twenty-one days of the placement of the temporary surfacing (weather permitting)".

306-1.5.2 Permanent Resurfacing.
ADD THE FOLLOWING THREE PARAGRAPHS TO THE END OF SUBSECTION 306-1.5.2

All existing pavement markings, traffic striping, and pavement markers removed or damaged as a result of construction operations shall be replaced in accordance with 310-5.6.

Permanent resurfacing materials, mixing and testing shall conform to 400-4 and shall be: 3/4” Maximum Aggregate, Medium 15% recycled Asphalt, Type A, PG64-10 asphalt concrete with a finish surface lift of one-inch (2.5cm) maximum conforming to ½” Maximum Aggregate, Medium 15% recycled Asphalt, Type A, PG64-10.

Permanent resurfacing type shall be as shown on plans.

REPLACE SUBSECTION 306-1.6 WITH THE FOLLOWING:

306-1.6 Basis of Payment for Open Trench Installations.
306-1.6.1 Measurement.

306-1.6.1.a Sewer pipes shall be measured in horizontal planes from structure center to structure center. Payment shall be made on horizontal measurement.

306-1.6.1.b Building sewer pipes shall be measured in horizontal planes from the wall of the main trench penetrated by the building sewers to the reconnection point to the existing building sewer or to the two-way cleanout.

306-1.6.1.c Storm drain pipes shall be measured along the longitudinal axis between the ends as laid and shall include the actual pipe in place and shall not include the inside dimensions of structures.

306-1.6.2 Payment.
306-1.6.2.a Payment for Pipe and Conduit.

1) The price per linear foot for sewer pipe and conduit in place shall be considered full compensation for the pipe or conduit material, all wyes, tees, bends, and special details shown on the plans; the identification tape; the closing or removing of abandoned conduit structures; the sawcutting of bituminous pavement, concrete pavement, curbs, gutters, sidewalks, and driveways; the excavations of the trench; trench shoring, the removal of interfering portions of existing sewers, storm drains, and improvements; the disposal of the excavated material; the removal and disposal of contaminated material not paid by separate item; the control and discharge of ground and surface waters not paid by separate item; the control and bypass of the existing pipe sewer and conduit flows, water pollution control work as specified in 7-8.6 unless paid by a separate bid item; the preparation of subgrade; placing and jointing pipe, supplying and placement of bedding material; supplying and placement of imported backfill material or special backfill material; reconstruction of existing structure channels with new pipe sewer; removing and replacing storm drain pipes including all necessary work to adjust the inlets to make the storm
drain pipes flow properly; permanent and temporary resurfacing; removal and replacement of pavement markings, traffic striping, and pavement markers not paid by separate bid item; replacement of curbs, gutters, sidewalks, traffic island/median and driveways; landscape restoration; protecting and restoring all improvement as specified in section 7-9; fence replacement; removal of debris and materials; pipeline cleaning; leakage testing; removal and replacement streetlights and traffic signal loops; removing and replacing street and traffic signs; CCTV acceptance inspection of the completed pipeline; additional surveying with no additional compensation provided due to changes in the sewer structure's invert and top of cover elevation, pipe slope, and pipe size; potholing of existing utilities prior to construction; and all work necessary to install the pipe or conduit, complete in place. The Contractor is to submit a Schedule of Values to the Engineer for review and approval.

2) The price for each building sewer connection or reconnection to a new or rehabilitated sewer main shall be considered full compensation for all labor, materials, and equipment to reconnect or connect the existing building sewer to the new or rehabilitated sewer main, including new building sewer pipe from the sewer main and beyond the trench walls as necessary. Such work shall include wyes, tees, bends, and special details shown on the plans; the closing or removing of abandoned conduit structures; adjusting cleanouts to grade; the saw-cutting of bituminous pavement, concrete pavement, curbs, gutters, sidewalks, and driveways; the excavations of the trench; trench shoring, the removal of interfering portions of existing sewers, storm drains, and improvements; the disposal of the excavated material; the removal and disposal of contaminated material not paid by separate item; the control of ground and surface waters and the control of the existing pipe sewer and conduit flows, water pollution control work as specified in 7-8.6 unless paid by a separate bid item; the preparation of subgrade; placing and joining pipe, supplying and placement of bedding material; supplying and placement of imported backfill material; reconstruction of existing structure channels with new pipe sewer; permanent and temporary resurfacing not paid by separate bid item; traffic control, removal and replacement of pavement markings, traffic striping, and pavement markers; replacement of curbs, gutters, sidewalks, traffic island/median, and driveways; landscape restoration, fence replacement, removal of debris and materials; pipeline cleaning; leakage testing; removal and replacement streetlights and traffic signals loops; removing and replacing street and traffic signs; CCTV acceptance inspection of the completed pipeline; additional surveying with no additional compensation provided due to changes in the storm drain structure's invert and top of grate/cover elevation, pipe slope, and pipe size; potholing of existing utilities prior to construction; and all work necessary to connect or reconnect the building sewer to the new or rehabilitated sewer main, complete in place. The Contractor is to submit a Schedule of Values to the Engineer for review and approval.

3) The price per linear foot for storm drain pipe and conduit in place shall be considered full compensation for all monolithic catch basin connections and specials shown on the Plans; the excavations of the trench; the control of ground and surface waters; the preparation of subgrade; placing and joining pipe; backfilling the trench; placing concrete bedding; split casings for utility crossings within the concrete bedding limits; installing concrete collar; permanent resurfacing; additional surveying with no additional compensation provided due to changes in the storm drain structure’s invert and top of grate/cover elevation, pipe slope, and pipe size; potholing of existing utilities prior to construction; and all other work (excluding temporary resurfacing) necessary to install the pipe or conduit, complete in place.

4) Payment for sewer and storm drain pipes shall include full compensation for furnishing all labor, materials, tools, equipment, and incidental for the design, installation and removal of the trench shoring, bracing, and sheeting system.

306-1.6.2.b Payment for Sawcut Pavement. Payment for all sawcutting shall be considered included in pipe rehabilitation or other work and no additional payment shall be made.

306-1.6.2.c Payment for Type 2 Concrete Bedding. Payment for concrete bedding shall be considered included in pipe rehabilitation or other work and no additional payment shall be made. Payment for sawcutting shall include full compensation for supplying, installing and compacting of Type 2 Concrete Bedding at locations shown in the plans/specifications or as directed by the Engineer.
306-1.6.2.d Payment for Concrete Low-Strength Material (CLSM). Payment for CLSM be considered included in pipe rehabilitation or other work and no additional payment shall be made. CLSM installation shall include full compensation for supplying, installing and compacting of CLSM at locations shown in the plans/specifications or as directed by the Engineer.

306-1.6.2.e Payment for Import Backfill. Payment for imported backfill shall be considered included in pipe rehabilitation or other work and no additional payment shall be made. Full compensation includes supplying, installing and compacting of import backfill at locations shown in the plans/specifications or as directed by the Engineer.

306-1.6.2.f Payment for Remove Culvert. Payment for remove culvert shall be at the price bid per linear foot of remove culvert at locations shown in the plans or as directed by the Engineer.

306-5 ABANDONMENT OF CONDUITS AND STRUCTURES.
ADD THE FOLLOWING PARAGRAPH TO THE END OF THE SECTION:

Payment for Removal of Existing Structures. The plugging, abandonment and removal of conduit and structures, unless paid by a separate bid item, shall be considered part of the pipeline construction or rehabilitation work or part of other work and no additional payment shall be made.

ADD NEW SUBSECTION 306-7.1 WITH THE FOLLOWING:

306-7.1 Sidewalk Trench Drain. Trench drains shall be constructed within the sidewalk. The invert of the trench drain shall be as shown on the plans. The opening width of the trench drain shall be 4 inches wide. The trench drain shall be laid on a straight grade with a minimum slope of 0.5 percent and terminate at the 6-inch curb face or connect to a drainage inlet, as shown on the plans or unless otherwise directed by the Engineer.

Frame and grate to conform to Section 206-10 of these Specifications.

306-7.1.1. Payment for Sidewalk Trench Drain. Payment for sidewalk trench drains shall be made at the price bid per linear foot, which shall include full compensation for incidentals and doing all the work involved in installing the sidewalk trench drain complete in place, including furnishing of frame and grate, rebar anchors, bolts, connecting to cast iron pipe, galvanized steel angle at outlets, and connecting existing roof drains.

ADD NEW SUBSECTION 306-7.2 TO READ:

306-7.2 Sidewalk Underdrain. Sidewalk underdrain shall be constructed within the sidewalk. The invert of the sidewalk underdrain shall be as shown on the plans. The opening width of the sidewalk underdrain shall be 3 ft wide. Cleanout shall be installed at all angles. Cleanout frame and cover shall be per City of Oakland Standard Detail. Rebar and galvanized steel angle at each end shall be as shown on the plans.

306-7.2.1. Payment for Sidewalk Underdrain. Payment for sidewalk underdrains shall be made at the price bid per linear foot, which shall include full compensation for incidentals and doing all the work involved in installing the sidewalk underdrain complete in place, including rebar and galvanized steel angle at outlets.

ADD NEW SUBSECTION 306-9 TO READ:

306-9 PIPE SEWER AND STORM DRAIN STRUCTURES.
306-9.1 General. Pipe sewer and storm drain structures (such as manholes, lampholes, cleanouts, and inlets) shall be constructed at the locations shown on the plans or where directed by the Engineer in accordance with the Standard Details, as specified herein, or as directed by the Engineer.

306-9.2 Existing Manholes to Remain. Where designated on the plans "Existing Manhole to Remain," the Contractor shall form a new channel in the manhole by removing the existing channel and laying new pipe sewer and storm drain through the manhole and imbedding the new pipe in Class "C" mortar made with Type V cement. All work shall be done as directed by the Engineer and in accordance with section 303-9.

306-9.3 Lines Terminating in Cleanout. Where designated on the plans to "Construct Cleanout" at the termination of a pipe sewer, the line may be lengthened or shortened to provide for the reconnection of all existing building sewers to the new pipe sewer.
306-9.4. Payment. Payment for pipe sewer and storm drain structures (such as manholes, lampholes and inlets) shall be made at the price bid for each structure and shall be full payment for each structure complete in place, including excavating, backfilling, constructing inverts, furnishing frames and covers and grates (unless otherwise provided in the Special Provisions and including manhole covers and metal frames), all costs related to the pickup or delivery of manhole frames and covers, installing frames and covers and grates, restoring the street surface, additional surveying, potholing of existing utilities prior to construction, and all other work, excluding temporary resurfacing, necessary to complete the work. The Contractor is to submit a Schedule of Values to the Engineer for review and approval.

All new manhole covers and metal frames shall be ordered by the City of Oakland and furnished by the District. The Contractor shall submit to the Engineer for approval the proposed schedule for number and type of manhole covers and frames required at each location and dates the manhole covers and frames are needed for each location. The schedule shall reflect the following requirements:

1. City shall not store any manhole frames and covers.
2. A manhole cover and frame can take 6 weeks to fabricate.

The schedule and quantity shall be confirmed each month and revised as necessary. Revised schedules must be approved by the Engineer. The Engineer will order the manhole covers and frames according to the approved schedule. The Contractor shall pick up the manhole covers and frames from the supplier as directed by the Engineer.

The Contractor shall purchase the new manhole covers and metal frames from the City of Oakland. The Contractor shall maintain records of manhole covers and metal frames purchased (material, tax, and delivery cost), and submit them to the AC Transit for reimbursement.

ADD NEW SUBSECTION 306-10 TO READ:

306-10 REMOVE STORM DRAIN INLET.

306-10.1. General. Inlets shall be completely removed at the locations shown on the plans or where directed by the Engineer.

306-10.2. Payment. Payment for remove storm drain inlet shall be at the price bid for each remove inlet.

ADD NEW SUBSECTION 306-10 TO READ:

306-11 MODIFY STORM DRAIN STRUCTURES.

306-11.1 Cap Storm Drain Inlet. Modify storm drain inlets by capping.

Excavate and remove structures to a depth of at least 1 foot below the grading plane.

Cap structures with minor concrete. Where shown, round the bottom of structures with minor concrete. Minor concrete shall contain at least 590 pounds per cubic yard of cementitious material.

Backfill to match the grading plane.

306-11.2. Modify Existing Storm Drain Inlet to Manhole. Modify storm drain inlets by converting to manholes in accordance with the Plans, as specified herein, or as directed by the Engineer.

Excavate and remove structures to a depth of at least 1 foot below the grading plane.

Convert to manhole with minor concrete. Minor concrete shall contain at least 590 pounds per cubic yard of cementitious material.

Backfill to match the grading plane.

Frame and cover shall be in accordance with City of Oakland Standard Drawings, as specified herein, or as directed by the Engineer.

306-11.3. Adjust Inlet to Grade. Adjust storm drain inlet to grade by removing top portion of inlet structure and reconstructing inlet to grade as specified in Plans, or as directed by the Engineer. Bottom portion of inlet structure and intake shall be protected in place; no debris shall enter the inlet during construction.

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Excavate and remove structures to depth of at least 1 foot below the grading plane.

Reconstruct inlet with minor concrete. Minor concrete shall consist at least 590 pounds per cubic yard of cementitious material.

Inlet type shall be the same as existing, as specified in Plans, or directed by the Engineer. Inlet grate shall be in accordance with City of Oakland Standard Drawings, as specified herein, or as directed by the Engineer.

Back fill to match grading plane.

306-11.3—306-11.4 Payment. Payment for modify storm drain inlets by capping, or converting to a manhole or adjusting to grade shall be made at the price bid for each modify structure and shall be full payment for each modify structure complete in place, including furnishing all costs related to pickup/delivery of frames and covers, installing frames and covers, installing inlet grates, excavating and backfilling (unless otherwise provided in the Special Provisions).

All new manhole covers and metal frames shall be ordered by the City of Oakland and furnished by the District. The Contractor shall submit to the Engineer for approval the proposed schedule for number and type of manhole covers and frames required at each location and dates the manhole covers and frames are needed for each location. The schedule shall reflect the following requirements:

1. City shall not store any manhole frames and covers.
2. A manhole cover and frame can take 6 weeks to fabricate.

The schedule and quantity shall be confirmed each month and revised as necessary. Revised schedules must be approved by the Engineer. The Engineer will order the manhole covers and frames according to the approved schedule. The Contractor shall pick up the manhole covers and frames from the supplier as directed by the Engineer.

Frame and cover must be purchase from the City of Oakland. Maintain records of manhole covers and frames purchased (material, tax, and delivery cost), and submit them to the AC Transit for reimbursement.

ADD NEW SUBSECTION 306-12 TO READ:

306-12 MODIFY PIPES AND CULVERTS.
306-12.1. Extend Pipes and Culvert. Extending pipes and culverts at the locations shown on the plans shall comply with Section 306-1.2.

306-12.2. Payment. The contract price paid per linear foot of extending pipe or culvert shall include full compensation for doing all work involved in extending pipelines and culverts, including excavation, backfill, repair, and installation as specified herein or as directed by the Engineer.

SECTION 307 – STREET LIGHTING AND TRAFFIC SIGNALS

307-1 GENERAL.

ADD NEW SENTENCE AFTER THE FIRST SENTENCE OF SUBSECTION 307-1 TO READ:

The work shall include trenching, backfilling, foundations (street light, traffic signal, and service control panel), anchor bolts, conduits, curb boxes, pull ropes, street lights and traffic signals, and the restoration of street surfaces: sidewalk, roadway, curb and gutter, ADA ramps, tree wells, etc. Work shall also include modification to existing foundations, as well as extension and connection to existing conduits, boxes and foundations. The contractor shall safe-guard all its installation until the City of Oakland accept and utilize the work.

DELETE THE 5TH PARAGRAPH OF SUBSECTION 307-1.
ADD NEW PARAGRAPH AT THE END OF SUBSECTION 307-1 TO READ:

All materials furnished and used shall be new and conform to the requirements shown in the standard drawings, except such used materials as may be specifically provided for on the plans. The materials shall be manufactured, handled, and used in a workman like manner to insure complete work in accordance with the plans and specifications.

The location of signals, standards, signs, controls, services and appurtenances are shown on the plans. Any relocation required due to obstructions shall be done under the Engineer’s direction.

All systems shall be complete and in satisfactory operating conditions at the time of contract acceptance.

The contractor shall contact the City of Oakland Electrical Department at (510) 615-5438 and identify specific electrical work involving power turn off to either lighting or traffic signals at least five working days prior to start working. This applies to all City electrical and traffic signal facilities. Contractor shall identify which systems will be affected by the pending notification.

The contractor shall contact the City of Oakland Electrical Department at (510) 615-5438 for field inspection by the City of the equipment. In addition, the controllers must be tested by the Electrical Department prior to installation at the jobsite. Signal turn on shall only occur after the contractor has satisfied the operational functions of the signal in accordance with the design.

All salvaged equipment removed by the Contractor shall be delivered to the Maintenance Service Yard of the City of Oakland. The Contractor shall notify the Engineer 48 hours in advance before delivering any salvage material. The address and contact of the Maintenance Service Yard is:

City of Oakland; Department of Public Works Maintenance Service Yard
7101 Edgewater Drive; Oakland, CA 94621
Attn: James Womack; Tel: (510) 615-5435

The positive location of traffic signal standards is anticipated to be on the critical path in the overall construction schedule. In order to minimize delay due to utility conflicts and field changes, the contractor shall adhere to the following order of work for selection of locations for traffic signal standards (poles):

1. Utility Markings
   a. Contractor to contact USA and have underground utilities marked.
   b. Contractor to coordinate with Engineer for the marking or identification of City and State utilities.
2. Contractor shall mark by construction staking locations of proposed curb ramps. Curb ramp layout shall match plans.
3. Contractor shall mark by construction staking the location of proposed signal poles and foundations. Locations shall match project plans. If it appears that the signal pole and foundation location conflict with utilities or other existing or proposed appurtenance, Contractor shall work with the resident engineer to propose a new location.
4. Contractor shall coordinate with the Engineer to obtain approval for the preliminary location of proposed ramps, signal poles, and signal pole foundations from agency with jurisdictional authority. The Contractor shall maintain a running list of status.
5. Once preliminary approval for locations has been obtained, Contractor shall confirm through utility potholing, Division 01 Section 01 71 25, the proposed signal pole foundation locations are clear of utility conflicts.
6. If utility conflicts are discovered, Contractor shall coordinate with the Engineer to propose new locations and proceed back to item 3.
7. Once a pole location is preliminary approved by the Engineer, and confirmed to be clear of utilities, it is considered final and shall be noted as such by the Contractor. The Contractor shall mark final pole location and any equipment changes on the project plans.
8. Traffic signal poles or pole equipment shall not be ordered until pole locations or any pole equipment changes have been finalized by the Engineer.
The provision, programming, and testing of traffic signal controllers is anticipated to be on the critical path in the overall construction schedule. The Contractor shall adhere to the following order of work for the installation of traffic signal controllers in Segment B (north of 42nd Avenue):

1. The Contractor shall submit to Engineer for approval the proposed schedule for delivery of all traffic signal controllers to the City of Oakland for testing and programming, pick-up of tested controllers, and installation of controllers. The schedule shall reflect the following requirements:
   a. A maximum of eight (8) controllers shall be in the City’s possession at any given time.
   b. A maximum of four (4) controllers can be tested by City at any given time.
   c. A maximum of two (2) fully equipped cabinets can be tested by City at any given time.
   d. Contractor shall furnish and deliver traffic signal controllers and/or fully equipped cabinets to City ESD a minimum of 10 working days prior to installation in the field.
   e. Approved signal timing plans shall be delivered with the controllers. The 10 working day period shall start only when both the traffic signal controllers and/or fully equipped cabinets and the associated approved timing sheets are in the possession of the City ESD.

2. Signal timing plans to be approved by City prior to delivery of traffic signal controllers.
   a. A maximum of five (5) timing sheets can be reviewed at any given time.
   b. Assume five (10) working day review time, and up to two (2) review cycles.

3. Contractor to schedule the delivery of traffic signal controllers only with the Engineer’s approval. Contractor shall deliver and pick-up of controllers from City of Oakland Maintenance Service Center.

307-1.1 Equipment List and Drawings.
ADD NEW SENTENCE AT THE END OF THE FIRST PARAGRAPH OF SUBSECTION 307-1.1 TO READ:

Where the Contractor installs electrical equipment as detailed on the plans, the submission of detailed drawings and diagrams will not be required.

REPLACE THE LAST PARAGRAPH OF SUBSECTION 307-1.1 WITH THE FOLLOWING:

Upon completion of the Work, the Contractor shall submit two complete sets of “as-built” Plans showing in detail all construction changes. Specifically one of these two sets shall be delivered to PWA Electrical Services. Further, a reduced set of 11”x17” shall be made of the “as-built” Plans and delivered to PWA Electrical Services.

307-1.1.1 Measurement and Payment
ADD NEW SUBSECTION TO READ:

Signal and Lighting will be measured and paid for on a lump sum basis at each location where the work is to be performed.

Roadway Lighting will be measured and paid for on a lump basis.
The lump sum payment for Signal and Lighting, at each location, as shown on the plans, shall include all labor, materials, tools, equipment and incidentals, required to modify existing signal and lighting or to install new signal and lighting, complete in place and operational. The work shall include, but not be limited to the removal and salvaging of existing traffic signal pole and equipment, pull box, vehicular signal head, and traffic signal controller cabinet assembly; abandonment of existing pole foundation, detector loops and conduits; relocation of existing vehicle detection camera; furnishing and installing controller cabinet assembly, 2070 controller, service pedestal, traffic signal pole, pedestrian push button post, concrete foundation, traffic signal head, pedestrian signal head, pedestrian push button, mountings, video detection equipment, video detection camera, internally illuminated street name signs, detectors, splice chamber, cables, conductors, pull box, anchor bolts, conduit, and grout; programming and configuration of devices to bring all project traffic signal controllers online; system integration and all needed equipment for ITS elements, including Transit Signal Priority and Emergency Vehicle Preemption systems; programming and configuration of all switches, switch management software, Central Control System seat license and all other related equipment pertinent to the traffic signal equipment; retrofit existing luminaires, internally illuminated street name signs; and install splice chambers, complete in place, in accordance with the plans and Standard Specifications, and these special provisions. The Contractor shall deliver salvaged existing controller and controller cabinet assembly to The City of Oakland Municipal Service Yard.

The lump sum payment for Roadway Lighting shall include all labor, materials, tools, equipment, incidentals, required to furnish and install street light standard with LED fixture, concrete foundation, service pedestal, cable, conduit, pull box, grout, and pothole investigation, complete in place, in accordance with the plans and Standard Specifications, and these special provisions.

307-2 Maintenance of Existing and Temporary Systems.
ADD SIX NEW ITEMS AT THE END OF SUBSECTION 307-2:

3. Prior to start of work, contractor shall perform functional test of existing street lighting and traffic signal system and submit a repair request to Electrical Services. Contractor shall be responsible for all maintenance and repairs of electrical systems during the entire duration of construction (until project completion sign off).

4. Temporary lighting shall be provided at the NW corner of Fruitvale Avenue and E 10th Street starting when the existing street lights are disconnected at this location and until the new street lighting associated with the signal construction has been reconnected and powered.

5. Relocation or reconnection of existing street light systems shall be completed before nightfall of the same day.

6. All existing street lights and street light circuits shall be in operation during the regular lighting schedule as defined by the serving utility.

7. All existing street lighting systems to be modified shall remain in operation until final connections are made.

8. Should the Contractor fail to meet the above requirements, City personnel or another licensed electrical contractor will do any required work to meet the above requirements at the Contractor’s expense. Similarly, any damage to existing electrical facilities due to the Contractor’s construction activities will be repaired by City personnel or another licensed electrical contractor at the Contractor’s expense.

307-2.1 Maintaining Existing Intelligent Transportation System (ITS) Elements During Construction.
ADD NEW SUBSECTION 307-2.1 TO READ:

Intelligent Transportation System (ITS) elements include, but are not limited to communication system, video vehicle detection system, microwave vehicle detection system, loop detection system, changeable message sign (CMS) system, PTZ camera system, red light camera system, fiber optic system and wireless communication system.

Existing ITS elements, including detection systems, shown and located within the project limits shall remain in place and be protected from damage. If the construction activities require existing ITS elements to be nonoperational or off line, and if temporary or portable ITS elements are not shown, the Contractor...
shall provide for temporary or portable ITS elements. The Contractor shall receive authorization on the type of temporary or portable ITS elements and installation method.

Before work is performed, the Contractor shall contact the Engineer to conduct a pre-construction operational status check with City’s Electrical Division and Transportation Service Division staff of all ITS elements and each element’s communication status with the Traffic Management Center (TMC) including existing ITS elements not shown and elements that may not be impacted by the Contractor’s activities.

The Contractor shall obtain authorization at least 72 hours before interrupting existing ITS elements and its communication with the TMC.

The Contractor shall submit a traffic signal communications system shut down plan for review and approval prior to any traffic signals being taken off-line. The plan shall include at a minimum, locations of traffic signals to be taken off-line, durations of planned downtime, and descriptions of how signal communications will be reestablished for each location, and whether interim signal interconnect or the new fiber optic cable will be connected.

All traffic signal controllers must be coordinated during construction. At any location at which communication to the Oakland TMC is interrupted or not available, a GPS clock must be installed. Locations for the GPS clocks must be approved by the Engineer prior to installation. At locations where temporary GPS clocks are installed, the contractor shall modify the controller to use the time synchronization from the GPS clocks rather than the master controller. Once permanent communication is established to the Oakland TMC via fiber optic cable, the GPS clocks must be removed and will remain the property of the contractor.

The existing traffic signal communications system (signal interconnect and field masters) shall be kept in effective operation for the benefit of the traveling public during the progress of the work, except when taking traffic signals off-line is permitted. Taking traffic signals off-line shall be permitted only during the switch over from existing to interim controller operation or from existing/interim to new controller operation unless prior approval is obtained from the Engineer.

Traffic signals taken off-line shall be limited to construction zones with work in progress. See Stage Construction sheets in the project Plans for construction zones. No more than eight (8) traffic signals shall be off-line at any given time in any one construction zone.

Traffic signal communications downtime during switch over from the existing communications system to an interim communications system shall be limited to not more than ten (10) working days.

Traffic signal communications downtime during switch over from the existing communications system to the ultimate communications system (fiber optic cable) shall be limited to not more than twenty (20) consecutive working days.

The traffic signal communications system shall not be taken off-line until a parallel system is in place. Relocation of existing traffic controllers and communications equipment to new controller cabinets may be required during construction. If a temporary traffic signal controller cabinet will be used during construction, the existing signal interconnect shall be rerouted and reconnected to the temporary traffic signal controller and communications equipment.

Temporarily taking a traffic signal off-line for reconnection of the existing signal interconnect system is permitted but shall be limited to no more than seven (7) consecutive working days.

If existing ITS elements are damaged or fail due to the Contractor's activity, where the elements are not fully functional, the Engineer shall be notified immediately. If the Contractor is notified by the Engineer that existing ITS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed ITS elements, excluding structure-related elements, shall be repaired or replaced, at the Contractor's expense, within 24 hours. For structure-related elements, the Contractor shall install temporary or portable TMS elements within 24 hours. For non-structure-related ITS elements, the Engineer may authorize temporary or portable TMS elements for use during the construction activities.

If fiber optic cables are damaged due to the Contractor’s activities, the Contractor shall install new fiber optic cables from an original splice point or termination to an original splice point or termination,
unless otherwise authorized. Fiber optic cable shall be spliced at the splice vaults or splice pull box. The amount of new fiber optic cable slack in splice vaults or splice pull box and the number of new fiber optic cable splices shall be equivalent to the amount of slack and number of splices existing before the damage or as directed by the Engineer. Fusion splicing will be required.

The Contractor shall demonstrate that repaired or replaced elements operate in a manner equal to or better than the replaced equipment. If the Contractor fails to perform required repairs or replacement work, the City may perform the repair or replacement work at the Contractor’s expense.

If the pre-construction operational status check identified existing ITS elements, then the Contractor, the Engineer, and City’s Electrical Division and Transportation Service Division staff shall jointly conduct a post construction operational status check of all existing ITS elements and each element's communication status with the TMC. ITS elements that cease to be functional between pre and post construction status checks shall be repaired at the Contractor’s expense.

The Engineer will authorize the schedule for final replacement, the replacement methods and the replacement elements, including element types and installation methods before repair or replacement work is performed. The final TMS elements shall be new and of equal or better quality than the existing ITS elements.

307-2.2 Scheduling of Work.
ADD NEW SUBSECTION 307-2.2 TO READ:

1. Work shall be so scheduled that each traffic signal and lighting system shall be completed and ready for operation prior to opening the corresponding roadway section to traffic.
2. The traffic signal system shall be placed in operation for use by public traffic without the energizing of street lighting at the intersection to be controlled if street lighting exists or is being installed in conjunction with the traffic signals.
3. The Contractor will aim all traffic signal heads and level all luminaires under the Engineer's direction before placing either system in operation.
4. Traffic signal systems will not be placed in operation prior to the Engineer’s acceptance.
5. After the intersection is placed in operation, a five-day fully operational test period will begin. The Contractor shall correct any failures or malfunctions occurring in that five-day period. After such corrections are completed, a new five-day test will recommence.
6. Street lighting circuits shall be energized in the presence of the Engineer between normal working hours of 9:00 a.m. to 3:00 p.m.
7. Lighting circuits shall be energized individually. After confirming circuit connections, all lighting circuits shall be connected and shall remain energized for a period of not less than fourteen (14) days, on the regular lighting schedule as defined by the serving utility. This period will be used as part of the functional test provisions for street lighting. The Contractor shall correct any failures or malfunctions that may occur in this period. After corrections have been completed, a new test period will recommence.

307-2.3 Controller Testing. New controllers for the traffic signals shall be delivered to the City of Oakland Electrical Services office for testing. Electrical services will deliver the controllers to the jobsite when requested by the contractor requests same to facilitate the startup of the traffic signals. The Engineer will supply new timing sheets to the City of Oakland Transportation Services Division for review. The Transportation Services Division will provide that information to the Electrical Services Division for use with the testing of the Traffic Signal Controllers.

307-7 EXCAVATION AND BACKFILL.
ADD THE FOLLOWING TO THE END OF THE 3RD PARAGRAPH OF SUBSECTION 307-7.1 TO READ:
307-7.1. General. The work site shall be in a presentable condition at the end of the workday or at the completion of work to the satisfaction of the Engineer.

ADD THE FOLLOWING TO THE END OF SUBSECTION 307-7.1 TO READ:
307-7.1. General. The contractor shall provide all required tools, equipment, shoring, boring, steel plating and traffic safety-warning devices.

307-7.2 Trenches.
ADD NEW SUBSECTION 307-7.2 TO READ:

Open trench shall be in accordance with plans and specifications and in accordance with the requirements in Drawings D-30 and D-31 of the Standard Details for T-section.

1. All concrete and asphalt trenching shall be done using the open trench method. The contractor shall not use a trencher which cuts and trenches at the same time. One lane at a time will be closed while cutting and trenching.
2. Trenching shall be done along score lines requiring complete flag removal.
3. All trenches will be filled with slurry. Backfill shall be per Section 306-1.3.4. – Backfilling Narrow Trenches. All concrete capping shall be no less than six inches thick and five inches wide. Concrete capping shall be continuous with no mechanical reinforcement. Transit ready mix vehicles shall be used. No hand or portable mixing shall be allowed.
4. The contractor shall properly dispose of all spoil (including concrete, asphalt or dirt) including all contaminated soil and waste at the Contractor’s expense. The contractor shall bear all costs to remove all excavated material from the work site – including transportation costs, dump fees, permits, etc.
5. T-section repair is required for open trenching – 6-inch width T-cut shall be installed on both side of the trench in accordance with Drawing D-30 and D-31 in the Standard Details.
6. All sidewalk replacement will match existing condition.

307-8 FOUNDATIONS, FOUNDATION CAPS AND SLABS.

307-8.2 Foundations.

ADD NEW PARAGRAPHS AT THE END OF SUBSECTION 307-8.2 TO READ:

Foundation construction shall conform to the Standard Details, State Standard Specifications Section 86-2.03, or as otherwise detailed on the construction plans and specifications. Position of poles, controller cabinet and service cabinet shall be marked and verified by the Contractor for approval by the Engineer prior to excavation for foundations. The contractor shall verify the position by potholing to check for conflicts with underground utilities prior to marking the locations. All foundation location shall be approved by the City of Oakland’s Transportation Services before construction of foundation begins.

When a foundation is to be abandoned in place, the top of foundation, anchor bolts, and conduits shall be removed to a depth of not less than 1 foot below the surface of sidewalk or unimproved ground. The resulting hole shall be backfilled with material equivalent to the surrounding material. Dispose of foundations removed. Should the foundation be in conflict with proposed improvements, then the entire foundation shall be removed.

Streetlight shall be installed at designated locations according to plans and specifications and in accordance with the requirements in Drawings E-72, E-73 and E-74.

In unpaved areas, construct a raised concrete pad around each controller cabinet, service pedestal, curb box, and street light pole.

Contractor shall be responsible to adjust all existing street light foundations and traffic signal foundations to allow 1” to 2” grout thickness between the bottom of pole baseplate and finished sidewalk grade. Based on the utility location and depth, the Engineer shall direct the contractor on use of foundation type. Street light foundations shall be per Detail E-72 or E-73. Traffic signal pole foundations shall be per State Standard Plans and Specifications.

307-8.2.1 Cast-In-Drilled-Hole Concrete Pile Foundations.

ADD NEW SUBSECTION 307-8.2.1 TO READ:

Materials used in reinforced Cast-In-Drilled-Hole (CIDH) concrete pile foundation shall comply with State Standard Specifications Section 86-2.03B.

307-8.5 Measurement.

DELETE SUBSECTION 307-8.5

307-8.6 Payment.

REPLACE SUBSECTION 307-8.6 WITH THE FOLLOWING SUBSECTION 307-8.6 TO READ:
Payment for foundations shall be considered as included in the Contract lump sum price in the Bid for the work that required foundation.

307-10 STANDARDS, PEDESTALS AND MAST ARMS.
307-10.1 General.
REPLACE THE FIRST PARAGRAPH OF SUBSECTION 307-10.1 TO READ:
    Street lighting, and traffic signal Standard, pedestals for cabinets, mast arm and other similar equipment furnished shall be as shown on the Plans, Standard Plans, State Standard Plans, State Standard Specifications, or a combination thereof and conform to 209.

307-10.3 Measurement.
REPLACE SUBSECTION 307-10.4 WITH THE FOLLOWING TO READ:
    Standard and mast arms shall be measured by each type and size.

307-10.4 Payment.
REPLACE SUBSECTION 307-10.4 WITH THE FOLLOWING TO READ:
    Payment for standards and mast arms shall be at the Contract lump sum prices in the Bid for other items bid. This shall include all labor, materials, tools, equipment, incidentals, required to install concrete foundation, pedestal, anchor bolts, conduit, grout, pothole investigation, abandon existing pole foundation, modify existing conduits and sweeps, modify existing sidewalk, and complete in place, in accordance with the Plans and Specifications, and Standard.
    Payment for “Removing Existing Pole and Foundation” shall be at the Contract lump sum prices for other bid items for the traffic signal and lighting modifications. and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and performing the work involved in abandonment of existing foundation, saw cutting, excavation, backfill, disposal of materials, restoration of sidewalk, curb ramp and pavement, modify existing conduits and sweeps, and salvage of existing standard.

307-11 PULL BOXES.
307-11.1 General.
ADD NEW PARAGRAPHS AT END OF SUBSECTION 307-11.1 TO READ:
    In concrete areas, a minimum of four inches (4") of concrete will be integrally poured around the box. The Contractor shall field locate all new pull box locations. The proposed locations shall be staked by the Contractor and approved by the Engineer prior to installation.

    All new curb boxes indicated on the plans shall be as follows unless otherwise noted:
    1. For streetlight circuit only - size No. 5.
    2. For Traffic Signal circuit– size No. 6
    3. For Controller Cabinet – size No. 6E
    4. For service cabinet pedestal service– PG&E size No. 2
    5. For Traffic Signal Interconnect – size No. 6 E with 12-inch extension

    Pull boxes shall not be installed in any part of a driveway, curb ramp or other traveled way unless otherwise specified or approved by the Engineer.
    All existing concrete street lighting curb boxes shall be replaced with new No. 5 curb boxes. All existing traffic signal concrete curb boxes shall be replaced with new No. 6 curb boxes. All existing curb boxes replaced with new shall be conditioned to new per City Standard Detail E-7.
    Contractor shall be responsible to adjust all new electrical curb boxes to match finish sidewalk grade.
    Contractor shall be responsible to replace all existing City electrical curb boxes with new to match finish sidewalk grade. Any curb box that requires being raised/lowered shall be replaced with new. Traffic loops, video camera cables, traffic inter-connect cable and fiber optic cable shall not be spliced except where there are current splices. Traffic signal cable may only be spliced with the Engineer's approval and if splice chambers are installed.

307-11.3 Payment.
ADD NEW PARAGRAPH TO THE END OF SUBSECTION 307-11.3 TO READ:
Pull boxes shall be included in the price bid for the traffic signal and includes and includes full compensation to furnish all labor, materials, tools, equipment, and incidentals required to install pull boxes, complete in place, in accordance with the Plans, Specifications and Standard Details. The work includes, but not limited to, pothole investigation, removal of existing pull box, saw cutting concrete and asphalt pavement, furnishing and installing pull boxes, excavation and backfill, disposal of materials, restoring sidewalk, curb ramp, pavement, stripping, and appurtenance damaged during construction.

307-12 CONDUIT.
307-12.1 General.
DELETE THE FIRST SENTENCE IN THE SIXTH (6TH) PARAGRAPH.

ADD NEW PARAGRAPHS AT THE END OF SUBSECTION 307-12.1 TO READ:

Unless otherwise approved by the Engineer, HDPE conduit shall be joined with the butt fusion techniques.

Mandrels shall be at least three inches long and shall have a diameter that is at least eighty percent (80%) of the inside conduit diameter. Any conduit run which will not allow the mandrel to pass will not be accepted until the obstructions have been corrected.

Conduit laid in open trench shall not be covered nor shall any trench or inspection hole be backfilled until the Engineer has approved the installation.

Conduits terminating in a curb box shall be brought into the box on a gradual upward sweep of up to 45 degrees. The Engineer will not permit any 90-degree bends into the box bottom. The conduit shall not extend into the box more than 2” beyond the inside face of the box. Longitudinal conduit runs entering curb boxes shall enter at their respective ends of the curb box. Lateral conduit runs shall enter at the respective side.

The conduit runs shall be as shown on the attached plans. The line to be followed by each run of conduit, as indicated on the plans, is necessarily approximate. The Contractor shall determine and make such deviations from the lines indicated on the plans as may be reasonably necessary in order to clear other underground utilities or structures, subject to the Engineer’s approval. It is not contemplated or intended that any existing underground pipes, conduits, or other existing underground structures shall be changed or moved in order to permit carrying out the work covered by these specifications.

a. All conduits shall be installed beneath official sidewalk or roadway areas excepting riser conduits. Conduit under a street or roadway shall be placed at a minimum depth of 36 inches for conduit intended for interconnect and 30 inches for others below the roadway surface. Conduit under railroad right-of-way shall be installed 36 inches below bottom of tie. Conduit placed in the ground under sidewalks shall, as far as practicable, be placed at a minimum depth of 18-inches below adjacent curb grade. Conduit under sidewalks shall be placed as near the adjacent existing curb position as is practicable without making repeated bends to clear poles, water meters, and similar obstructions.

b. Conduit may be laid on top of the existing pavement within curbed medians being constructed on top of said pavement.

The Contractor shall install as per Plans, Specifications and Standard Details and be entirely responsible for the correct conduit installation method i.e. open trench, in pavement cuts, or in holes bored through the ground from one excavation to another.

The following restrictions shall apply in appropriate circumstances:

a. The Contractor shall consult with the proper utility companies or agencies to determine the location of their conduits, ducts, underground pipes, cables, sewers or other underground structures.

b. The Contractor shall open, by hand digging, test holes to locate existing conduits, cables, sewers or other underground structures which could be damaged by the new installation.

c. No conduit shall run through catch basins, drainage ducts or other underground installations.
d. The Contractor shall have full responsibility for repairing any underground structure damaged by operations.

e. The City shall have the right to require any additional inspection holes the Engineer finds necessary.

f. Tunneling under streets or trenchless boring will be allowed in accordance with the Plans and Specifications, and as permitted by the Engineer. The Contractor is required to obtain video scan of all sewer laterals before commencement of the boring and at the end of the bore and per the direction of the Engineer.

g. Each conduit run terminating in a Pacific Gas and Electric (PG&E) Company structure shall terminate not less than one-half (1/2) inch or more than one inch short of the inside wall, leaving a recess which shall be grouted smooth into a funnel shape. The Contractor shall schedule and meet with PG&E to determine the exact location where the conduit will terminate in the PG&E structure. The Contractor shall repair any damage to the structure walls to the satisfaction of PG&E.

Extreme care shall be exercised to avoid stepping on cable or supports or otherwise injuring cables. No smoking or other open flames will be allowed in manholes.

**307-12.6 Payment.**
REPLACE "each" WITH "all" IN SUBSECTION 307-12.6.

**307-13 WIRES, CONDUCTORS AND CABLES.**

**307-13.1 General.**
ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 307-13.1 TO READ:

Wire and cable shall be installed in continuous lengths from luminaire to curb box and from curb box to curb box without intermediate splices.

The Contractor shall provide sufficient slack wire in curb boxes so that finished loops may extend at least two feet beyond the enclosure limits.

Wire, cable and pull tape or rope shall be carefully pulled in at the same time so that crossings and wrapping are avoided. The conduit system is designed as a multipurpose system; additional electric system will be installed in available conduit space.

Cable entering a curb box shall be protected from water during the construction period. The Contractor may be required to replace part or all of a cable length when an unprotected end has been in water.

Splicing chambers and fuse kits shall be carefully assembled so that they are watertight.

The Contractor shall seal conduit ends with sealing compound after wire is installed. Sealing compound shall be non-hardening, putty-like, adhesive material.

Water, a special lubricant approved by the Electrical Services Division, or a combination thereof are the only permissible lubricants.

All street light circuits shall be tagged in service boxes and in every curb box where more than one circuit appears. Circuits shall be identified using 3/8-inch plastic tape with letters printed with a tape-writer. The self-adhesive tape shall be wrapped around the conductors and folded back on itself to form a tag. The description shall be printed on the tail of the tag.

All detector lead-in cables shall be tagged in the curb box where they splice to the loop and magnetometer head lead-in and in the local controller. The tagging method shall be the same as described for street light circuits.

All traffic signal cables and wires shall be tagged in the curb box per Cable/Conductor Schedule shown in plans.

**307-13.2 Splices.**
ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 307-13.2 TO READ:
Street lighting splices shall generally use approved compression type devices, Burndy Type YC-C, or equal. For "T" splices, the through conductor shall not be broken. Handmade splices may be used but procedure shall be approved before making up the splices.

The splice shall be taped to 1-1/2 times the thickness of the original insulation with 3/4" wide, 7 mil, electrical tape, or approved equal. Each layer shall lap 1/4" over the preceding layer along the original insulation. Apply waterproof sealer to finished splice and allow drying before placing in the box.

307-13.3 Payment.
REPLACE SUBSECTION 307-13.3 WITH THE FOLLOWING TO READ:

Payment for wire, conductor, cable (except fiber optic cable and locator wire), splicing wire, splice chamber, and fuses shall be considered as included in the Contract lump sum price in the Bid for traffic signal and lighting modifications.

Full compensation for adding or reconnecting wires, conductors, cables (except fiber optic cable and locator wire), splicing wires, splice chambers, and fuses in existing conduits and pull boxes shall be considered as included in the Contract Unit Price or Lump Sum price in the Bid traffic signal or lighting modifications that requires new wires, conductors, cables (except fiber optic cable and locator wire), splicing wires, splice chambers, and fuses.

307-13.4 Bonding and Grounding.
ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 307-13.4 TO READ:

Conduit bonding and the ground rod location in curb boxes shall conform to the State Standard Plans. Ground rods shall be installed in curb boxes and foundations as shown on the plans.

ADD NEW SUBSECTION 307-13.5 TO READ:

307-13.5 Restoration of Existing Wires and Cables.

All existing streetlights are fully functional and the Contractor shall not modify any of the existing streetlight wirings. At locations where the Contractor shall remove existing conductors to install the new substructure, the Contractor is responsible for ensuring that existing wirings are reconnected exactly as found or as specified in the plans and are left fully functional after new wires and cables are installed. The Contractor shall restore any damages they make on the existing wirings. The Contractor shall conduct tests, in the presence of the Engineer, to record the operational condition of existing wires and cables prior to completion if it is suspected that such wires or cables are not currently fully functional.

307-14 SERVICES
307-14.1 General.
ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 307-14.1 TO READ:

Streetlight and traffic signal services shall be connected to the service utility's wires at those locations shown on the plans. The Contractor shall be responsible for coordinating the service installation with the serving utility.

At all new and modified service locations, the Contractor shall furnish conduit, curb box, conductors, and all other necessary material to complete the installation to the service location in accordance with the serving utility's rules and regulations. The Contractor shall pay all utility company connection.

Service arrangement for meters, fuses, and circuit breakers are shown on the Plans, Standard Details or Specifications.

307-14.2 Services on Utility-Owned Poles.
ADD NEW PARAGRAPH TO THE END OF SUBSECTION 307-14.2 TO READ:

Service riser conduit shall terminate with a service head or shall be sealed to prevent the entrance of water, as approved by the serving utility.

ADD NEW SUBSECTION 307-14.6 TO READ:

307-14.6 Service Pedestal. For installation of new street lights or traffic signal system, a service pedestal that conforms to 209-3.10.2 is required.

ADD NEW SUBSECTION 307-14.7 TO READ:
307-14.7 Measurement. Service Pedestal shall be measured by each unit implemented.

ADD NEW SUBSECTION 307-14.8 TO READ:

307-14.8 Payment. Payment for Service Pedestal shall be included in the lump sum price for Traffic signal and includes the unit implemented complete with the material, the foundation, conduit(s) for the utility service and conduits for street light/traffic signal, ground rod, pull rope, anchor bolts, circuit breakers and all other materials and labor needed to complete the installation.

The contract unit price paid for traffic signal includes furnishing and installing the PG&E Spec Box and connecting service feeders to the PG&E service point shall include full compensation for all labor, materials, tools, equipment, and incidentals required for furnishing and installing the equipment as shown in the Plans, specified in the Specifications and the Special Provisions, as required by PG&E, and as directed by the Engineer.

REPLACE SUBSECTION 307-15.1 TO READ:

307-15.1 General. Circuit breakers conforming to 209-3.11 shall be constructed at the locations shown on the Plans. Circuit breakers used shall be enclosed in a Service Pedestal that conform to 209-3.10.2.

307-16 STREET LIGHTING CONSTRUCTION.

REPLACE SUBSECTION 307-16.2 WITH THE FOLLOWING:

307-16.2 Pull Box Covers. Pull box covers shall be inscribed "CITY OF OAKLAND" "STREET LIGHTING".

307-16.4 Wiring/Conductors.

REPLACE THE THIRD PARAGRAPH OF SUBSECTION 307-16.4 WITH THE FOLLOWING:

Each multiple lighting circuit shall be protected by a fuse mounted in a watertight inline fuse holder installed in each ungrounded conductor. The fuses shall be located in the adjacent curb box as shown on the plans and be readily accessible. Fuse Splice Connectors shall meet the requirements of Special Provisions 209-4.3.2.

307-16.7 Service.

DELETE THE ENTIRE SUBSECTION.

307-16.8 Luminaires.

REPLACE THE SUBSECTION 307-16.8.1 WITH THE FOLLOWING:


307-17 TRAFFIC SIGNAL CONSTRUCTION.

307-17.1 General.

ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 307-17.1 TO READ:

City personnel shall energize and de-energize all traffic control circuits as needed and make any necessary changes to the existing controller.

Contractor is responsible for all work related to controller and controller cabinet assembly including wiring, testing, programming, installation and relocation of PG&E meter. Contractor is also responsible for all controllers and cabinets and any related issues that arise prior to City accepting the project, and the contractor shall address all safety issues immediately.

ADD SUBSECTION 307-17.1.1 TO READ:

307-17.1.1 TRAFFIC SIGNAL TIMING SERVICES. Contractor shall provide all signal timing services required for the following items:

1. Construction staging coordination timing
2. Controller timing sheets
3. Pre-revenue signal coordination and TSP timing
4. Final signal coordination and TSP timing
5. Maintenance timing
All signal timing shall be prepared and certified by a registered Traffic Engineer, registered by the State of California. All signal timing shall be approved by the relevant local operating agency (City of Oakland, Caltrans, City of San Leandro) prior to installation and operation.

The Contractor shall be responsible for timing at all Segment B signals, and the signals within Segment A identified in Division 2.2 Section 86-1.01 as having City of Oakland applicable standards.

The registered Traffic Engineer preparing the signal timing shall possess the following experience:

1. Developed, implemented and fine-tuned traffic signal timings for the City of Oakland within the last three years
2. Worked directly with City of Oakland Traffic Engineering staff on traffic signal timing and coordination projects within the last three years
3. Developed, implemented and field fine-tuned TSP timings for traffic signals located in the City of Oakland within the last three years
4. Prepared signal timing sheets including base controller settings and parameters, signal coordination plans, and TSP parameters (hardcopy) for the City's standard traffic controller hardware and firmware (Model 2070 controllers with Naztec firmware) within the last three years
5. Configured and bench tested the City's standard controller hardware and firmware including entire controller databases, base controller settings, clock updates, signal coordination timings, TSP timings and communications parameters within the last three years
6. Hands on experience within the last three years working with the City's Central Traffic Management System, ATMS.now, including the integration of controller databases and traffic signal timings (base controller settings, signal coordination timings and TSP) and downloading the database to the traffic controllers in the field and working with the City's central system for fine tuning of the signal timings
7. Worked with the City's Traffic Signal Communications System including configuration, testing and implementation of the field network switches

The traffic signal timings for both Segment A and Segment B shall be prepared and implemented by the same registered Traffic Engineer.

307-17.1.1.1 Construction Staging Coordination Timing

307-17.1.1.1 Coordination Patterns. Prior to the beginning of construction on each stage, new coordinated traffic signal timing patterns shall be developed for all the signals within the construction stage, for the periods when construction is active and lane closures are in place, in accordance with Section 1570. This will involve the following periods:

1. Business hours
2. AM and PM peak hours (for periods when lanes remain closed during the peak, e.g., to allow concrete curing).
3. Weekends (for periods when lanes remain closed during the peak, e.g., to allow concrete curing).

Timing plans shall be developed using SYNCHRO, and illustrated on time-space diagrams. The plans shall be approved by the relevant local operating agency (City of Oakland, Caltrans, City of San Leandro). The plans shall then be installed by a suitably licensed traffic engineer in the controllers and fine-tuned to the satisfaction of the operating agency in the field once lane closures begin.

The coordination patterns shall be operated according to a time-of-day (TOD) schedule that shall be developed to accommodate the normal hours of operation of the construction activities. Variations to construction hours shall be handled manually by the contractor subject to the approval of the operating agency and relevant TMP coordination staff.

The contractor shall enter the coordination patterns and TOD schedule into the ATMS.now database and, where communication is available, download to the local controllers. Where communication is not available, the patterns and schedule shall be entered directly into the controller at the intersection.
307-17.1.1.1.2 Detectors and Isolated Operation. The contractor shall be responsible for ensuring all signal phases remain operational to serve all vehicle permitted movements when detectors are non-operational during the construction periods. During those periods, relevant phases will be placed on recall and phase maximum times adjusted to the satisfaction of the operating agency. All phase maxima shall continue to accommodate all pedestrian walk and clearance times, as applicable. Where applicable, non-coordinated signal timing parameters shall be modified to accommodate traffic control plans developed in accordance with Section 1570.

307-17.1.1.3 Payment. Payment for construction staging coordination traffic signal coordination timing shall be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).

307-17.1.2 Controller Timing Sheets. The contractor shall provide full and complete signal timing data sheets for each new controller prior to testing and installation. The timing sheets shall provide all controller parameters that are needed to be established for normal isolated (non-coordinated) signal operation. The timing sheets shall be provided electronically to the operating agency for approval prior to installation in each controller database. The timing sheets for initial controller installation will not include coordination pattern timing, nor TSP parameter timing.

Acceptance testing of each controller will be undertaken by the relevant local agency (Caltrans, City of Oakland or City of San Leandro). The contractor shall support the testing agency to troubleshoot failures and refine the timing database until the testing agency accepts the timing data.

307-17.1.2.1 Payment. Payment for traffic signal controller timing sheets shall be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).

307-17.1.3 Pre-Revenue Coordination Timing. The contractor shall prepare signal coordination and TSP timing parameters suitable for operation along the entire BRT corridor during pre-revenue testing. The contractor shall undertake new traffic counts at 40 intersections, to develop projected traffic and bus volumes applicable to opening day operation.

The contractor shall use SYNCHRO to analyze the expected traffic operation and develop suggested cycle length, splits and offsets, and also the recommended grouping of signals, for the following periods:

1. AM Peak
2. Business hours
3. PM Peak
4. Evening hours
5. Saturday
6. Sunday

Recommended coordinated timing patterns and TSP timing shall be submitted to the operating agency (Caltrans, City of Oakland, City of San Leandro) for approval. Timing shall be illustrated on time-space diagrams, and documented in SYNCHRO printout.

TSP parameters shall be developed for each controller, to provide the maximum priority to BRT, within the constraints imposed by the operating agencies. The contractor shall meet with each relevant operating agency to confirm the acceptable ranges for TSP parameters. All TSP parameters shall be approved by the relevant operating agency prior to implementation in the local controllers.

The coordinated timing shall be set up and optimized before any TSP operation begins. Once the timing is entered and the coordination patterns become operational, the contractor shall observe traffic operation and fine tune the timing, to the satisfaction of the relevant operating agency.

After the coordination patterns are approved by the operating agency, testing of the TSP parameters shall be undertaken. Bus operation will then be permitted and the TSP timing shall be fine-tuned to the satisfaction of the relevant operating agency.

307-17.1.3.1 Payment. Payment for pre-revenue traffic signal coordination timing shall be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).
307-17.1.4 Final Coordination Timing. After an initial settling-in period, to be determined by the relevant operating agency, the coordination timing and TSP timing shall be reviewed and modified to accommodate actual operaticional experience of station dwell times, bus speeds, and actual traffic volumes, to the satisfaction of the relevant operating agency. The revised timing shall cover operation during AM peak, PM peak, business hours, evenings and weekends, along the entire BRT route.

The Contractor shall contract with a qualified vendor to implement, monitor, troubleshoot, and repair TSP Timings for the first year of revenue service operations. Final coordinated timings shall be documented on time-space diagrams, and relevant revised pages of signal timing sheets.

307-17.1.4.1 Payment. Payment for final traffic signal coordination timing shall be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).

307-17.1.5 Maintenance Timing. The Contractor shall be responsible for timing at all Segment B signals, and the signals within Segment A identified in Section 86-1.01 as having City of Oakland applicable standards, until the full project is completed and will maintain the signal timing for three years after the project is completed. This maintenance is not to exceed three changes to the coordination timing and BRT TSP timing.

307-17.1.5.1 Payment. Payment for maintenance traffic signal coordination timing shall be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).

307-17.2.5 Measurement.
ADD THE FOLLOWING TO THE END OF THE FIRST WORD OF SUBSECTION 307-17.2.5 TO READ: .controller cabinet assembly, and controller cabinet assembly and foundation

307-17.2.6 Payment.
ADD THE FOLLOWING TO THE END OF THE THIRD WORD OF SUBSECTION 307-17.2.6 TO READ: ,controller cabinet assembly, and controller cabinet assembly and foundation
ADD THE FOLLOWING TO THE END OF SUBSECTION 307-17.2.6 TO READ: Basis for payment for controller cabinet assembly shall be the Contract lump sum price for traffic signal and shall include all labor, materials, tools, equipment, incidentals, required to install concrete foundation, pedestal, anchor bolts, conduit, grout, pothole investigation, remove and existing controller and controller cabinet assembly, modify existing conduits and sweeps, remove existing foundation, modify existing sidewalk, and complete in place, in accordance with the Plans and Specifications, and Standard. The contractor shall deliver salvaged existing controller and controller cabinet assembly to The City of Oakland Municipal Service Yard.

307-17.3 Pull Box Covers.
REPLACE SUBSECTION 307-17.3 WITH THE FOLLOWING:
Pull box covers to be installed in signal systems or combined signal and low-voltage lighting systems shall be inscribed “CITY OF OAKLAND” “TRAFFIC SIGNAL.”

307-17.5 Wiring, Conductors and Cable.
307-17.5.1 General.
ADD TO THE END OF THE THIRD PARAGRAPH OF SUBSECTION 307-17.5.1: …and approved splicing chambers.
DELETE THE SECOND LAST PARAGRAPH OF THIS SUBSECTION.
ADD NEW PARAGRAPH AT THE END OF SUBSECTION 307-17.5.1 TO READ: Traffic signal cables shall be spliced in watertight splicing chambers. City Electrical Services Dept will not furnish Splice Chamber part #5 A27, A28, A29, and F24 per standard detail drawing E-57. All splice chamber parts/components shall be furnished by contractor.

Each traffic signal circuit shall be protected by a fuse mounted in a watertight inline fuse holder installed in each ungrounded conductor. The fuses shall be located in the curb boxes as shown on the plans. Fuse kit requirements are shown in the Standard Details.

307-17.5.5 Fiber Optic Cable.
307-17.5.5.1 General
ADD NEW PARAGRAPHS TO THE END OF SUBSECTION 307-17.5.5.1 TO READ:

Fiber optic cable shall be furnished, installed, spliced, terminated, and tested by the Contractor per the standard specifications and the latest City of Oakland Telecommunications Standards. Electrical copies in pdf format of the test result shall be submitted to the City. A No. 10 AWG orange jacketed locator wire shall be installed in conduit along with the SMFO cable(s).

Following splicing, the Contractor shall ensure that the underground splice closures are sealed watertight and secure.

307-17.5.5.2 Installation.
REPLACE THE LAST PARAGRAPH OF SUBSECTION 307-17.5.5.2 WITH THE FOLLOWING:

The contractor shall perform all final length measurements and order cable accordingly.

Installation procedures shall conform to the procedures specified by the cable manufacturer for the specific cable being installed, and these Special Provisions. All existing cables in existing conduit shall be removed prior to new cable installation and shall be reinstalled with new cable, if required.

All cable installation work shall be carried out in accordance and consistent with the highest standards of quality and craftsmanship in the communication industry with regard to the electrical and mechanical integrity of the connections; the finished appearance of the installation; as well as the accuracy and completeness of the documentation.

The Contractor shall make a physical survey of the project site for the purpose of establishing the exact cable routing and cutting lengths prior to the commencement of any fiber optic work or committing any fiber optic materials. The fiber shall be continuous and only be spliced at the locations shown on the Plans unless otherwise approved by the Project Engineer.

All work areas shall be clean and orderly at the completion of work and at times required by the Project Engineer during the progress of work.

Installation of the fiber optics cable shall not cause damage to the environment from release of toxic chemicals and gasses over the life expectancy of the cable, and the materials utilized shall be non-toxic to the installers.

The City shall be given at least a 48-hour notice prior to the installation of fiber optic cable into any existing conduit. All installations within conduit shall be performed in the presence of an inspector. Any existing communication conduit and related infrastructure damaged by the Contractor’s operation shall be restored within 48 hours at no additional cost to the Owner.

The Contractor shall monitor the supply reel during installation to prevent violation of the bend radius due to back wrapping, improper winding of the cable on the reel, or loosening of the cable on the reel. At all times, the Contractor shall use the proper tools and techniques for the installation of fiber optic cable. A fiber optic cable lubricant, compatible with the jacket material of the cable, shall be utilized during the installation into the conduit. Service loops shall be provided in pull boxes and splice vaults as shown on the Plans. Cable utilizing water-blocking gels shall be capped to prevent the gel from flowing out of the cable. Fibers and buffer tubes shall be protected at all times to prevent accidental damage or breakage.

Neatly and separately coil each slack fiber optic cable in pull boxes or vault and secure each coil to the hook and rack assembly. See Plans for splice pull box installation details. The Contractor will provide 50 feet of fiber optic cable slack at each splice location and 10 feet of slack in all other pull boxes and at the base of each cabinet.

No. 10 AWG orange jacketed locator wire shall be installed into the conduit along with the SMFO cable. The No. 10 AWG orange jacketed locator wire shall be connected at each pull box using wire nuts to form a continuous circuit for the length of the installed fiber cable.

307-17.5.5.2a Installation in Conduit Occupied by Existing SIC.
ADD NEW SUBSECTION 370-17.5.5.2a TO READ:

When new fiber cable is to be installed in conduit occupied by signal interconnect cable (SIC) to be removed and salvaged, the Contractor shall first remove existing SIC according to Section 86 of the State Standard Specifications. The Contractor shall then clean the conduit with a mandrel or wire brush before...
pulling the new fiber cable through the existing conduit. After cleaning the existing conduit, Contractor shall install fiber cable in the existing conduit according to the procedures specified by the cable manufacturer for the specific cable being installed and these Special Provisions. All trunk fiber cable shall be installed with an insulated locator wire or equal unless approved otherwise by the Engineer.

All existing SIC removed by the Contractor shall be salvaged and delivered to the City of Oakland unless approved otherwise by the Engineer. The Contractor shall notify the Engineer 48 hours in advance before delivering any salvage material. Contractor shall deliver the salvaged SIC to the following address:

City of Oakland; Department of Public Works Maintenance Service Yard
7101 Edgewater Drive; Oakland, CA 94621
Attn: James Womack; Tel: (510) 615-5435

307-17.5.5.2b Installation in Conduit Occupied by Existing Traffic Signal Cables and Other Cables
ADD NEW SUBSECTION 370-17.5.5.2b TO READ:
When new fiber cable is shown by the Project Plans for installation in conduit occupied by traffic signal conductors and or other cables, the Contractor shall remove the existing cables and reinstall them along with the new cable in accordance with Section 86 of the State Standard Specifications. At the Contractor's option, subject to Engineer's approval, the Contractor may install a type of conduit divider or inner duct to separate the existing conductors from the new cables or conductors. If approved by the Engineer, the Contractor may pull new cable over existing conductors. If power-pulling equipment is used to pull new cable over existing cable, then the following requirements apply:

- Use a silicon-based lubricant without micro-roller spheres such as Polywater Silicon NN-128 or approved equal, when pulling new cable over existing cable. Use 1.5 times the manufacturer's recommended amount of lubricant.
- Do not exceed 0.75 times the new cable manufacturer's recommended pulling tension when installing new cable over existing cable.

After installation of new cable in conduit occupied by existing cable, verify that the existing cable continues to function as it did prior to installation. Correct or replace any existing cable that does not function properly following Contractor's activities.

The Contractor shall be responsible for any damage to existing cable as a result of Contractor's operations. In addition, the Contractor is responsible for documenting and reconnecting existing cable and wiring as found, and ensuring that it is left fully functional after new cables are installed.

The Contractor may elect to inspect and conduct tests of existing cable prior to removal, in the presence of the Engineer, to record the operational condition of existing wires. The Contractor will not be held responsible for any cable damage found, documented, and noted by the Engineer, as part of the pre-removal inspection and testing.

307-17.5.5.3 Splicing of Fiber Optic Cable.
ADD THE FOLLOWING TO THE END OF SUBSECTION 370-17.5.5.3 TO READ:
The Contractor shall install underground splice closures in 6E pull boxes or vault as shown on the Plan set.
The Contractor shall make splices and terminate branch cable at locations shown on the Plans, as approved by the Project Engineer.
The Contractor shall make all splices as shown on the Plans in accordance with the splicing details. Trunkline splicing shall be performed to provide continuity between similar strands (i.e., splice strand 1 of upstream cable to strand 1 of downstream cable). Lateral splicing shall be made to splice the trunk cable to the 12-strand branch cables at the individual field devices as shown on the fiber splice diagram in the plan set. Intermediate splices may be made for convenience to connect cable segments between designated splice locations, but no such splices shall be less than 3,300 feet apart without the approval of the Project Engineer. The Contractor shall receive approval from the Project Engineer before performing any splices that are not indicated on the Plans.
All connectors shall be factory or factory-approved installed SC or SC-compatible connectors. All connector bodies shall be metallic and all ferrules shall be ceramic. Connectors shall have a maximum insertion loss of 0.50 dB and a back reflection of greater than 35 dB. After installation, all connectors shall be cleaned with alcohol wipes and a compressed cleaning gas.

The fiber optic cable splices shall be the fusion type and shall not exceed 0.05 dB loss per splice. Splice losses shall be measured and recorded by the splicing equipment. This measurement shall not be used in lieu of OTDR testing of the fiber. All splices shall be tested in accordance with the requirements of the following subsection of these specifications.

Splices shall be housed in a splice tray in a splice enclosure and in underground splice closures or fiber termination units as shown on the Plans or specified herein. All splices shall be protected with a thermal shrink sleeve. The Contractor shall perform all outdoor splices within a tent, truck or trailer. If the Contractor wishes to use another type of facility for splicing, it shall be approved by the Project Engineer on a day-by-day basis.

Cable routed through a fiber optic splice box that requires no splicing shall have 50 feet of cable coiled within that pull box to accommodate future splicing. Cable shall be coiled in all other pull boxes and cabinets per Plans.

Only those fibers that are to be spliced shall be removed from the cable and buffer tubes. All other fibers shall remain in their tubes and shall be suitably protected. The Contractor shall seal all cables where the cable jacket is removed. The cable shall be sealed per the cable manufacturer's recommendation with an approved blocking material.

Contractor shall submit to the Project Engineer for approval the resumes with references of people who will be performing splices. Splices shall be performed only by experienced personnel with experience including successful completion of no less than 2000 fusion splices. Only those individuals approved by the Project Engineer shall be allowed to make fiber optic splices.

Prior to splicing or connectorizing the fiber optic cable, the cable shall be prepared in accordance with the method described below:

- Remove jacket without damaging buffer tubes.
- Expose fibers without damaging by removing buffer tube with purpose built tool.
- Clean fibers and buffer tubes using a solvent designed to remove all water blocking gel from each exposed fiber.
- Solvent shall not remove any color from individual fibers or buffer tubes and shall not be harmful to the MDPE cable jacket.
- Cleave tools shall be used during splicing to cut the individual fibers as close to a perfect 90° angle as possible, thus allowing the highest core to core alignment and therefor the lowest dB splice loss. The manufacturers of cleave tools have established “end angle” cleave averages that are based on a minimum of 150 cuts utilizing a minimum of 10 cutters. Based on these test results, the City shall allow cleave tools that have minimum end angle averages as follows: Less than 0.70° average with no cut of the 150 cleaves exceeding 1.5°. Prior to the splicing of any fiber cable, the Contractor shall submit to the Project Inspector the part number and manufacturer of the cleave tool along with an “end angle” distribution chart that demonstrates the actual 150 cut end angles.

307-17.5.5.4 Fiber Optic Pigtails.
ADD NEW SUBSECTION 370-17.5.5.4 TO READ:
Fiber strands terminating at cabinets and communications hubs shall be terminated with a connectorized pigtail. Pigtails shall be factory assembled with SC connectors with an insertion loss of 0.5dB or less. Pigtails shall be constructed with an outer jacket and dielectric strength member. Pigtails shall of a suitable length to be routed from fiber splice trays to the fiber termination panels. Splice bare end of the pigtail to fiber. Match the color of single fiber pigtails with the color of the fiber to which it is spliced. Alternatively, single fiber pigtails may be routed through colored fan-out tubing that matches the fiber to which it is spliced.

**307-17.5.5.5 Splice And Cable Logging/Cable Identification**

ADD NEW SUBSECTION 370-17.5.5.5 TO READ:

The Contractor shall keep accurate detailed records of each splice and each splice location. These records shall include the date each splice was made, the name of the splicer, splice location, splice loss, fiber and tube color codes, splice tray number and position of the fiber within the tray. For each splice closure, the Contractor shall provide the Project Engineer with a chart indicating the source and destination of every fiber spliced in that enclosure, and indicating the tray and position within each tray. This also applies to fibers terminated at patch panels.

To log the fiber routes, terminations and splices, the Contractor shall use a series of numbers and letters to describe the cable, tube, fiber and location of the termination or splice. The following naming convention shall be used as a guide to developing your documentation:

- Intersection Name – Sequential #
- Segment Name – # Strands
- Buffer Tube Color – Strand Color

The Contractor shall also provide identification and labeling for all new fiber optic cables. The contractor shall submit permanent identification tags or labels and the method of attachment, for approval by the Engineer. The cables shall be labeled at all pull boxes where cable is exposed and at the near the end at all cable termination points. As a minimum, the labels shall state; City of Oakland, city contact phone number, fiber strand count, fiber type, and To/From locations. Labeling shall be by mechanical methods and labels or tags shall be non-metallic type.

**307-17.6 Signal Heads.**

**307-17.6.1 General.**

REPLACE THE THIRD PARAGRAPH WITH THE FOLLOWING:

All indications shall be 12 inches.

ADD TO THE LAST PARAGRAPH OF SUBSECTION 307-17.6.1 TO READ:

Side-mounted adapters shall be mounted on the standard quadrant facing the property line. The Engineer shall approve locations for traffic signal mounting before drilling.

**307-17.6.2 Signal Head Mountings.**

REPLACE SUBSECTION 307-17.6.2 WITH THE FOLLOWING:

Signal head mounting assemblies shall be installed as shown on the plans and Standard Details. Replaced signal mounting hardware shall be salvaged and delivered to the Maintenance Service Yard of the City of Oakland.

**307-17.6.5 Measurement.**

ADD THE FOLLOWING TO THE END OF THE SECOND WORD:

……, and vehicular signal mounting

**307-17.6.6 Payment.**

ADD THE FOLLOWING TO THE END OF THE FIFTH WORD OF SUBSECTION 307-17.6.6:

and vehicular signal mounting

**307-17.7.3 Inductive Loop Detectors.**

SUBSTITUTE THE TWO PARAGRAPHS UNDER ITEM a) AND ITEM b) OF SUBSECTION 307-17.7.3.2 WITH THE FOLLOWING:

a) Detector loops shall be installed as detailed on the construction plans and specifications and in accordance with the Standard Details.
RENUMBER THE c) PARAGRAPH IN SUBSECTION 307-17.7.3.2 AS THE b) PARAGRAPH

REPLACE THE LAST SENTENCE IN THE PARAGRAPH UNDER ITEM c) OF SUBSECTION 307-17.7.3.2 WITH THE FOLLOWING SENTENCE:

The measurement shall be made using the nearest ground and the shield (if any) of the lead-in shall be grounded.

ADD THE FOLLOWING AT THE END OF THE SECOND LAST PARAGRAPH IN SUBSECTION 307-17.7.3.2 TO READ:

Sprinkle dry cement on top of the loop sealant to prevent lifting by vehicle tires during the setting period.

DELETE THE SECOND SENTENCE OF THE 8TH PARAGRAPH OF SUBSECTION 307-17.7.3.2.

307-17.7.4 Magnetometer Detectors.

SUBSTITUTE THE LAST PARAGRAPH OF SUBSECTION 307-17.7.4 WITH THE FOLLOWING:

The epoxy sealant for the slots and holes shall be as shown in the Standard Details, except the top 3 inches (76 mm) of the holes shall be filled with the epoxy sealant.

ADD NEW SECTION 307-17.7.5

307-17.7.5 Video Detection Camera. The Contractor shall furnish and install video detection camera and all components as specified in these Special Provisions. The video detection shall be mounted at best possible locations with approval from the Engineer.

The video detection complete system shall be installed and tested by supplier factory-certified installers and as recommended by the supplier. Proof of factory certification shall be provided.

The supplier of the vide detection system shall program and configure all equipment and components for the intended detection zones. The supplier shall work with the City to develop the detection zone requirements, program the detection zone and test the performance of the system.

Run coaxial cable serving the cameras shall be un-spliced between the camera and controller cabinet, with ten feet of slack provided in the controller cabinet.

307-17.8.3 Measurement.

ADD THE FOLLOWING TO THE END OF THE SECOND WORD:

, pedestrian signal mounting

307-17.8.4 Payment.

ADD THE FOLLOWING TO THE END OF THE FOURTH WORD:

, pedestrian signal mounting

REPLACE SUBSECTION 307-19 WITH THE FOLLOWING:

307-19 PAINTING AND GALVANIZING.

1. Upon receipt of the lighting standards, the Contractor shall spot-prime all damaged areas with a high quality automotive gray enamel primer equal to Sherwin Williams primer #B50N2.

2. Pole finish shall be galvanized or painted with an alkyd resin automotive enamel of one of the following four standard colors, as per the City Outdoor Lighting Standards: a) RAL 6011 Boxwood Green, b) RAL 6009 Dark Green, c) RAL 5020 Teal Green, and d) RAL 9004 Signal Black. The thickness of the finish enamel shall be 1.5-mil minimum.

3. Application shall be by brush or by spray without runs or holidays. The drying time between paint layers shall be as recommended by the manufacturer.

4. When completed, the lighting standard shall have a uniformly glossy appearance with a minimum of 2.5 mils of paint on the pole and an average thickness not less than 3 mils taken at five random points on the pole.

5. Before painting, all standards and pedestals shall be installed on their foundations and shall be painted with the standard bolted in place.
6. Standards used for streetlight and traffic signals shall have the bottom 10 feet painted with two coats of enamel. If a traffic signal mast arm is installed, it also shall have two coats of this enamel.

7. The traffic signal standards and controller cabinets shall be painted with two coats of enamel. Base covers and signal head mounting brackets shall be painted to match traffic signal head color.

8. After final painting has been accepted, the pole number shall be affixed on the quadrant facing traffic. Numbers shall read from top to bottom with the bottom numeral five (8) feet six (6) inches above sidewalk grade as per Standard Details.

9. Previously painted standards that are relocated shall be spot-primed and repainted with two coats of finished enamel applied as specified above.

10. Refer to Standard Details for painting colors and configurations.

11. Contractor shall not paint new galvanized streetlight or traffic signal standards, galvanized mast arms or intermediate metal conduit standards, except as noted on the plans.

307-20 Salvage.
ADD NEW PARAGRAPH AT THE END OF SUBSECTION 307-20 TO READ:
Where an existing system is to be modified, the existing material shall be reused in the revised system, or removed and returned to the City. The Contractor shall notify the Engineer 48 hours in advance before delivering any salvage material. The Contractor shall unload the salvage material in an area designated by the Engineer.

ADD NEW SECTION 307-21
307-21 Global Positioning System (GPS) Time Source
307-21.1 General. The Contractor shall furnish and install GPS Time Source per manufacturer’s recommendations in providing a fully functional unit.

307-21.2 Payment. The unit contract price for GPS Time Source unit shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all work involved with this line item as shown on the Plans, as specified in these Special Provisions and as directed by the Engineer.

ADD NEW SECTION 307-22
307-22 Internally Illuminated Street Name Sign (IISNS)
307-22.1 General. The Contractor shall furnish and install IISNS per manufacturer’s recommendations and according to details in the Plans and these Special Provisions to make the assembly completely operational.

307-22.2 Payment. Payment for IISNS shall be included in the lump sum price for Signal and Lighting, at each location, and The unit contract price for IISNS shall include full compensation for furnishing all labor, material, tools, equipment and incidentals, and for doing all work involved with this line item as shown on the Plans, as specified in these Special Provisions and as directed by the Engineer. Full compensation for all additional materials and labor, not shown on the plans or specified, which are necessary to complete the installation of the various systems, shall be considered as included in the prices paid for other items of work, and no additional compensation will be allowed therefor.

ADD NEW SECTION 307-23
307-23.1 General. The Contractor shall furnish and install EVP/TSP System per manufacturer’s recommendations and according to details in the Plans and these Special Provisions to make the assembly completely operational.

307-23.2 Payment. Payment for the EVP/TSP system shall be included in other items bid for the traffic signal installation and includes furnishing and installation of the system, testing, and includes the labor, equipment, materials for the system and no additional compensation shall be provided therefor.
Full payment for the TSP System Demonstration Plan, conducting the demonstration and producing required documentation, the TSP System Verification Plan, conducting all verification tests and producing required documentation, including all incidental equipment required to render the TSP system fully functional and testable, shall be included in other items bid for the traffic signal installation, and no additional compensation shall be provided therefor.

SECTION 308 – LANDSCAPE AND IRRIGATION INSTALLATION

308-1 GENERAL.
ADD TO SUBSECTION 308-1:
   Protect existing improvements and existing trees to remain, unless they are scheduled for removal. Tree protection during construction shall follow Section 308-8 during all phases of construction.
   Perform work in accordance with all applicable laws, codes and regulations required by authorities having jurisdiction over such work and provide for all inspections and permits required by Federal, State and local authorities in furnishing, transporting and installing materials.

308-2 EARTHWORK AND TOPSOIL PLACEMENT.
308-2.2 Trench Excavation and Backfill.
ADD NEW SUBSECTION 308-2.2.1 TO READ:
   308-2.2.1 Drainage, Detrimental Soils and Obstructions. Contractor shall notify the Engineer in writing of any and all soil or drainage conditions that are detrimental to the growth of trees. Contractor shall state the encountered condition and submit a proposal to the Engineer for how to improve drainage.

   Drainage Test: Sample tree pits shall be filled with 2 feet of water prior to planting and shall drain overnight. If pit fails to drain overnight, submit in writing a proposal for the correction to the Engineer before proceeding with work. Number to be tested shall be one (1) pit per every five (5) pits. If rock, underground construction work, tree roots or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Engineer. Provide one (1) irrigation and aeration assembly per tree well and two irrigation/aeration/monitoring pipes at each palm tree location as indicated on the Plans.

308-2.3 Topsoil Preparation and Conditioning.
308-2.3.1 General.
ADD NEW SUBSECTION 308-2.3.1.1 TO READ:
   308-2.3.1.1 Weed and Debris Removal. Ground areas to be planted shall be cleaned of weeds and debris prior to any soil preparation or grading work. Noxious weeds and grasses shall be removed by the roots wherever they are found at any stage of the work. Weeds and debris shall be disposed of off the site.

   Soil contaminated by cement, paint, plaster, herbicides, or other construction debris shall be removed from the site and replaced with clean topsoil at no extra cost to the Client. Replacement soil shall conform to requirements spelled out in Section 212-1.1.2 Class “A” Topsoil and be approved by the Engineer prior to placement.

ADD NEW SUBSECTION 308-2.3.1.2 TO READ:
   308-2.3.1.2 Soil Fracturing (Loosening). Do not proceed with soil fracturing until verification has been completed that no conflicts exist between underground utilities and fracturing activities. If no conflicts with underground utilities are found, follow the following process:

   After grading and removing all plants and debris from the surface, spread 2 to 3 inches of compost over the surface of the soil. Loosen the soil to depths specified below, using a backhoe to dig into the soil through the compost. Lift and then drop the loosened soil immediately back into the hole. The bucket then moves to the adjacent soil and repeats the process until the entire area indicated has been loosened.

   Loosen soil in shrub planting areas to a depth of 18 inches and in tree planting areas to a depth of 24 inches at curbside locations and 36 inches in median locations prior to adding topsoil and/or
amendments. Loosen soil in entire tree well area at curbside and median tree locations. Do not loosen soil, scarify or till within the drip line of existing trees to be retained.

ADD NEW SUBSECTION 308-2.3.1.3 TO READ:

308-2.3.1.3 Moisture Content. Soil shall not be worked when moisture content is so great that excessive compaction will occur nor when it is so dry that dust will form in air or that clods will not break readily. Water shall be applied, if necessary, to bring soil to an ideal moisture content for tilling and planting.

ADD NEW SUBSECTION 308-2.3.1.4 TO READ:

308-2.3.1.4 Amend Existing (Class “C”) Site Soil. After soil fracturing is complete, amend site soil to meet required organic matter content for topsoil per soils report. Apply non-synthetic fertilizers and other amendments, including a minimum of 4 cubic yards of compost per 1000 square feet of planting area (or 1.3 inches per square foot) appropriate quantities of compost to bring soil organic matter content to level specified in the soils analysis report, to the surface of the aerated soil/subgrade. For bid purposes assume 3 inches of quality compost applied to all areas to receive planting—Mix to the depth required to achieve 8 inches of settled topsoil/amendment mix.

Soil amendments shall be uniformly and thoroughly mixed into the soil to the required depth as indicated in soil analysis report.

ADD NEW SUBSECTION 308-2.3.1.5 TO READ:

308-2.3.1.5 Fine Grading. Fine Grading shall conform to Section 308-2.4.

308-2.3.2 Fertilizing and Conditioning Procedures.

REPLACE THE 2ND PARAGRAPH OF SUBSECTION 308-2.3.2 WITH:

Per soil analysis and lab report, fertilizing and conditioning materials shall be mechanically spread at a uniform rate. The quantities of materials necessary for the planting area shall be at the site and shall be verified by delivery tickets furnished to the Engineer before spreading.

ADD NEW SUBSECTION 308-2.3.3 TO READ:

308-2.3.3 Pest Control.

308-2.3.3.1 Weed Control. Synthetic pre-emergents are prohibited.

Integrated Pest Management: Contractor shall utilize integrated pest management (IPM) practices during installation and maintenance to control pests and disease in the landscape. IPM uses cultural, mechanical, physical, and biological control methods before using pesticides. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, the least toxic and the least persistent pesticide that will provide adequate pest control is applied. Refer to Bay-Friendly Landscaping Guidelines and Maintenance Specification for more information.

308-2.3.3.2 Controls. Cultural/Mechanical/physical methods will be used as the first choice in weed management.

Monitor planting areas frequently to identify and eradicate weeds early in the growth stage prior to their setting seed.

Cut or pull weeds using hand operated equipment where possible.

Mulches shall be maintained at all times over soil surface that is not covered by vegetation.

Dispose of hand pulled weeds the same day they are pulled. Dispose of removed groundcover within 3 days. Dispose of mowed material from the initial mowing.

If allowed on this project, Contractor shall apply all chemicals in a safe manner and according to label instructions and Agency, State and Federal requirements. A California Chemical Applicators license is required by the Contractor for chemical applications. The Contractor shall mix and apply chemicals to protect against accidental spills and drift to non-target areas, and to insure safety of the applicator. Any spilled chemicals, as well as contaminated soil, water, and/or landscape materials must be removed from the Project and disposed of in accordance with the Agency requirements. The Contractor shall maintain applicator’s licenses and records of applications as required by the State.
A Chemical Work Report shall be completed for each chemical application. The Contractor is responsible for submitting chemical usage reports to the County Agricultural Department.

Contractor shall maintain records of all pest management activities. Each record shall include the following information:

1. Target pest;
2. Type and quantity of pesticide used;
3. Site of the pesticide application;
4. Date the pesticide was used;
5. Name of the pesticide applicator;
6. Application equipment used;
7. Prevention and other non-chemical methods of control used.

Contractor shall submit the pest management record to Engineer on monthly basis.

308-2.3.3.3 Herbicides. Least toxic herbicides may be employed by Contractor as a last resort. (Trade names are used only as examples and are not intended as an endorsement) Examples are:

1. Fatty acid potassium salts (herbicidal soaps e.g. Safer's Superfast Weed and Grass Killer Dr. Bronner’s Peppermint Anti-Bacterial Soap)
2. Acetic and citric acids (e.g. Nature’s Glory Weed and Grass Killer RTU)
3. Clove, citrus, mint and thyme oil (e.g. Matran II, Xpress)
4. Corn gluten
5. Low-toxic, low-residual herbicide [e.g. glyphosate (Round-up), glufosinate-ammonium (Finale), pelargonic acid (Scythe)]

Restricted herbicides that may not be used because they have been identified as ground water contaminants are (trade names in parentheses):

1. Atrazine (Aatrex)
2. Simazine (Princep)
3. Bromacil (Hyvar, Krovar)
4. Prometon (Pramitol)
5. Bentazon (Basagran)
6. Norflurazon (Solicam, Predict, Zorial)

Restricted herbicides that may not be used because they have been identified as a compost contaminant are:

1. Picloram
2. Clopyralid

308-2.4 Finish Grading.
REPLACE SUBSECTION 308-2.4 TO READ:

When weeding, soil preparation, and soil conditioning have been completed and placed soil has been thoroughly water settled, all planting areas shall be fine graded for placement of planting. Subgrades shall have been established under other portions of the work. No soil preparation shall be done until rough grades to 0.10 foot of finished grades have been approved by the Engineer. Finnish grade in planting beds and tree wells shall be established by taking into account the depth required for topsoil and amendments, plant container sizes, and layers of decomposed granite, wood chip mulch, sheet mulch or pea gravel, where applicable. If subgrades are improperly compacted, do not proceed until condition is corrected to the satisfaction of the Engineer. Imported or site topsoil and amendments shall be installed in all areas designated to receive plants. Install and rototill to a depth of 8”. Rake beds to a smooth surface and remove surface rocks larger than 1 inch in diameter. Finish grades shall be smooth and even, free of abrupt changes of plane or low points. Minor changes may be ordered by the Engineer to satisfy design intent.
Finish grade of tree wells and median planting areas relative to adjacent hardscape edges as shown on the Plans.

**308-3 HEADER INSTALLATION**

REPLACE SUBSECTION 308-3 WITH THE FOLLOWING:

Headers shall be installed at the locations and grades shown on the Plans prior to planting or placing of decomposed granite. In curves, boards shall be lapped at one-third of the length of individual boards, with no two boards lapped at the same place.

Stakes shall be located at splices, corners, and at intervals not to exceed 5 feet on center and driven to slightly below the top of the header. In curves or bends stakes shall be placed close enough to maintain a smooth curve. Headers shall be nailed to the stakes with 2 nails, clinched 1/2 inch (13 mm). Splice plates shall be centered on the joint and nailed to each header with four 10d box nails.

**308-4 PLANTING.**

**308-4.1 General.**

ADD TO SUBSECTION 308-4.1:

Commencement of planting operations by Contractor shall presume that Contractor has fully examined all areas to be planted and has determined that conditions are satisfactory. Coordinate tree-planting operations with installation of irrigation systems, drain installation, and work of other trades. At the nursery and upon delivery, plants shall be subject to inspection and approval by Engineer for conformity with this section. The Engineer reserves the right to examine and reject any plant material deemed in unhealthy or otherwise unsatisfactory condition during planting or throughout the Guarantee period. Notify the Engineer a minimum of 48 hours prior to commencement of tree planting. Examine areas to receive planting prior to commencement of work. Items to be examined include irrigation installation, drainage installation and completed work of other trades.

**308-4.2 Protection and Storage.**

ADD TO SUBSECTION 308-4.2:

Carefully pack trees to prevent breaking, damage to bark, branches and root systems, and root ball cracking. Provide adequate ventilation. Protect root balls from sun, drying wind and frost. Do not drop trees from vehicles. Legibly label trees with correct botanical name and common name. Store packaged materials in dry locations away from contaminants. Separate pesticides from other landscape materials, if used.

**308-4.3 Layout and Plant Location.**

DELETE THE FIRST, SECOND AND FOURTH SENTENCE OF SUBSECTION 308-4.3

**308-4.5 Tree and Shrub Planting.**

REVISE THE SECOND SENTENCE OF FOURTH PARAGRAPH TO READ:

All planting holes shall be backfilled with site or imported topsoil amended as per recommendations in the soils report.

DELETE THE LAST SENTENCE OF ITEM 5 IN THE LIST OF 7 ITEMS.

ADD TO SUBSECTION 308-4.5:

Trees shall be staked in the manner prescribed on the Plans. Temporary nursery staking shall be removed at time of plant installation.

Saw-cut tree wells into existing concrete sidewalks in locations and of sizes indicated on the Plans. Remove all concrete debris and aggregate from tree well areas and prepare for tree planting as per Section 308-2.

Protect trees at all times prior to planting from sun or drying winds. Trees that cannot be planted immediately on delivery shall be kept in the shade; wilt protected and shall be kept well watered. Carefully excavate planting pit and provide utility protection as shown on Plans.

After removing trees from container, scarify sides of root ball to prevent root-bound condition. Place root ball on subgrade or backfill compacted to 95%. Set tree plumb and brace rigidly in position until planting soil has been tamped solidly around the ball and roots. When trench has been backfilled
approximately 2/3 full, water root ball thoroughly, saturating root ball, before installing remainder of the backfill to top of trench, eliminating all air pockets.

Install irrigation and aeration tube assembly at new trees as shown on the Plans. Position vertical tube of assembly as follows:

1. In tree wells for Ginkgo biloba at curbside stations: aligned with lightport in tree grate. Final lightport location to be determined by Contractor prior to ordering tree grates. Locations may vary based on presence of trench drain extension through tree well and tree grate manufacturer’s instructions for locating lightport in 4-foot by 8-foot tree grate.

2. In tree wells for all other curbside trees: between tree trunk and curb.

3. For median trees: between tree trunk and curb. Use same of two median curbs for the length of the corridor or provide Engineer with Shop Drawing or Diagram that depicts Contractor’s recommended locations along the corridor.

308-4.5.1 Planting in Bioretention Areas. For planting in the biorention areas of the Fruitvale Parking lot:

1. Refer to original construction plans for the parking lot for the location of bioretention soils.

2. Prior to planting, remove all rubble, debris, dust and silt from the top of the bioretention soil that may have accumulated after the initial installation of the biotreatment soil. If Engineer determines that too much rubble, debris, dust and silt is present, Contractor shall remove and replace biotreatment soil consistent with the original specifications for the biotreatment soil.

If Engineer determines that the bioretention soil has settled since its original placement, install additional bioretention soil as necessary to meet the original finish grade indicated on the original construction plans for the parking lot.

308-4.6.1 Method “A” Tree Staking.

REPLACE SUBSECTION 308-4.6.1 WITH THE FOLLOWING:

Trees shall be staked using in accordance with 20-3.03C(3)(b) Trees, Shrubs, and Vines of the Caltrans Revised Standard Specifications with the following exceptions:

1. Trees planted with tree guards do not require stakes and shall be tied to the tree guard using ties conforming to Section 212-1.5.3. Attach ties to tree guard as indicated on the Plans and following the manufacturer’s recommendations.

2. Trees planted in tree wells covered by existing tree grates shall be tied to single steel stake complying with Section 212-1.5.3. Attach steel stake to tree grate using the stake manufacturer’s recommended hardware and installation instructions. Tie tree to steel stake using the stake manufacturer’s recommended hardware and straps and following the manufacturer’s installation instructions.

REPLACE SUBSECTION 308-4.6.2 TO READ:

Not Used

ADD NEW SUBSECTION 308-4.10 TO READ:

308-4.10 Sheet Mulch. After the soil preparation has occurred and 5 gallon and larger plant materials have been planted the “sheet mulch” shall be installed in locations identified on the plans.

Apply a minimum of two layers of cardboard complying with Section 212-1.14 as a biodegradable weed barrier to the entire planting area, completely covering all existing soil and remaining herbaceous vegetation, if any. Wet cardboard while applying to prevent it from blowing away. Sheets of cardboard shall overlap a minimum of 8”. Cardboard shall abut directly against edge of pavement, curbs, boulders or other site features. Cardboard shall not cover tree and shrub root crowns. Excess cardboard shall be folded under itself when abutting against hardscape objects or root crowns areas, as opposed to being cut, avoid excessive cardboard scraps. This folding under process is greatly aided when the cardboard is wet.
All cardboard scraps shall remain separated from other construction debris and shall be disposed at the local recycling facility. Apply compost and mulch. Apply 3" of mulch on top of the compost to obtain a 3-inch minimum depth of combined compost and mulch above the cardboard. Mulch will protect compost during the planting of 1 gallon and 4" pots and the laying out of drip lines. Keep root crowns of all plants clear of compost, mulch and debris.

ADD NEW SUBSECTION 308-4.11 TO READ:

**308-4.11 Decomposed Granite at Tree Wells.** Do not place decomposed granite during rainy conditions.

Protect adjacent areas and improvements during delivery and storage. Protect all materials from damage caused by moisture, erosion and theft.

Examine areas to receive the work of this Section. Surfaces should be clean of extraneous material, smooth, sound, properly compacted, graded, constructed and of the correct moisture content to receive the surface layer of decomposed granite. Adjacent concrete paving shall have been installed and completed at locations where decomposed granite is to be placed. Notify the Engineer of any defects, which might affect the installation of these materials. Arrange for repairs after the Engineer's review and before continuing work.

Install weed barrier fabric before placing decomposed granite in medians and tree wells as shown on the Plans. Surfaces to receive weed barrier fabric must be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Align fabric and place in a wrinkle-free manner. If necessary, overlap adjacent runs of the fabric from 12 to 18 inches unless specified otherwise by manufacturer’s installation instructions. Spread each overlapping run in the same direction. Fasten fabric with staples flush with the adjacent fabric to prevent movement of fabric by placement of decomposed granite.

Repair or replace fabric damaged during placement of decomposed granite with sufficient fabric to comply with overlap requirements.

Place decomposed granite in areas shown on the Plans. Place to avoid segregation of materials in maximum layers of 4 inches. Compact by wetting. Roll with a hand operated roller to a smooth uniform surface texture to a maximum of 80% relative compaction. Consult with project arborist to determine weight of roller and the proper compaction rate for decomposed granite within drip line of existing trees identified on the Plans as to remain and to be preserved. Repeat filling, compaction, and rolling until surface pavement achieves a level surface. Avoid damaging new and remaining existing trees and adjacent curbs, paved surfaces, or potentially present edge restraints during compaction and rolling. Damaged trees and other materials must be replaced immediately and at the Contractor's expense. Do not leave adjacent soil overly compacted. Make any adjustments needed to assure proper drainage of water over the adjacent concrete and off the pavement. Final thickness of compacted work must be as shown on the Plans or as directed by the Engineer or project arborist with a maximum variable tolerance of 1/2 inch. Make measurements by means of test holes taken at random in the finished surface. Repair test holes after inspection.

Leave decomposed granite and all adjacent pavement surfaces smooth and free of debris and extraneous material resulting from the work and the work site clean.

ADD NEW SUBSECTION 308-4.12 TO READ:

**308-4.12 Band of Decomposed Granite in Parking Lots.** Protect adjacent areas and improvements during delivery and storage. Protect all materials from damage caused by moisture, erosion and theft. Deliver materials in original containers with labels intact and exposed for inspection.

Examine areas to receive decomposed granite. Surfaces should be clean of extraneous material, properly compacted, graded, constructed and of the correct moisture content to receive decomposed granite. Concrete curbs shall have been installed and completed at locations where shown on the Plans.

The Contractor shall construct a test plot at least 1 foot by 5 feet at the site of the same materials proposed for the permanent work. Decomposed granite shall not be placed prior to approval by the Engineer of a test plot prepared by the Contractor.
Additional test plots shall be constructed at no additional cost as directed by the Engineer until a plot is produced which conforms to the requirements herein.

Place header edging for decomposed granite in conformance with Section 308-3.

Weed control fabric shall be placed in areas to receive decomposed granite as recommended by the manufacturer and as specified in these special provisions. Weed control fabric shall be placed loosely with longitudinal and transverse joints overlapped by 12 inches and stapled to the subgrade at 6 inches on center. Staples shall be driven perpendicular to the ground surface. Following placement, the fabric shall lay flat, smooth and be in uniform contact with the prepared subgrade, without bulges or wrinkles.

Do not place decomposed granite during rainy conditions.

Mix solidifying emulsion thoroughly and uniformly throughout the decomposed granite and under the manufacturer's instructions. Mix the material in the field using portable mixing equipment, or delivered in mixer trucks from a local ready-mixed plant.

Place decomposed granite uniformly in layers no more than 1-1/2 inch thick. Compact each layer of decomposed granite to a relative compaction of not less than 90 percent. Begin compaction within 6 to 48 hours of placement.

If the material was mixed in the field, apply an application of solidifying emulsion after compaction as recommended by the manufacturer. Prevent runoff or overspray of solidifying emulsion onto adjacent paved or planting areas.

Decomposed granite areas shall receive a final application of solidifying emulsion as recommended by the manufacturer. The Contractor shall prevent runoff or overspray of solidifying emulsion onto adjacent paved or planting areas.

The finished decomposed granite surface must be smooth and uniform, compacted to a relative compaction of not less than 90 percent, maintaining original flow lines, slope gradients, and contours of the job site. Do not leave adjacent soil overly compacted.

If cracks develop in the surface of the decomposed granite, loose fines shall be swept into the cracks, watered thoroughly and hand tamped. A final topcoat of solidifying emulsion shall be applied at the same rate used for the final application at installation or as recommended by the manufacturer.

Leave surface of decomposed granite free of extraneous material and the work site clean and free of debris resulting from the work.

ADD NEW SUBSECTION 308-4.13 TO READ:

308-4.13 Root Barrier. Prior to commencing installation of barriers, verify that adjacent work is complete and that conditions are acceptable for installation of root barriers. Contractor shall request a review of the root barrier layout by the Engineer to determine adjustments on site from locations shown on plans. Proceed with installation only after unsatisfactory conditions have been corrected.

All root barriers shall be installed per manufacturer's specifications in locations and per the details shown on the Plans. The vertical root directing ribs shall be facing inwards to the root ball and the top edge shall be aligned relative to the adjacent grade, curbs or tree grates as shown on the Plans. Each of the required number of panels shall be joined in a linear fashion and placed along the adjacent hardscape as shown on the Plans.

ADD NEW SUBSECTION 308-4.14 TO READ:

308-4.14 General Clean Up. Remove cans, surplus materials, and other debris from site. Neatly dress and finish planting areas. Flush walks, paved areas, and the like clean to the satisfaction of the Engineer. Remove nursery tags and binding tape from plants.

Within seven (7) days of written notification by the Engineer, remove and replace all warranted plant materials, which, for any reason, fail to meet requirements of warranty. Replacements shall be made to the same specifications required for original materials and shall carry the same warranty from the time they are replaced.

308-5 IRRIGATION SYSTEM INSTALLATION.
ADD TO SUBSECTION 308-5:
Scope of Work: Furnish materials and labor required to execute this work as indicated on the plans, as specified, and as necessary to complete the contract, that may include, but not be limited to, these major items:

1. Irrigation and related appurtenances.
2. Excavation and backfill of pipe trenches.
3. Record Drawings and guarantee.
4. Permits and licenses.
5. Testing of completed systems.
6. Clean-up.

308-5.1 General.
ADD NEW SUBSECTION 308-5.1.1 TO READ:
308-5.1.1 Quality Assurance. Qualifications of Installers: Provide at least one person who shall be present at all times during execution of this portion of the work and who shall be thoroughly familiar with the type of materials being installed and the material manufacturer's recommended methods of installation and who shall direct all work performed under this section.

Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the latest rules of the National Electrical Code and the Electrical Safety Orders of the State of California, Division of Industrial Safety for all electrical work and materials.

Standard of Installation: Material and workmanship shall be in accordance with local codes and ordinances of legally constituted authorities, except that where provisions of these specifications exceed such requirements, these Specifications shall govern.

Permits and Licenses: The Contractor shall secure the required licenses and permits including payments of charges and fees, give required notices to public authorities, verify permits secured or arrangements made by others affecting the work of this section.

Final Acceptance: Within 10 days of the Contractor's notification that the installation is complete, the City and required agencies will inspect the installation and, if acceptance is not given, will prepare a "punch list" which, upon completion by the Contractor, another inspection will be made. Final acceptance will not be made until all punch list items have been completed.

ADD NEW SUBSECTION 308-5.1.2 TO READ:
308-5.1.2 Delivery, Storage and Handling. Use all means necessary to protect irrigation system materials before, during and after installation and the installed work and materials of all other trades.

Replacement: In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the City and at no additional cost to the City. Exercise care in handling, loading, unloading and storing pipe and fittings under cover until ready to install. Transport pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load. Protect pipe from sunlight. Repair all dented and damaged pipe by cutting out the dented or damaged section and rejoining with a coupling.

ADD NEW SUBSECTION 308-5.1.3 TO READ:
308-5.1.3 Project Site Conditions.
Connections to Utilities:

Source of water supply: The Contractor shall verify and be familiar with the location, size and material at the existing source of water supply to the irrigation system, as shown on the plans. Source of supply and point of connection shall be the existing components at approximate locations as shown on plans.

Existing utilities and conditions: Prior to trenching, the Contractor shall locate and mark all cables, conduits, sewer lines, and other utilities and shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the City. Do not proceed until all discrepancies have been resolved.
Inspection: The Contractor shall at all times permit the City or its authorized agents to visit and inspect the work or any part thereof. He shall maintain proper facilities and provide safe access for such inspections to all parts of the work. Where the specifications require work to be tested by the Contractor, it shall not be covered up until tested or approved by the City and/or governing agencies. The Contractor shall be solely responsible for notifying the City and/or required agency (48 hours' notice required), where and when such work is in readiness for testing. Should any such work be covered without such test or approval, it shall, if so ordered, be uncovered at the Contractor's expense.

Completion: The work will be accepted in writing when the entire Scope of Work shall have been completed to the satisfaction of the City. In judging the work, no allowance for deviation from the original plans and specifications will be made unless previously approved in writing by the City or Landscape Architect.

The City or its authorized representative shall have final authority on all items of the project.

Equipment to Furnish: Bubbler head equipment, operating keys and spare parts shall be furnished to the City and AC Transit by the Contractor, as shown on the plans.

ADD NEW SUBSECTION 308-5.1.4 TO READ:

308-5.1.4 Water Meter

For upsizing of the existing water meter, Contractor to coordinate with East Bay Municipal Utility District:

EBMUD New Business Office
375 11th Street, First Floor
Oakland, CA 94607-4240
(510) 287-1008
(510) 287-0325 FAX
Email: nbo@ebmud.com

ADD THE NEW SUBSECTION 308-5.2.5 TO READ:

308-5.2.5 Irrigation Pipe Slewing. All water lines installed within hardscape, across streets, sidewalks, walkways and similar features shall be installed in high-density polyethylene pipe (HDPE) schedule 80. HDPE shall be joined with the butt fusion technique.

Slewing/crossovers shall conform to standards for rigid nonmetallic conduit in accordance with ASTM F2160. Slewing/crossovers shall be a minimum of 4" diameter and at least two times the total sum diameter of all pipes contained within sleeve. Sleeves shall extend 12" beyond edges of hardscape. The Contractor shall be responsible for coordinating sleeve and pipe locations with other trench work and paving installations prior to installation.

ADD THE NEW SUBSECTION 308-5.2.6 TO READ:

308-5.2.6 HDPE Pipe Butt Welding Technique. Equipment

Mirror Welding Machine

a. Heating Plate

Electric heating plates for general fusion use shall be controlled thermostatically and capable of being adjusted over a temperature range from 150° to 300°C.

For welding of HDPE, the temperature thermostat shall be set according to manufacturer's recommendation.

The mirror (heating plate) shall be equipped with a thermometer or other built-in temperature-measuring device and shall have sufficient area to adequately cover the ends of the pipe to be joined.

b. Alignment jig
The alignment jig shall consist of: Two fixed and two moveable clamping blocks for holding the two parts to be fused in moveable axial alignment; one shaver for simultaneously preparing the ends to be joined, and appropriate adapters “inserts” for different pipe sizes.

c. Shield for Mirror welding Assembly

The contractor shall use a shield that permits welding operations to continue regardless of weather conditions, and serve as a windbreaker to prevent rapid cooling of weld seam.

Welding Procedure

a. Welding Operation

The procedures stated below should be regarded as a general guideline only. The manufacturer of the HDPE pipe should be asked to supply specific recommendations for welding of their products or materials. Likewise, the welding machine supplier shall supply detailed welding procedure for their machines.

Heat fusion bonding is a combination of temperature and force resulting in two mating surfaces flowing together to produce a joint. Fusion bonding occurs when the joint cools below the melt temperature of the material. There is a temperature range within which any particular material may be satisfactorily joined. The specified temperature used requires consideration of the properties of the specific material, the fusion equipment being used and the welding environment.

The butt-welding shall be completed in phases using several parameters. These phases are:

- The alignment of the pipe
- The shaving of the surfaces of the pipe ends
- Cold matching of the HDPE pipes
- Cleaning of surfaces
- Heating of surfaces
- Fusion of surfaces
- Cooling of weld joint

The parameters used during welding are:

- Bead-up pressure in bars or psi
- Bead-up height in mm or inches
- Heat soaking time in seconds
- Heat soaking pressure in bars or psi
- Transfer time in seconds
- Fusion pressure in bars or psi
- Cooling time in minutes

These parameters are for information only and shall be compared with the parameters given by the HDPE pipe manufacturer and the welding machine supplier.

b. Welding Preparation

The welding zone must be protected from unsuitable weather conditions (e.g. humidity effects, wind and temperatures below 0°C). The surfaces to be joined must be undamaged and free from impurities or loose particles.

c. Alignment of HDPE Pipes

The pipes must be aligned when they are clamped into the mirror welder in such a way that the surfaces are in the same plane (parallel) to each other. The HDPE pipes can be positioned...
directly into the welding machine. Install the correct adapter insert for the size of pipe diameter to be used and tighten them to the machine.

Position the pipe in a way that approx. 1 - 3/4 inch is protruding behind the last clamp. This will allow approx.1/2 to 3/4 inch to shave from, and the remaining 1 to 1-1/4 inch for welding.

Once the pipe has been placed in position, the top clamps can be closed. Tighten the top clamp nuts evenly in order to get a totally circular pipe; an even clamping pressure must be achieved. Then, make the first dry matching (press the two pipes to each other) and check the amount of shaving that will be required.

d. Shaving of Surface

After the dry matching is completed, open up the pipes and introduce the shaver. Turn the shaver on and adjust to suitable speed.

Press the two pipes together, and shave until a continuous strip of HDPE is peeling off on both sides of the shaver. Once constant peeling off is observed, release the pressure on the pipes and separate the pipes. Do not turn off the shaver until the pipes are apart. If the shaver is stopped during shaving, the shaver will create an end cut-mark and the shaving operation will have to be repeated.

Remove the shaver, match the pipes again, and check the pipe for proper alignment. If, even when continuous peeling off is achieved on each side of the shaver, the pipes do not match properly, check that the clamps are not at pressing on to the pipe with different pressures. Re-tightening the nuts slightly on either side. If this does not help, contractor to open up one clamp and insert a shim in between the jaws and the pipe. The shim will concentrate the pressure on to the pipe and move the pipe into alignment. It is important to remember that, if the clamp has been opened during operation, the shaving operation must be repeated.

Once the pipes are correctly aligned, separate the pipes again for cleaning. Remove chips inside the pipes on both sides, all chips scattered under the pipes, and also inside the machine. Otherwise, they will stick to the mirror (heat plate) later while re-heating. Remove the chips by using a brush or a small hook made out of a thin steel wire. Never put any dirty gloves inside the pipe or remove the chips with your hands. Do not touch the shaved pipe ends. Contractor shall, always clean the surface with a clean rag and mineral spirits/alcohol before introducing the mirror.

e. Heating of Surface

Before heating the surface, contractor shall have all parameters available for this operation. Contractor shall check the mirror temperature. The mirror has a yellow or red lamp, which tells if the mirror has reached working temperature. To make sure there is no cold air flowing through the pipe, place some plastic bags on each end of the pipe, this will prevent the air from cooling the mirror on one side. Contractor shall confirm the pipe has a good fit, then remove the shaver and introduce the mirror.

Push the pipes together against the mirror and raise the pressure to the Bead-up pressure. This pressure needs to be maintained until the Bead-up height has been reached. The bead up height is the height of the bead, which is pressing up against the mirror.

As soon as the Bead up height has been reached, release the pressure down to the Heat Soak pressure. Heat soak pressure is the pressure maintained during the Heat Soak time.

As soon as the heat soak time has elapsed, separate the pipes, remove the mirror, and then press together.

f. Fusion of Surfaces

This operation has to be done quite fast, since there is actually a time limit “Transfer time” from the removal of the mirror until the two pipes are pressed together and reached the Fusion pressure.
Fusion pressure is the pressure that shall reach during the Transfer time and maintained during the Cooling time.

g. Cooling of Joint

Cooling time is the time in which the pipe has to be left undisturbed.

Under no circumstances shall the clamps be opened or the pressure released until the cooling time has elapsed.

h. Checks of Weld Seam

The mirror-welding machine, if coupled to a data log, will give a printout confirming the parameters used during welding of a specific seam and approval/rejection of the welded seam.

ADD THE NEW SUBSECTION 308-5.6 TO READ:

308-5.6 Conduit for Irrigation Electrical Wiring. All low voltage electrical wire shall be installed in HDPE conduit. Unless specified otherwise on the plans. Conduit shall extend into splice boxes, or other enclosures. Where splice box is located in paved area, provide capped stub-out conduit piece extending out from box at least 12" into planting bed area.

Splice boxes, which must be installed in paved areas, are to be concrete valve boxes approved by the Project Engineer. Boxes shall not be installed in streets, or driveways. The Contractor shall be responsible for coordinating conduit locations with other trench work and paving installations prior to installation.

308-6 MAINTENANCE AND PLANT ESTABLISHMENT

REPLACE SUBSECTION 308-6 WITH THE FOLLOWING:

The Contractor shall maintain all planted areas on a continuous basis as they are completed during the progress of the work and during establishment period, and shall continue to maintain them until final acceptance.

Protect adjacent walls, walks and utilities from damage or staining by soil.

All planting areas shall be kept free of litter and debris and shall be weeded, cultivated, fertilized, and mulched. Replace plants immediately upon failure with same species and size.

Proper performance of any irrigation system modified by the Contractor's work and the irrigation system in the Fruitvale off-street parking lots shall be checked at intervals not to exceed 10 days. Any required repairs or adjustments to irrigation systems shall be performed immediately.

Every 9 months after installation of decomposed granite in tree wells and medians and just before the end of the 36-month maintenance period, the Contractor shall apply additional layers of decomposed granite where the subgrade or planting soil have subsided. Layers of decomposed granite shall added until curbside tree wells are flush with the adjacent sidewalk surface or curb and until the original finished grade in medians has been reestablished. Material and installation of additional layers shall be as shown on the Palms and per these Special Provisions.

Where berms are used to hold irrigation water from truck watering, these shall be remove at the end of the 36-month maintenance period.

Every 365 days after installation of the decomposed granite band in the parking lots, a dilute topcoat of solidifying emulsion shall be applied at the same rate as the final application at installation, or as otherwise recommended by the manufacturer.

All newly planted trees, with the exception of trees located in medians in San Leandro that are watered by an irrigation system, shall be truck-watered for the length of the plant establishment period. Watering shall occur at amounts and intervals that result in healthy tree growth. Prior to commencement of the maintenance and plant establishment period, Contractor shall provide to the Engineer and Project Arborist for approval a detailed watering schedule that outlines watering intervals and amounts for the duration of the maintenance and plant establishment period.

Contractor shall conduct pruning of trees and other plants as designated by the Engineer at the start of the plant establishment period and as part of the plant establishment work under the supervision of the
Project Arborist. Prune at least annually as recommended by the Project Arborist to properly develop structure and health of trees and shrubs and for median trees to establish and maintain clearances from and above travel and BRT lanes as required by the City of Oakland.

Contractor shall keep a detailed log of plant establishment activities performed and submit a copy to the Engineer with each payment request.

The Contractor shall request a final inspection to begin the plant establishment period after all planting and related work has been completed in accordance with Construction Documents.

If a new tree sustains damage after it was planted or, as determined by the Project Arborist, is in poor health, the Contractor shall replace the tree within one month of determination of this condition by the Project Arborist. Replacement of failed trees just before the end of the 3-year plant establishment period is not acceptable. If an existing tree identified as to-be-protected on the Plans is damaged or in poor health, as determined by the Project Arborist and Engineer follow replacement procedure detailed in section 314-2.3.7. New trees requiring replacement due to the Contractor’s fault or negligence shall be replaced at the Contractor’s expense.

After planting is completed, a field notification will be issued to the Contractor by the Engineer to establish the effective beginning date of the plant establishment period. The plant establishment period shall be for a period of 36 calendar months and shall be extended by the Engineer if the planted material areas are improperly maintained, appreciable plant replacement is required during the establishment period, or if other corrective work becomes necessary.

Upon completion of the plant establishment period, a final inspection for acceptance will be performed by the Engineer.

308-8 PAYMENT.
REPLACE SUBSECTION 308-8 WITH THE FOLLOWING:

The lump sum shown in the Bid Item “Landscape” shall include full compensation to complete and maintain all the work as shown on the plans, as specified in the Standard Specifications and these Special Provisions Section 308-4, including furnishing all labor, materials, tools, equipment and incidentals, and performing all adjustments necessary to complete the work involving earthwork, trenching, excavation and backfill, site soil and topsoil preparation and conditioning, import top soil placement, erosion control, staking, guying, deep watering tubes and systems, root barriers, fertilizer, amendments, recycled wood mulch, sheet-mulching, weed barrier filter fabric, decomposed granite, trees, sawcutting of tree wells into existing sidewalk pavement, tree transplanting and storage, and no additional compensation will be allowed therefore.

The lump sum shown in the Bid Item “Irrigation” shall include full compensation to complete and maintain all the work as shown on the plans, as specified in the standard specifications and these special provisions section 308-5, including furnishing all labor, materials, tools, equipment and incidentals, and performing all adjustments necessary to complete the work involving earthwork, trenching, excavation and backfill, installation of irrigation controllers with DOME antenna, master valves, flow meters, main line piping, lateral piping, bubblers, subsurface drip irrigation system, remote control valves, ball valves, quick coupler valves, irrigation sleeving and irrigation electrical conduit, and no additional compensation will be allowed therefore.

The lump sum shown in Bid Item “Maintenance and Plant Establishment Period” shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in truck watering, weeding, mulching, fertilizing, mowing, litter/debris removal, removal of berms for watering, pruning and maintaining the planting and irrigation, including the establishment of relocated palm trees, as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no further compensation will be allowed therefore.

SECTION 309 – MONUMENTS

309-4 PAYMENT.

OCTOBER 2015
REPLACE THE SUBSECTION 309-4 TO READ:
The price paid for any survey monuments shall be included in the price paid for Construction Surveying.

SECTION 310 – PAINTING

310-1 GENERAL.
310-1.2 Application.
ADD THE SENTENCE TO THE END OF SUBSECTION 310-1.2:
Lane lines and pavement markings shall be thermoplastic. Curb markings shall be paint.

310-5 PAINTING VARIOUS SURFACES.
310-5.6 Painting for Traffic Striping, Pavement Markings, and Curb Markings.
310-5.6.1 General.
ADD THE FOLLOWING PARAGRAPHS TO THE END OF SUBSECTION 310-5.6.1 TO READ:

a. The Contractor shall replace all existing pavement marking, traffic striping and pavement markers removed or damaged as a result of construction operations in accordance with Section 7-9. Repairs and replacements shall match or exceed the existing in quality and finish, and shall match existing dimensions. Such replacements and repairs shall be completed within FIVE working days of completing the permanent pavement resurfacing. If the permanent pavement resurfacing is staged over time, the Engineer may direct the replacement of pavement markings, traffic striping and pavement markers to be similarly staged. With temporary resurfacing, the Contractor shall be required to install temporary markings, markers and striping or other devices as directed by the Engineer at the end of each workday.

b. All removed or damaged pavement markings such as crosswalks, stop bars, symbols, legends or arrows; traffic striping such as center lane, or edge lines; and pavement markers shall be replaced in accordance with the following:

<table>
<thead>
<tr>
<th>Existing Material</th>
<th>Replacement Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paint</td>
<td>Extruded Thermoplastic or permanent type pre-cut plastic</td>
</tr>
<tr>
<td>Thermoplastic material</td>
<td>Extruded Thermoplastic material</td>
</tr>
<tr>
<td>Pre-cut plastic</td>
<td>Permanent type pre-cut plastic</td>
</tr>
<tr>
<td>Raised ceramic or reflective materials</td>
<td>Replace in kind</td>
</tr>
</tbody>
</table>

c. All removed or damaged paint shall be replaced in conformance with 210-1.6. All removed or damaged pavement markers shall be replaced in conformance with Sections 214 and 312.

d. Permanent type pre-cut plastic shall be 3M Stamark Pliant Polymer Pavement Tape, Series 5760 for white and Series 5761 for yellow, or approved equal. The application method for the 3M tapes shall be per manufacturer’s recommendations.

e. Unless separate pay items are provided in the Bid Schedule, payment for removing and replacing pavement markings, traffic striping and pavement markers shall be included in the price paid for other project work and no other payment will be allowed.

f. Lane lines and pavement markings shall be thermoplastic. Curb markings shall be paint.

ADD NEW SUBSECTION 310-6 TO READ:
310-6 Pavement Traffic Striping Replacement.
310-6.1 General. The Contractor shall construct pavement marking and striping as it currently exists unless shown otherwise on the construction plans, or as directed by the Engineer. The traffic striping shall be placed in accordance with the latest State Department of Transportation Standard plans.

The Contractor shall perform all the work necessary (including power cleaning the grinding areas and layout work) to install satisfactory lines for traffic stripes.

After traffic striping is removed either by removal for slurry sealing and microsurfacing or by milling of pavement, temporary striping shall be installed immediately. After paving the contractor shall install temporary striping immediately. The contractor shall “cat track” the proposed marking locations no later...
than 2 weeks after paving for inspections by the City of Oakland Transportation Services Division. The Contractor shall notify the Resident Engineer to schedule inspections immediately after “cat track” is performed for each paving segment. Provided that the “cat track” is approved by the City, the Contractor shall install permanent striping no later than 2 weeks after “cat track”. The contractor shall not place the finished markings until locations have been inspected and approved.

For each consecutive calendar day in excess of the time specified to complete the temporary striping, “cat track”, and permanent striping, the Contractor shall pay to the Owner or the Owner may deduct from monies due the Contractor, the sum of $500.00 per paving segment per day, unless otherwise provided in the contract documents.

ADD NEW SUBSECTION 310-6.1.1 TO READ:

310-6.1.1 As-Built Striping and Marking Plans. At the Pre-Construction meeting the Engineer will provide the Contractor with one set of full-size color 1”=40’ project plans and electronic files of the project plans. The location of monuments shall be indicated on the project plans.

All existing pavement markers, pavement markings and traffic striping (except crosswalk striping as noted in the paragraph below), shall be replaced at their existing locations in accordance with the approved plan (unless otherwise directed in the field by the Engineer) after the pavement resurfacing operations are concluded.

The parallel distance between existing 12” crosswalk lines shall replicate existing conditions, unless otherwise directed by the Engineer during the plan review process. All 12” crosswalk lines shall be white in color, except those crosswalk lines adjacent to schools shall be yellow. The interior crosswalk lines shall be joined with a diagonal crosswalk segment with 60” spacing between the gutter flow line and the crosswalk line per modified City Details S-4 and S-5, which are included in the project plans.

Payment: Preparing and maintaining of the As-built drawings duties shall be considered as included in the price bid for the various bid items of work and no additional compensation shall be allowed therefore.

310-6.2 Preformed Traffic Striping.
310-6.2.1 General. The preformed traffic striping shall consist of white or yellow materials as designated, with pigments selected and blended to conform to standard highway colors throughout the expected life of the striping. Glass beads shall be incorporated to provide immediate and continuing retroreflection. The traffic striping shall be capable of being adhered to asphalt concrete or portland cement concrete by a pre-coated pressure sensitive adhesive. A primer may be used to precondition the pavement surface. The traffic striping shall conform to pavement contours by the action of traffic. The traffic striping shall be capable of application on new, dense graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer’s instructions. After placement, the traffic striping shall be immediately ready for traffic.

310-6.2.2 Classification. The preformed traffic striping shall be a durable retro reflective plant polymer material designed for longitudinal striping subjected to high traffic volumes and severe wear conditions such as shear action from crossover or encroachment on typical longitudinal configurations.

310-6.2.3 Requirements.
1) Composition: The retro reflective plant polymer traffic striping shall consist of a mixture of high quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area, with a reflective layer of beads embedded into the patterned surface.

2) Reflectance: The white and yellow traffic striping shall have the following initial expected reflectance values as measured in accordance with the testing procedures of ASTM D4061. The photometric quantity to be measured shall be Specific Luminance (SL), and shall be expressed as millicandels per square foot per foot-candle. The metric equivalent shall be expressed as millicandelas per square meter per lux. The test distance shall be 50 feet (15 meters) and the sample size shall be a 2.0 feet by 2.5 feet rectangle (0.61m X 0.76m)

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Yellow</th>
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</tr>
<tr>
<td>Observation Angle</td>
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<td>1.0°</td>
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Specific Luminance values indicate initial expected values, and are not intended to represent minimum values.

310-6.2.4 Beads.

1) Index of refractions: The glass beads on the surface of the material shall have a minimum index of refraction of 1.70 when tested using the liquid oil immersion method. The glass beads mixed into the pliant polymer shall have minimum index of refraction of 1.50 when tested by the oil immersion method. The size and quality of the beads shall be such that the performance requirements for the retro reflective pliant polymer shall be met.

2) Bead Adhesion: Shall be such that beads are not easily removed when the film surface is scratched firmly with a thumbnail.

3) Acid Resistance: The beads shall show resistance to corrosion of their surface after exposure to a one percent solution (by weight) of sulfuric acid. The one percent acid solution shall be made by adding 5.7cc of concentrated acid into 1000cc of distilled water. CAUTION: always add the concentrated acid into the water not the reverse. The test shall be performed as follows:
   a. Take a one-inch by two-inch sample, adhere it to the bottom of a glass tray and place just enough acid solution to completely immerse the sample. Cover the tray with a piece of glass to prevent evaporation and allow the sample to be exposed for 24 hours under these conditions.
   b. Then decant the acid solution (do not rinse, touch, or otherwise disturb the bead surfaces) and dry the sample while adhered to the glass tray in a 150 F (66 C) oven for approximately 15 minutes.
   c. Microscopic examination (20X) shall show no more than 15 percent of the beads having a formation of a very distinct opaque white corroded layer on their entire surface.

310-6.2.5 Skid Resistance. The surface of the retro reflective pliant polymer traffic striping shall provide an initial minimum skid resistance value of 45 BPN when tested according to ASTM E 303.

310-6.2.6 Thickness. The material without adhesive shall have a minimum caliper of 0.06 inch (1.524 mm) at the thickest portion of the cross-section and a minimum caliper of 0.02 inch (0.508 mm) at the thinnest portion of the cross-section.

310-6.2.7 Performance Requirements & Material Replacement Obligations.

1) Field performance requirements and manufacturer’s replacement obligations:
   a. Before installation, a manufacturer’s written warranty for compliance with the following conditions shall be provided the City of Oakland.
   b. For a period of 48 months from the date of installation, regardless of conditions, the manufacturer shall provide replacement material for any material used as longitudinal striping which (1) fails to retain the minimum reflectance values as shown in the table below (minimum Replacement Zone is 360 feet of road length) or (2) fails due to loss of adhesion or complete wear through.

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<thead>
<tr>
<th></th>
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</tr>
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<td>Observation Angle</td>
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<td>1.0°</td>
</tr>
<tr>
<td>Specific Luminance</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*All reflectance measurements shall be made using an “ECOLUX”, or equal brand retroreflectometer.
2) The warranty covers material replacement only.

310-6.3 Thermoplastic Traffic Striping, Thermoplastic Pavement Markings, and Reflective Pavement Markers.

310-6.3.1 General. Thermoplastic traffic stripes (traffic lines) and pavement markings shall conform to the provisions in the Sections 84-1, “General,” and 84-1, “Thermoplastic Traffic and Pavement Markings,” and Section 85 “Pavement Markers” of the latest State Department of Transportation Standard Specifications and these special provisions.

The preformed thermoplastic material for green thermoplastic pavement markings shall be packaged in cardboard cartons. The cartons shall not exceed 40 inches in length and 25 inches in width. The cartons shall be labeled for ease of identification. The weight of the individual carton must not exceed 50 pounds. A protective film around the carton must be applied in order to protect the material from rain or premature aging.

310-6.3.2 Thermoplastic Material. All project traffic striping and pavement markings shall be installed with the Thermoplastic material specified in this section.

Thermoplastic traffic striping and pavement markings shall be a reflectorized material to the road surface in a molten state by extrusion method or as approved by the Engineer. It shall have surface application of glass beads, which upon cooling to normal pavement temperature, will produce an adherent reflectorized stripe of the specified thickness and width and will be resistant to deformation by traffic. Thermoplastic material shall conform to State Specifications 8010-21C-19 (ALKYD BINDER). Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-51J-22 (Type II).

State Specifications for thermoplastic material and glass beads may be obtained from Transportation Laboratories, P.O. Box 19128, Sacramento, CA. 95819, (916) 739-2400.

310-6.3.3 Application. Thermoplastic Traffic Striping application shall conform to Section 84.204 of State Department of Transportation’s Standard Specifications and the following provisions:

Thermoplastic material for traffic striping shall be applied at a thickness of 0.125 to 0.188 inch. Glass beads shall be applied immediately to the surface of the molten thermoplastic material by an automatic bead dispenser closely behind the striped line. The glass bead dispenser shall be equipped with an automatic cut-off control synchronized with the cut-off of the thermoplastic material. Beads shall be applied at the rate of not less than 10 pounds per 100 square feet.

The thermoplastic material for green thermoplastic pavement markings shall be capable of being applied using the propane torch method, and, or infrared or blue flame heater recommended by the manufacturer. The material shall be capable of being applied at ambient and road temperatures down to 45°F without any preheating of the pavement to a specific temperature. A sealer specified by the manufacturer shall be applied to the pavement surface prior to material application to ensure proper adhesion. A thermometer shall not be required during the application process. The pavement shall be clean, dry and free of debris. Supplier shall enclose application instructions with each box/package.

310-6.3.4 Reflective Pavement Markers. Reflective pavement markers shall be furnished and placed at the locations as shown on the Standard Details or as directed by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in furnishing and placing reflective pavement markers when they are included as part of a Caltrans striping detail, shall be considered as included in the unit prices bid for traffic striping and no additional compensation will be allowed therefor.

310-6.4 Measurement and Payment.

a. Continuous Stripes will be continuous except at break points as shown on the construction plans. Measurement and payment will be by linear foot of traffic striping, regardless of the number of stripes or pavement markers per measured foot.

b. Caltrans Traffic Striping Details featuring one or more traffic stripe type and pavement markers will be continuous except at break points as shown on the construction plans.
Measurement and payment will be by linear foot of traffic striping detail, regardless of the number of stripes or markers per measured foot.

c. Subsection 312-4 provides for the measurement and payment for individual pavement markers that are not installed as part of a Caltrans striping detail.

d. A double thermoplastic traffic stripe, consisting of 2, 4 inch wide yellow stripes, will be paid for as 4 inch double yellow thermoplastic traffic stripe.

ADD NEW SECTION 310-7 TO READ:

310-7 Crosswalks, Limit Lines, and Pavement Markings.

310-7.1 General. Thermoplastic pavement markings shall be applied as shown on the State Standard Plans RSP A24A, RSP A24B, and RSP A24C and shall conform to the applicable provisions in Section 310-5.6 and these special provisions. Thermoplastic material for crosswalks, limit lines, and pavement markings shall be applied at a thickness of 0.125 to 0.188 inch. Glass bead shall be applied immediately to the surface of the molten thermoplastic material at a rate of not less than 10 pounds per 100 square feet.

310-7.2 Measurement and Payment. Crosswalks, limit lines, and pavement markings will be measured and paid by the square foot for the actual area covered. The price paid per square foot for pavement markings shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals and for doing all the work involved in furnishing and placing the pavement markings, complete in place as specified herein and as directed by the Engineer.

ADD NEW SECTION 310-8 TO READ:

310-8 Object Markers.

310-8.1 General. Markers and delineators must be on the Caltrans’ Authorized Material List for signing and delineation materials, found at:


Install surface mounted Type K-1 (CA) object markers per manufacture’s installation instructions.

310-8.2 Measurement and Payment. The contract unit price paid for Type K-1 (CA) object markers shall include full compensation for furnishing all labor, materials, equipment, and incidental work involved in installing the object marker, complete in place, as shown on the plans, as specified in the State Standard Plans and Specifications and these special provisions, and as directed by the Engineer.

SECTION 312 – PAVEMENT MARKER PLACEMENT AND REMOVAL

312-4 MEASUREMENT AND PAYMENT.

ADD THE FOLLOWING PARAGRAPH TO THE END OF SUBSECTION 312-4:

The contract unit price for each reflective and non-reflective pavement marker placed or removed shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in each placement or removal of reflective and non-reflective pavement marker, and performing all the incidental work connected therewith as herein specified.

ADD NEW SECTION 313 TO READ:

SECTION 313 – ROADSIDE SIGNS

313-1 GENERAL.

Roadside signs shall conform to Section 56, “Signs” of the State Standard Specifications and these special provisions.

313-2 PAYMENT.

The contract unit price paid for signs shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, for doing all the work involved in installing roadside sign, complete in
place, as shown on the plans, as specified in the State Standard Specifications and these special provisions, and as directed by the Engineer.

ADD NEW SECTION 314 TO READ:

**SECTION 314 – MISCELLANEOUS LANDSCAPE ITEMS**

### 314-1 SITE FURNISHINGS.

#### 314-1.1 General.

#### 314-1.1.1 Submittals. Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or shop Drawings indicating size, materials, finishes, color and quantities of furnishings being supplied.

#### 314-1.2 Materials.

#### 314-1.2.1 Bollards. Bollards, except where noted on the Plans, shall be Dumor, 36 inches high, Schedule 40 steel pipe bollard, model 400-36 S-1 (embedded), or approved equal; with factory-applied powder coat finish; color: color – to match color of canopy on BRT platform. If requested by the Engineer, reflective tape shall be applied to bollard. Reflective tape shall be 4-inch wide 3M 3431 Engineering Grade Prismatic Reflective Tape, or approved equal. All elements of the bollard shall be free of fins, abrasions, sharp edges and other surface defects.

Where indicated on the Plans as “Relocated Existing Bollard”, relocate bollards salvaged from the existing median located between 34th and 33rd Avenue to locations indicated on the plans and as directed by the engineer. Secure relocated bollards in new locations using salvaged hardware or hardware recommended by the bollard manufacturer. The Contractor shall obtain the make and model information for existing bollards from City of Oakland Public Works.

#### 314-1.2.2 Tree Grates and Frames. Tree grates, except where noted on the Drawings, shall be Urban Accessories “Chinook” RCT custom-sized to 4-foot by 8-foot, or approved equal; Material: 100% recycled grey iron, conforming to ASTM A48 class 35b, hardness 170-223 brinnell; finish: raw natural finish. Openings in pattern shall not exceed greater than 3/8-inch, in conformance with ADA Accessibility Guidelines. Each tree grate shall have a single 9 inches lightport opening and corresponding metal lightport cover for access to the deep watering and aeration tube assembly that is to be located under the opening. Contractor to review exact location of trench drains that project through tree wells prior to ordering tree grates with light ports. Lightport shall be located on longitudinal side of tree well opposite from trench drain, aligned to give access to the deep watering and aeration tube below and as per manufacturer’s lightport worksheet instructions.

Tree grates for “Chinook” tree grate shall be Urban Accessories, 4’x8” RCT Standard "S" tree grate frame made from steel with a raw finish and for direct embedment in new concrete.

Tree Grate Frames for Salvaged Tree Grates: Where called for on the Plans, tree grate frames for salvaged tree grates in the City of Oakland shall be as per the tree grate manufacturer’s recommendations. Contractor shall obtain tree grate manufacturer’s information from the City of Oakland’s Public Works Department.

#### 314-1.2.3 Tree Guards. Where called for on the Plans, tree guard shall be Urban Accessories, “Windsor” with flat tops, or approved equal; material: cast components shall be of 100% recycled aluminum conforming to ASTM B261, fabricated components shall be mild carbon steel, conforming to ASTM A36; color and finish: custom – to match color and finish of canopy on BRT platform. All visible welds shall be ground smooth on outside edges. Castings shall be squared and flat, free of burrs, slag, air pockets, blow holes, flashing, and grinding or welding on exposed surfaces. Excessive warping or shrinkage are not acceptable.

#### 314-1.2.4 Bicycle Racks. Where called for on the Plans, bike racks shall comply with Division 3.1 Section 12 93 00.

#### 314-1.3 Construction. Prior to commencing installation, verify that adjacent work is complete and that conditions are acceptable for installation of site furnishings. Contractor shall stake layout and request a
review by the Engineer to determine adjustments on site from locations shown on plans. Proceed with installation only after unsatisfactory conditions have been corrected.

All site furnishings shall be installed per manufacturer's specifications. Work shall be set plumb level, and true to line and shall present a neat and finished appearance.

Tree grate frames shall be embedded in concrete such that all edges of tree grates are flush with adjacent paving surfaces. Unstable tree grate components and tree grates that pose a tripping hazard due to offsets between grate and adjacent concrete surfaces will be rejected by the Engineer. Reinstallation of rejected tree grates will be the contractor's sole responsibility and no additional payment will be made. Tree grates shall be attached to the tree grate frame using tamperproof, anti-theft bolts.

Attach tree guard components to one another and to tree grate using tamperproof bolts and per manufacturer's installation instructions. Tie tree to tree guard as shown on the Plans.

314-1.3.1 Relocate Bollards. Existing bollards shown on plans to be relocated shall be removed without damaging the bollards. If an existing bollard is deteriorated or broken, notify the Engineer. If a new bollard is ordered by Engineer due existing bollard being deteriorated or broken prior to removal, then price for replacement bollard shall be a change order. Bollards that are damaged during removal shall be the replaced at the Contractor's expense. The replacement bollard shall comply with section 314-1.2.2. The Contractor shall install the bollards per section 314-1.3. The Contractor shall assume all responsibility for the bollards, until final acceptance of the work by the Engineer. Contractor shall furnish all materials needed to reinstall the bollards and dispose of all excess materials.

314-1.3.2 Relocate Tree Grate. Existing tree grates shown on the Plans to be relocated shall be removed without damaging the tree grate. If an existing tree grate is deteriorated or broken, notify the Engineer. If a new tree grate is ordered by Engineer due existing tree grate being deteriorated or broken prior to removal, then price for replacement tree grate shall be a change order. Tree grates that are damaged during removal shall be the replaced at the Contractor's expense. The replacement tree grates shall comply with section 314-1.2.1. New tree grate frames for relocated tree grates shall comply with section 314-1.2.2. The Contractor shall install the tree grate and matching new frames per section 314-1.3. The Contractor shall assume all responsibility for the tree grate, until final acceptance of the work by the Engineer. Contractor shall furnish all materials needed to reinstall the tree grate and tree grate frame and dispose of all excess materials.

314-1.4 Measurement and Payment

The price paid for each bollard for Bid Item "BOLLARD" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in procuring and installing bollards complete in place as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no further compensation will be allowed therefor. Such payment shall include footings, anchoring hardware, adhesives and all other necessary items.

The price paid for each tree grate and frame for Bid Item "4' X 8' TREE GRATE AND FRAME" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in procuring and installing tree grate and frames complete in place as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no further compensation will be allowed therefor. Such payment shall include footings, anchoring hardware, adhesives and all other necessary items.

The price paid for each tree guard for Bid Item "TREE GUARD" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in procuring and installing tree guards complete in place as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no further compensation will be allowed therefor. Such payment shall include footings, anchoring hardware, adhesives and all other necessary items.

The price paid for each bicycle racks for Bid Item "BICYCLE RACK (SIDE RUNNING STATION)" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in procuring and installing bicycle racks complete in place as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no
further compensation will be allowed therefor. Such payment shall include footings, anchoring hardware, adhesives and all other necessary items.

The price paid for each bollard relocated for Bid Item "RELOCATE BOLLARD" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing and installing bollard complete in place as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no further compensation will be allowed therefor. Such payment shall include footings, anchoring hardware, adhesives, disposal of excess material and all other necessary items.

The price paid for each tree grate and frame relocated for Bid Item "RELOCATE TREE GRATE" shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in removing and installing relocated tree grates and matching new frames complete in place as shown on the plans, as specified in the Specifications, these special provisions and as directed by the Engineer and no further compensation will be allowed therefor. Such payment shall include footings, anchoring hardware, adhesives, disposal of excess material and all other necessary items.

314-2 TREE PRESERVATION.
314-2.1 General. Work under this section includes specifications for preserving existing trees, transplanting palm trees, and maintaining existing planted areas.

The preservation of existing trees includes the protection and stress reduction of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent. Tree preservation work is to be coordinated with all demolition, construction and landscaping activities in the vicinity of existing trees identified on the Plans for protection and preservation.

Transplant palm trees between March 15 and October 15.

314-2.1.1 Definitions.

Certified Arborist: Credential of an individual arborist issued and administered by the International Society of Arboriculture. This credential must be current and valid to qualify to use the copyrighted designation of "Certified Arborist". Refer to www.isa-arbor.com for additional information.

Project Arborist: Arboricultural consulting firm contracted to provide technical assistance and advice to the Contractor. Duties include the following: site investigation and documentation (design phase inventories, assessments, root investigations, etc.); develop tree preservation plans, methods, details and specifications; and provide final document review and monitoring of the Contract Arborist. The Project Arborist is contracted directly to the Owner and acts specifically on behalf of the Owner/Agency concerning tree related issues. Project Arborist shall have authority over the Contract Arborist and any disputes shall be decided by the Project Arborist and Engineer.

Contract Arborist: Arboricultural contracting firm implementing the approved tree preservation plans on site. All crews conducting arboricultural operations on site shall consist of at least one Certified Arborist who directly oversees all work by that crew. Arboricultural operations include, but are not limited to, pruning, tree protection device installation and maintenance (fence, matting, etc.), root pruning, air tool root excavation/exploration (SSAT), soil care activities, soil testing, mulch application, tree inspections, pesticide/chemical applications and tree removal. Special qualifications submittal is required for review and approval below. Contract Arborist will be sub-contracted by the general contractor or owner, at the owner’s discretion.

Tree Protection Area (TPA): Area of Critical Root Zone surrounding individual trees or groups of trees to be protected during construction.

Critical Root Zone (CRZ): Estimated area surrounding each tree based upon an industry standard “rule of thumb” of 1.5 feet of radius per inch of diameter at breast height (DBH). CRZ is described as the minimum area of tree roots required to be protected to maintain tree health and stability. Any impacts within the CRZ must be mitigated based on severity up to and including tree removal if the impact or disturbance is severe.

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Tree Protection Action Key (TPAK): Matrix provided on Plan sheets for each tree indicating designated protection and stress reduction measures specified in this document.

Supersonic Air Tool (SSAT): Hand held tool designed to focus highly compressed air (90-125 psi) provided from a large air compressor (185-375 cfm) at speeds close to 1400 mph at the tip of the tool. Widely used by arboricultural firms and consultants for multiple purposes including but not limited to: root collar investigation, CRZ investigation, root pruning (especially large roots > 1.5” diameter or were existing underground cables or conduits are located), radial mulching and restoration of compacted soils, excavation for utilities within protected CRZs to minimize root damage from constriction.

Crown Pruning: Action by the Contract Arborist of pruning specific tree limbs to improve tree health, reduce hazard, and / or provide construction clearance.

Supportive Cabling: Installation of supportive cabling for designated tree branches due to weak branch attachments.

Root Pruning: Action indicated TPAK to provide a more suitable cut for protected tree roots to minimize ripped or torn roots during excavations and grading with standard construction equipment. Various methods may be used.

Mulching of Trees: Application of a wood mulch product to areas surrounding designated trees. Mulch increases moisture-holding capacity, helps mitigate soil compaction, and increases needed soil organic composition.

Limits of Disturbance (LOD) (also called Limits of Construction): Specific outer limits of all construction activities for the entire project.

DBH (Diameter at Breast Height): Tree trunk diameter measured at 4.5 feet above grade.

314-2.1.2 Submittals. Submit a work plan for Transplanting palm trees. The work plan must include methods for lifting, transporting, storing, planting, guyling, and maintaining each tree to be transplanted. Include root ball size, method of root ball containment, and a maintenance program for each tree.

Maintaining existing planted areas adjacent to . The work plan must include weed control, fertilization, mowing and trimming of turf areas, and watering.

Product Data: For each type of product indicated.

Certification: For each phase, the Contract Arborist shall certify for each tree designated to remain has been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when dam-aged.

Qualification Data: For Contract Arborist Firm Qualifications, submit to the Engineer firm and individual qualifications as follows.

a. Submit a minimum of two resumes and detailed qualifications from staff or team individuals assigned to this project as detailed under Quality Assurance below.

b. Provide references for above from a minimum of three commercial, nongovernmental or governmental projects for whom similar tree preservation pro-grams have been successfully implemented. Include the following information: Project name, size and scope; Number of trees involved; Scope of services provided; and name and contact for project owner, designer, or contractor.

Pedestrian/Property Protection Plan: Contract Arborist to submit a written plan describing all protective measures proposed to be used to minimize potential impact to pedestrians, parked cars, workers and other public and private property. Protection measures shall be required for all on-site tree care activities including but not limited to Supersonic Air Tool excavation, root pruning, canopy pruning, etc.

Maintenance Prescription: Contract Arborist shall submit for care and protection of trees as a result of construction, changes in weather patterns or events, and response in health from individual trees during and after completing the Work.
Site Documentation: Submit reports to Contractor and Project Arborist at intervals determined by the Engineer containing complete documentation of all tree impacts and tree preservation activities including but not limited to: root pruning, tree protection fencing, excavation within critical root zones, tree fertilization or other treatments, etc. Documentation shall include tree numbers of trees impacted and/or treated. Photographic records are to be included as requested by the Project Arborist.

314-2.1.3 Quality Control and Assurance. Inspect for deficiencies of existing planted areas in the presence of the Engineer. Complete the inspection within 15 days after the start of job site activities. Deficiencies requiring corrective action include:

a. Weeds
b. Dead, diseased, or unhealthy plants
c. Missing plant stakes and tree ties
d. Inadequate plant basins and basin mulch
e. Other deficiencies needing corrective action to promote healthy plant life
f. Rodents and pests

On-site Arborist (individual) Qualifications. An arborist certified by the International Society of Arboriculture (ISA) and licensed in the jurisdiction where project is located. All work performed by Contract Arborist including any oversight and documentation work, shall be performed or directly supervised by at least one on-site arborist with these minimum qualifications.

Contract Arborist Firm Qualifications. Contract Arborist Firm shall comply with the following:

a. Established business with documented experience of at least five years.
b. Experience working on a minimum of three commercial, non-governmental or governmental projects where similar tree preservation programs have been successfully implemented.
c. Properly licensed and insured to perform arboricultural work in the jurisdiction where the project is located.

Provide names of each individual to comply with the following:

a. Certification by ISA (Certified Arborist or Board Certified Master Arborist) or Registered Consulting Arborist from the American Society of Consulting Arborists (ASCA)
b. Resumes should reflect combined 10 years full time experience on similar tree preservation projects.
c. Provide biographies with individual(s) names, certifications, and each anticipated role in this project. “Role(s)” shall be defined as one or more of the following: Project Manager, Technical oversight, Field Arborist / Technician.

Publications listed herein are part of this work to extent referenced:

a. ANSI A300 Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance
b. Part 1-2001, Tree Pruning;
c. Part 2-3004, Fertilization;
d. Part 3-2000, Cabling, Bracing, Guying of Established Trees;
f. ANSI Z133.1 - 1994 and most recent updates, Tree Care Operations - Safety Requirements

Fertilizer will be applied in strict accordance with the manufacturers label instructions and applicable federal, state, and local requirements. Fertilizer, soil conditioners, and applications must be approved by the Engineer prior to application. Material Safety Data Sheets (MSDS) will be available for fertilizers in the Contract Arborists’ possession while on the site.

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Pre-Construction Meeting: Conduct meeting at the project site prior to commencement of any project related site activities.

Contract Arborist, Project Arborist, and Contractors shall attend. As well, the local agency inspector or arborist as applicable.

Review methods and procedures related to tree protection and preservation including, but not limited to, the following:

a. Construction schedule - verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
b. Enforcement of requirements for tree protection areas
c. Responsibilities of all parties, including coordination, access and timing requirements
d. Field quality control

Prior to salvaging, boxing, moving, and relocating palm trees to new locations as shown on the Drawings, Contractor must have the project arborist conduct diagnostic testing of each palm to determine if the palms have Pink Rot, Sudden Crown Drop, or other disease that would impact or prevent their ability to survive the stress of the transplant.

Only palms identified by the arborist as viable for transplanting shall be transplanted. Palms must not be transplanted if they are too diseased and must instead be removed as described in the tree and stump removal section of these Special Provisions and following appropriate horticultural practices.

Contractors must have a minimum of 5 years of palm removal and planting experience. Contractor shall be responsible for the testing, removal, boxing, storage, transport, and installation of all palm trees.

Transplant palm trees from their exiting to the new locations shown on the Plans on the same day whenever feasible. Where this is not feasible, limit the storage time for salvaged, boxed palms at the project site to a minimum in order to prevent exposure to weathering, vandalism or damage from work of other trades. If temporary storage at the job site is not feasible, Contractor shall propose suitable off-site storage locations for approval by the Engineer. Damaged materials will be rejected. Remove all damaged materials from the job site immediately, and replace at no additional cost.

314-2.1.4 Project Conditions. The following practices are prohibited within all tree protection areas except as specifically indicated herein:

a. Storage or stockpiling of construction materials, chemicals, debris, or excavated materials
b. Parking vehicles, trailers or equipment
c. Unnecessary foot traffic
d. Erection of sheds or structures
e. Impoundment or discharge of water
f. Excavation or other digging unless otherwise indicated
g. Attachment of signs or other materials to, or wrapping materials around trees or plants unless otherwise indicated

Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

314-2.2 Materials.

314-2.2.1 Root Protection Mat. Root Protection Matting (RPM) geocomposite material comprised of a tri-planar geonet structure with thermally bonded nonwoven geotextiles on both sides.

Material shall be SynTec ROADRAIN T-7 or approved equal.
For short duration applications (1-2 pass/1 day or less), 3/4-inch plywood, AlturnaMATS, or approved equal; or 1-inch thick steel plates may be used in lieu of RPM.

Submit shop drawings / cut sheets and material samples for review by Project Arborist and the Engineer.

314-2.2.2 Trunk Protection Wrap. Trunk Protection Wrap: to provide specific protection to tree trunks when construction activities are expected to be in close proximity.

Material shall be SynTec ROADRAIN T-7 or approved equal.

Alternative methods and materials may be submitted for review.

314-2.2.3 Tree Protection Fence. Tree Protection Fence shall be galvanized steel chain-link fence fabric of 10-11 gauge wire fabric; 6 feet high; with 1.9-inch diameter line posts; 2-3/8-inch diameter terminal and corner posts; with tie wires, hog ring ties, gates, and other accessories for a temporary fence system.

314-2.2.5 Wood Chip Mulch. As specified under landscape materials section of these specification. Green chips or mulch aged less than 6 months shall not be used. Walnut mulch shall not be used.

314-2.2.7 Fertilizer and Soil Amendments. Fertilizer and soil amendment selection shall be based upon soil test results and recommendations.

314-2.3 Construction.
314-2.3.1 Remove Tree. All trees designated for removal shall be marked in red for review and approval by Engineer.

Mature trees shall be removed during the non-breeding season for birds, September through February. Mature trees shall be removed during daylight hours when roosting is not anticipated.

All trees designated for removal, shall be taken down sectionally, or directionally felled to minimize damage to adjacent tree canopies or root systems by a qualified Contract Arborist. Damage to adjacent trees shall be reviewed by Project Arborist and Engineer for remedial recommendations or replacement.

All work shall be done by hand, bucket truck or crane operated equipment.

Motorized equipment shall operate on existing pavement and not enter tree preservation areas without prior approval. Temporary root protection matting may be required for such access to prevent rutting and compaction.

Stumps shall be ground to 8” below grade and grindings raked and removed from site; backfill holes with approved topsoil and mulch per direction by the Engineer. Coordinate with underground utilities locators prior to grinding. All stump grinding shall be performed by the Contract Arborist. For tree pits where a new tree is proposed, the stump may be ground out completely (as determined by the Contract Arborist) to allow the pro-posed tree to be planted. Backfill as above. Only trees with stumps within deep excavations may have stumps removed by excavator. Stump excavation to be performed by Site Contractor and under the direct supervision of the Contract Arborist.

Removal of shrubs designated for removal for each phase shall be cut and stumps ground out or hand dug to remove stumps. Prior to removal, verify with the Engineer.

All debris generated by tree and stump/root removal shall be removed from the job site by the Contractor as part of his tree removal operation and no separate payment must be made. The area beneath the sidewalk, curb, gutter and street pavement section voided by removal of debris generated by stump/root removal shall be replaced with selected material.

Remove all wood debris from site promptly. All wood debris shall be removed each day unless directed otherwise by the Engineer.

314-2.3.2 Tree Preservation Measures.
314-2.3.2.1 General. Refer to the TPAK for specific measures determined for each tree.
Installation/implementation of the following measures shall be performed in the field by an ISA Certified Arborist as provided by the Contractor Arborist.

All work, substitutions and/or modifications shall be subject to review and approval by the Owner and Project Arborist.

All work shall conform to applicable federal, state and local regulations and industry standards.

The Contract Arborist shall be responsible for all items in this section.

314-2.3.2.2 Coordination of Temporary Tree and Plant Protection and Transplants. The work of the Contract Arborist coordination to include but not limited to the following:

Existing underground utility marker conflicts brought to the attention of the Contractor for resolution as well uncovered underground utilities as a result of work.

Coordinate necessary survey layout of proposed construction elements in order to provide accurate locations for tree protection measures.

Layout location of designated tree protection based upon proposed construction and methods of construction for that area.

Site walk with Project Arborist and the Engineer to verify location of all tree protection measures prior to execution.

Notify Engineer and Project Arborist if construction adjacent to tree protection does not appear to follow specifications or prior agreement or conflicts with tree protection seem eminent.

Coordinate with Engineer and Contractor for access of deliveries, crews, equipment, start up, and clean up of each item of work.

Provide “as built” of any change to location of tree protection.

Attend progress meetings as requested.

Provide submittals as required.

Notify Engineer and Project Arborist of any breach or damage to tree protection requiring attention.

314-2.3.2.3 Pruning and Supportive Cabling.

314-2.3.2.3.1 Tree Canopy and Clearing Pruning. Specific canopy pruning for tree health, risk reduction, and construction clearance per Plan documents.

Size, health, species, and impact from proposed construction will be taken into consideration in determining pruning type for each designated tree. Risk Reduction Pruning will remove dead, dying, and declining limbs 2-inch diameter and larger. No interior green branching including sprouts will be removed unless approved by Project Arborist.

Contractor, Contract Arborist, and Engineer shall meet at site to determine overhead clearance conflicts between trees and construction equipment/activities to prevent breakage, impacts, or aesthetic concerns. Project Arborist may be consulted if questions arise.

All work shall conform to ANSI A-300 arboricultural standards. An aerial assessment shall be made for all trees climbed to report any structural weakness of concern to the Project Arborist and Owner.

Prior to climbing any tree a risk assessment will be performed using visual, sounding, or basic drilling as needed by the Contract Arborist. Trees deemed high risk should not be climbed; alternative methods should be used and the tree reported to the Project Arborist and Owner immediately.

314-2.3.2.3.2 Support Cables. Supportive Cabling of weak unions may be recommended by the Contract Arborist if the need is discovered during pruning operations. ANSI Standards apply. Cabling may be included only if submitted to and approved by the Engineer.

314-2.3.2.4 Root Pruning. Purpose of the root pruning is to provide a more suitable cut so as to not rip or tear roots during excavations and grading with standard construction equipment. The exact location
and depth along the LOD or edge of utility excavation will be determined during the layout by an ISA Certified Arborist.

Root Pruning for urban sites with specimen trees or for transplanting requires the use of SSAT excavation for hand pruning. Refer to SSAT specifications in this section.

Sufficient moisture is necessary for reducing the level of dust, increase work efficiency, and provide a hospitable environment for the tree roots and pedestrians.

At a pre-work site inspection by the Contract Arborist more than 72 hours in advance of work start, subsurface probing to 24 inches to 36 inches with a tile probe or similar method will determine if sufficient soil moisture exists. If sufficient moisture is not found, immediate coordination with the site managers shall be made to irrigate the proposed work areas. Methodology may be soaker hose, sprinklers, soaker cans with small drilled holes to release water slowly or other methods. A second follow up inspection shall be made to determine final sufficiency to begin.

All root pruning operations shall be performed by the Contract Arborist and directed in the field by an ISA Certified Arborist with documented experience in similar SSAT excavation and root pruning.

314-2.3.2.5 Tree Protection Fence. Type and placement of fence per details.

Attach tree protection area signs at 30-foot spacing facing construction LOD. For fence lower than 6 feet in height, attach minimum 3 strips glow-flagging 2-inch long for each fence panel.

Tree protection area signs shall be high visibility and all weather to last the duration of the project / phase. Phone number of responsible contact person shall be included on sign.

Install after root pruning if shown, and prior to demolition, clearing and excavation.

Install at 6-inch to 12-inch outside (construction side) of the Root Prune line or within the Root Prune trench.

Silt fence will be outside (construction side) the tree protection fence. Trenchless installation method shall be employed per Detail if Root Protection Matting is designated.

Exact placement of fence will be determined in walk through with Contractor, Project Arborist, Contract Arborist, and Engineer.

Sequencing of the tree protection fence will be determined during the initial site walk. In any case, no construction activities shall occur in each phase or section until approved protection is installed.

314-2.3.2.6 Root Protection Mat (RPM). The purpose of the RPM is to reduce compaction, rutting, and contamination of soils and root systems of trees to be retained should staging, temporary stockpile, or equipment access be required within the CRZ areas due to extreme site constraints.

RPM shall be used for all access within CRZ areas of trees to remain. Matting is not required where existing pavement or concrete will remain undisturbed.

Trees anticipated receiving temporary or repetitive materials staging, footing traffic, or equipment access within protected root zone are to receive RPM. Wood chip mulch 12-inch shall be installed under matting to further protect soils and roots.

If short duration access is needed, such as one day or less, the use of "AlturnaMATS", ¾" plywood, 1-inch steel plate, or approved alternative may be needed to avoid rutting and compaction. These materials may be shifted and re-used as work progresses.

All-weather staging, stockpile, or other repetitive construction operations may require 12-inch stone layer over RPM to allow heavy vehicles have the potential to cause dynamic compaction yet without rutting original surface soils and roots. In this situation, the stone may be contained by silt fence or super silt fence where adjacent to or within a TPA.

All temporary RPM areas to be used beyond a single day or beyond continuous on site supervision of the Contract Arborist shall be surrounded by temporary tree protection fence as per specifications. For
temporary staging of soils beyond 24 hours “trenchless” silt fence fabric shall be in-stalled on the lower /
downhill side or as directed by the Project Arborist.

If a Silt Fence is required for Erosion Control in RPM areas, installation of silt fence shall be
coordinated with the Contract Arborist and must be performed by the Contract Arborist to prevent damage
to tree roots from trenching operations. Erosion control socks may be used in lieu of silt fabric if approved
by the Engineer.

314-2.3.2.7 Trunk Protection Wrap. Temporary trunk protection to cover the root flare and up to 12' height,
or to the scaffold branches, or as determined for the situation.

Tree trunk (or limbs, as determined by Project Arborist) shall be wrapped with geocomposite material.
More than one layer may be installed to reach suitable protection from the equipment or operations
designated for work in the area. Attach with banding or strong tape that will not girdle the tree during the
project timeframe. No nails or other devices are to penetrate the trunk.

Wrap shall be removed promptly after construction is complete.

314-2.3.2.8 Excavation (Tree Protection Area)
314-2.3.2.8.1 Hand Excavation within Tree Protection Areas. For excavation within CRZ areas of
trees to remain, the intent is to minimize tree and root damage from excavation activities.

Excavation shall be performed using SSAT, hand tools (shovels, etc), or other approved non-
damaging method. Roots shall not be damaged by the excavation except for approved root pruning.

Refer to “Supersonic Air Tool Excavation” and “Construction Oversight by Arborist” specifications in
this section for additional requirements.

All work shall be directly supervised by ISA Certified Arborist (provided by the Contract Arborist) in
collaboration with the Owner’s trades and sub-contractors.

RPM shall be installed along trench sides to allow for temporary soil stockpile and access.

Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the
plans. Roots shall be uncovered and care taken to avoid damage to roots and bark.

Contract Arborist shall prune the exposed roots. Excavation shall not ex-tend beyond the line where
roots were pruned.

Contractor may proceed with conventional excavation methods or with hand excavation methods if
 clearance to the tree is inadequate for equipment access.

No roots may be cut by the contractor.

314-2.3.2.8.2 Supersonic Air Tool (SSAT) Excavation. Refer to “Hand Excavation within Tree
Protection Areas” specification in this section for additional requirements.

At a minimum, all SSAT work shall include the use of a barrier system such as temporary walls or
tents to protect property and pedestrians from flying debris.

Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the
plans. Roots shall be uncovered and care taken to avoid damage to roots and bark.

Excavation shall proceed per the “Hand Excavation within Tree Protection Areas” specification in this
section.

314-2.3.2.8.3 Special Demolition of Hardscape within Tree Protection Areas. Sidewalks and other
hardscape items to be removed from within Tree Protection Areas (TPAs) shall be removed under direct
supervision of the Contract Arborist. Site restoration, if required, shall also be supervised by the Contract
Arborist.

No mechanized equipment shall enter the TPAs. All work shall be either done by hand (with hand-
operated equipment such as jackhammers) or with equipment staged outside the TPA. Alternatives for
specific situations shall be reviewed by Project Arborist and Engineer.
Sequence of work shall be reviewed and coordinated with the work of the Contract Arborist by the construction manager, contractor, Contract Arborist, Project Arborist, Engineer, and owner as appropriate for the project. Methods of protection of overhead branches, trunks, and roots shall be reviewed. Refer to specifications for approved methods of temporary wrapping, or selective pruning.

Small equipment may operate upon existing hardscape or upon designated root protection matting if approved by the Project Arborist and Engineer. All staging or stockpiling of materials shall occur outside the TPA.

Demolition of paving shall not damage protected roots outside the limit of work nor below existing hardscape. Approved options include jack-hammer and pick up by hand or break up by small excavator operating upon existing hardscape. Once hardscape is removed, no equipment shall operate upon stone base unless inspected and approved by arborist as roots may have grown into base below hardscape.

Refer to “Hand Excavation within Tree Protection Areas” and “Super-sonic Airtool Excavation” specifications in this section.

314-2.3.2.8.4 Excavation for Proposed Sidewalk within Tree Protection Areas. Excavation for site preparation shall be done by SSAT or by hand.

Excavation shall be done under direct supervision by the Contract Arborist.

Excavation for base preparation shall not damage tree roots, trunks or branches. Areas shall be assessed for overhead clearance prior to commencement.

Excavation shall be the minimum necessary to achieve the required grades for the new sidewalk section. Sidewalk section and required grades shall be determined by the Engineer.

Compaction of the new aggregate base shall be the minimum necessary as dictated by the Engineer.

Refer to “Hand Excavation within Tree Protection Areas” and “Super-sonic Airtool Excavation” specifications in this section.

314-2.3.2.8.5 SSAT Landscape Planting Excavation. Proposed landscape planting within critical root zones within TPAs shall be reviewed by the Contract Arborist, Contractor, and Engineer in the field to determine potential for damage to priority roots of select trees and layout the limit of work.

Pre-watering of the proposed areas of excavation during summer and fall months is recommended to maintain root / soil moisture.

The Contract Arborist shall provide a qualified arborist crew experienced with the SSAT and landscape planting excavation to protect adjacent natural resources and construction work, open the excavation, hand prune minor roots, and identify and protect priority roots to remain. Coordination with the appropriate sub-contractor shall be made to determine appropriate width, depth, and sequencing.

314-2.3.2.9 Wood Chip Mulch. Mulching for the duration of construction for protection and stress reduction. Mulching will increase moisture-holding capacity, minimize soil compaction, and increase needed organic composition.

Mulch area options:

a. For individual trees designated on the TPAK within the TPA or curvilinear TPA install mulch to a radius equal to trunk diameter inches equated to mulch ring diameter in feet (24-inch trunk diameter = 24-inch diameter mulch ring). Where planting pit areas are restricted by hardscape or other restrictions, mulch the greatest area possible.

b. Where planting pit or tree lawn areas are restricted by hardscape or other restrictions, mulch the greatest area possible.

c. Either option may be used as appropriate for the area.

For privately owned trees, any installation is contingent upon receipt of owner’s permission. Owners may decline.
Motorized equipment shall not enter the TPA unless specifically approved by the Project Arborist and specific conditions met (RPM, AlternaMATS, or approved equal etc). Any such motorized equipment shall be operated by a certified arborist while inside the TPA.

Do not allow mulch to contact trunk/ root flare.

Mulch depth shall be 3-inch to 4-inch.

Mulch shall remain for the duration of construction and may remain permanently if the owner approves.

If the mulch is to be removed after construction, it must be removed by hand only. No equipment may be used.

**314-2.3.2.12 Overhead Clearance.** Trees to remain shall be assessed prior to construction for overhead clearance for construction activities. Contract Arborist shall recommend either canopy pruning, temporary guying/tying of select limbs, or alter-native construction methods.

Pruning for clearance shall not remove branches above 12 foot or over 6 foot diameter.

All pruning proposed by the Contractor and/or Contract Arborist shall first be reviewed and approved by the Owner and Project Arborist.

Equipment exhaust should be directed away from trees as much as possible. Stationary equipment shall not exhaust directly under or towards trees.

Contractor shall use appropriate equipment near trees to ensure that trees are not damaged by construction. Contractor shall provide any specialized equipment needed at no additional cost to the owner.

Any pruning shall also conform to the pruning specifications in this section.

**314-2.3.3 Transplant Palm Tree.** Contractor is responsible for proper relocation, storage (if necessary), testing, monitoring, maintenance, watering, and fertilizing of all palm trees. Transplanting two palm trees at the open space at E12th and 2nd Avenue shall include salvaging of irrigation parts, modifications and adjustments to the existing irrigation system and the reinstallation and reconnection of irrigation system parts at the new palm tree locations.

Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information for any products used in transplanting palm trees.

Workers assigned to this work must be tooled and trained to perform the transplanting, storage (if necessary) and maintenance of the palm tree species subject to relocating. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.

Submit for acceptance and approval by the Engineer and Project Arborist a detailed watering schedule and procedure specific to the species of transplanted palm trees and local site and climatic conditions.

All palm trees identified in the Plans for relocation must be set plumb and roots at proper finished grade. If any palm begins to lean due to settling or for any other reason, necessary adjustments must be made by the Contractor to straighten it as soon as possible. Any adjustments necessary to straighten palms must be made by the installation contractor at no charge to the City within 12 months after planting.

Ensure the planting hole has proper drainage. Inform Engineer if conditions are detected that inhibit to optimal health and rigorous growth.

Do not proceed with digging of drainage sumps under palm trees until verification has been completed that no conflicts exist between underground utilities and holes for drainage sumps. If no conflicts with underground utilities are found, proceed with construction of drainage sumps to the depth indicated on the Plans.
Drainage within the root zone must be monitored by determining the presence or absence of water at the bottom of drainage inspection tubes installed below the bottom of the rootball. No standing water must be present in the tube.

If standing water is discovered, its depth below grade must be recorded, all water must be pumped out and watering schedule adjusted to prevent reoccurring standing water.

Contractor must monitor the following: Soil moisture content, Drainage (inspection tubes) and make adjustments as required.

Contractor must monitor the soil moisture content and make adjustments to the approved palm tree watering or irrigation schedule as required.

Contractor shall be responsible for fertilization and complete maintenance of palm trees.

The soil surrounding the bases of palms must be maintained clear of groundcovers and weeds to a distance of 18 inches.

All weeds must be hand pulled. The use of herbicides for a radius of 12 feet. is not allowed. Contractor must provide Fungicide applications as required.

No additional soil may be added over the rootball or the backfill sand.

Injury of any kind to the trunks or bases of palms must be avoided.

The leaves should be untied 6 to 8 weeks after installation, or at the commencement of the rainy season, whichever comes first.

Contractor must ensure that the re-established irrigation system (only applicable to the two transplanted palm trees at the open space) conforms to the recommendations detailed in the installation specifications. During the establishment period, only the drip system must be activated. The bubbler system will not be used until after the palms become established in their new locations.

Water from spray heads, which may be irrigating other nearby plants, must not be allowed to strike the trunks or bases of the palms.

The palms must not be pruned during the establishment period other than to remove dead and broken leaves as they may periodically appear. Live leaves must not be removed. (Removal of dead and broken leaves is necessary only for appearance and hazard reduction, not for the health of the palms.)

When leaves are removed, they must be cut back to the level from which they emerge. All inflorescences (flower and fruit stalks) must also be removed at that time. If inflorescences cannot be removed in their entirety, as much should be removed as possible.

The spear leaf in the center of the crown must never be pruned or disturbed in any way as serious decline or death of the palm can result.

If pruning is scheduled at the same approximate time as a fungicidal spray application, the pruning must be completed first. This will allow more thorough spray coverage and will help protect pruning wounds from infection.

Before pruning any individual tree, sterilize all pruning tools by soaking them in a solution of 1 part Clorox bleach and one part water for a minimum of 5 minutes. All portions of cutting blades must be submerged. Non-mechanized pruning tools or reciprocal saws with replaceable blades are recommended. Chain saws may not be used without additional specifications for tool sterilization and written permission from the project palm specialist.

It is imperative that all pruning tools be sterilized each time before pruning each individual tree. Non-sterilized pruning tools can transmit Fusarium wilt, a disease that is both fatal and incurable.

Do not use climbing spurs on palm trees for pruning or for any other reason. If the crown of a palm tree cannot be reached by an aerial lift trunk or device, it should be climbed with the aid of a ladder, with both the ladder and the climber securely tied in. There are also climbing techniques that involve the use of climbing lines in such a way that neither ladders nor spurs are necessary.
Any pruning operations, which are not specified above, must adhere to the general recommendations of the following publications:


314-2.3.4 Field Quality Control and Monitoring.

314-2.3.4.1 Tree Condition Monitoring. An ISA Certified Arborist (provided by the Contract Arborist) shall perform monitoring twice per month year round to monitor insects, disease, soil moisture levels, weather, and health changes on all trees designated on Tree Protection Action Key.

The monitoring will include a report that details problematic areas that have been addressed, treatments provided to reduce the problem, and anticipated treatments forecast for 30 days. This report will be forwarded to the Project Arborist, Engineer and Owner for documentation.

Any treatments recommended by the Contract Arborist not already included in the project scope shall be noted in the reports for review by the Project Arborist and Engineer. No additional work is to be performed unless approved in writing by the Engineer.

314-2.3.4.2 Contract Arborist (Construction Oversight). Any work within CRZs of retained trees shall be directly supervised by the Contract Arborist.

If roots are encountered during excavations, work shall progress as directed by the Contract Arborist. Contract Arborist, in coordination with the construction and design teams, shall determine appropriate means and methods to address the roots. Options may include, but not be limited to, severing the roots, hand or SSAT excavation. Contractor shall not cut roots.

Refer to “Hand Excavation within Tree Protection Areas” specification in this section.

All work shall be documented thoroughly, including photo documentation. Refer to site documentation submittal requirements.

314-2.3.5 Contractor Damages and Penalties

314-2.3.6 Remedial Measures. Any damage caused to the trees by the work of this contract through negligence by the contractor shall be immediately remedied by the contractor. Contractor shall be responsible for any associated costs.

Remedial work may include pruning, cabling, or any other measures up to and including removal and replacement, as determined by the Project Arborist and Engineer.

Remedial work shall be performed by the Contract Arborist, as approved by the Project Arborist and Engineer.

All required remedial work shall be performed to the satisfaction of the Project Arborist and Engineer, at no additional cost to the owner.

314-2.3.7 Tree Replacement. If a new tree sustains damage after it was planted due to Contractor's tree preservation related activities follow replacement procedure described in Section 308-6. If an existing tree identified as to-be-protected on the Plans is damaged or in poor health, as determined by the Project Arborist and Engineer, the tree must be replaced with a new tree of equal size caliper and species as that of the damaged tree. Replacement shall occur within one month after determination of the condition by the Project Arborist and Engineer.
If a replacement tree of equal size caliper is not possible as determined by the Project Arborist and Engineer, it shall be replaced on an inch for inch basis with new trees of a minimum caliper size of 2-inch to 3-inch.

If the damage or poor health of the tree are the result of negligence by the Contractor as determined by the Project Arborist and Engineer, replacement trees shall be supplied and installed at no additional cost including all incidental costs including the costs of inspection of the tree at the nursery and any other incidental costs associated with tree replacement.

314-2.4 Payment. The following items will be paid for at the contract unit price for completed and/or installed units, based on the units outlined below. Unit prices shall include all materials, equipment, tools, labor, transportation, traffic control, operations and all work incidental thereto, including the removal of debris, except as specifically noted.

a. Wood Chip Mulch: per tree installed.
b. Tree Protection Fence: per linear foot installed, including appropriate signage and markings.
c. Root Pruning: Mechanical root pruning: per each tree completed.
d. Tree Canopy and Clearance Pruning: per each tree completed
e. Support Cables: per each tree requiring cables
f. Contract Arborist (Construction Oversight): per each tree requiring the arborist on-site
g. Excavation (Tree Protection Areas): included within Root Pruning
h. Root Protection Mat: per each tree installed (plywood)
i. Trunk Protection Wrap: per each tree completed
j. Transplant Palm Tree: per each tree transplanted (includes palm testing)
k. Remove Tree: per each tree removed

314-3 RELOCATE AND MAINTAIN EXISTING IRRIGATION FACILITY.

314-3.1 General. All Irrigation work within the Cities of Oakland and San Leandro Right of Way.

314-3.2 Project Conditions. Except for materials indicated to be stockpiled or to remain the Owner’s property, Cleared materials are the Contractor’s property except for materials indicated to be stockpiled, salvaged, relocated, or to be maintained. Remove cleared materials from site and dispose of in lawful manner.

Protect open irrigation excavations, trenches, and the like with fences, covers and railings to maintain safe pedestrian and vehicular traffic passage.

314-3.2.1 Salvageable Improvements. Carefully remove irrigation components indicated to be salvaged or relocated and store where indicated on plans or where designated by the Engineer. Avoid damaging materials designated for salvage or relocated. Damaged materials shall be replaced at the Contractor’s own expense.

314-3.2.2 Unidentified Materials. If unidentified materials are discovered, including hazardous materials that will require additional removal other than is required by the Contract Documents, immediately report the discovery to the Engineer. If necessary, the Engineer will arrange for any testing or analysis of the discovered materials and will provide instructions regarding the removal and disposal of the unidentified materials.

314-3.3 Preparation and Restoration. The Contractor shall be required to repair and or replace all disturbed or damaged irrigation components to 100% operational. Contractor shall ensure that all reconnections (water and power) have been tested and approved by the Engineer prior to backfilling. Prior to final acceptance and during the maintenance period specified, the Contractor and Cities’ Representatives shall meet to engage each and every irrigation system within the Project limits that has been disturbed including the area that these irrigation systems encompass both within and adjacent to

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this project. The Contractor shall ensure that each system has been returned to a fully operational and functional system and that any deficiencies have been corrected. All work shall comply with these Plans and Special Provisions.

Protect-in-place existing irrigation components to remain during construction.

314-3.4 Existing Irrigation Systems. Locate, identify, disconnect, and seal or cap off irrigation components indicated to be removed or abandoned. Prior to demolition or relocation, contact Underground Service Alert.

Arrange to shut off irrigation utilities with EBMUD or verify that utilities have been shut off.

314-3.4.1 Existing Irrigation. Do not interrupt irrigation systems servicing areas within or adjacent to the Project limits unless authorized in writing by the Engineer and then only after arranging to provide temporary irrigation services according to requirements indicated.

Coordinate water interruptions with EBMUD.

Do not proceed with irrigation interruptions without the permission of the Engineer. Notify the City/Owner affected three working days prior to utility interruptions.

314-3.4 Site Improvements. Remove existing above-grade and below-grade irrigation components as indicated and as necessary to facilitate new construction.

314-3.4.1 Backfill. Place and compact material in irrigation excavations and depressions remaining after site clearing in conformance with Section on Trenching and Backfill.

314-3.4.2 Dust Alleviation And Control. Contractor shall be responsible for and shall provide pollution and dust abatement and control measures satisfactorily during the course of the work.

The Contractor shall utilize reclaimed water, or dust palliatives, if necessary for compliance with both Cities’ Water Conservation Ordinance.

314-3.4.3 Finish Operations and Disposal. Remove surplus obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Owner’s property.

Surplus materials and construction debris remaining upon completion of the work shall become the property of the Contractor unless otherwise specified herein or noted on the plans, and shall be removed from the work site by the Contractor and disposed of off-site in a lawful manner.

314-3.5 Payment. The price paid per lump sum for Maintain Existing Irrigation Facilities and Relocate Irrigation Facilities shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in relocating and maintaining existing irrigation facilities, salvaging and disposing of excess material, protecting in place existing irrigation facilities, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer.

ADD NEW SECTION 315 TO READ:

SECTION 315 - PRECAST ARCHITECTURAL PAVERS

315-1 GENERAL.

315-1.1 References. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

American Society of Testing Materials (ASTM):

ASTM C 936-08, Standard Specification for Interlocking Concrete Paving Units (section 4.2 exempt)
ASTM C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units
ASTM C 136, Method for Sieve Analysis for Fine and Coarse Aggregate
ASTM C 33, Specification for Concrete Aggregates

OCTOBER 2015
ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction

ASTM B308-10 for Aluminum-Alloy 6061-T6 Standard Structural Profiles

315-1.2 Delivery, Storage, and Handling. Pavers shall be carefully packed and loaded for shipment and all necessary precautions taken against damage in transit and handling. Pavers damaged in any manner will be rejected and shall be replaced with new materials at no additional cost to the Owner. Sand shall be protected with waterproof covering to prevent exposure to rainfall or removal by wind. Secure the covering in place. Aggregate materials shall be kept dry and free from soiling.

315-1.3 Environmental Conditions. Do not install sand or pavers during heavy rain.

315-1.4 Field Mock-Up. Prior to placing orders for the full quantities of precast, permeable concrete unit pavers specified below, the Contractor shall construct an 8 foot x 8 foot minimum test panel adjacent to and in coordination with test panels for the approval of adjacent stamped concrete treatments in medians. This is intended to allow the Engineer to provide final confirmation of all material and color choices.

Contractor shall construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer. Contractor shall only proceed with placing a final order for the approved type and color of precast, permeable concrete unit pavers and their installation after having received final approval by the Engineer of a successfully executed test panel. All executed precast, permeable concrete unit pavers installation throughout the project shall match the approved test panel. The accepted panel shall become the standard for the entire job and shall remain undisturbed until completion of all precast, permeable concrete unit paving.

315-2 MATERIALS.

315-2.1 Concrete Unit Pavers. Concrete Unit Pavers shall be:

1. Permeable Paver: 6 inch by 9 inch by 2.375 inch thick, "Rustic Cobble Large" HYDRO-FLO color B10 Tahoe Granite (Charcoal) as manufactured by Pacific Interlock Pavestone, Inc., or approved equal.

2. Pavers shall meet the requirements of ASTM C936-08.

3. Pavers shall have an average compressive strength of 8,000 psi and minimal compressive strength of 7,200 psi per individual unit.

4. Permeable Pavers shall allow in excess of 3 inches of water per hour to pass directly through the paver.

315-2.2 Crushed Stone Filler, Bedding Course and Base for Permeable Paver. Crushed stone with 90% fractured faces, LA Abrasion < 40 per ASTM C 131, minimum CBR of 80% per ASTM D 1883. Do not use rounded river gravel.

All stone materials shall be washed with less than 1% passing the No. 200 sieve.

Joint/opening filler and bedding shall conform to ASTM D 448 gradation as shown in Tables 1 and 2 below. No. 89 or finer gradation may be used to fill permeable pavers with narrow joints.

Table 1: Bedding Course and Joint/Opening Filler - ASTM No. 8 Grading Requirements

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>% Passing</th>
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<tbody>
<tr>
<td>12.5 mm (1/2 in.)</td>
<td>100</td>
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<tr>
<td>9.5 mm (3/8 in.)</td>
<td>85 to 100</td>
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<tr>
<td>4.75 mm (No. 4)</td>
<td>10 to 30</td>
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<tr>
<td>2.36 mm (No. 8)</td>
<td>0 to 10</td>
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<tr>
<td>1.16 mm (No. 16)</td>
<td>0 to 5</td>
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</table>

Table 2: Permeable Aggregate Base - ASTM No. 57 Grading Requirements
Sieve Size | % Passing  
---|---
37.5 mm (1 1/2 in.) | 100  
25 mm (1 in.) | 95 to 100  
12.5 mm (1/2 in.) | 25 to 60  
4.75 mm (No. 4) | 0 to 10  
2.36 mm (No. 8) | 0 to 5

Color of crushed stone filler shall be close match to the paver color, and shall be approved by the Engineer.

Crushed stone filler shall be supplied by a single source. Source of supply shall not be changed during course of project without written permission of the Engineer.

**315-2.3 Aluminum Edge Restraints.** Aluminum edge restraints between planting areas and concrete unit pavers in medians shall be Curv-Rite, 4000 Series Heavy Duty, or approved equal, "L"-shaped aluminum edge restraint, 3-inch high by 3-inch base, with a natural aluminum finish as manufactured by Curv Rite, or approved equal. "L" shaped aluminum sections shall conform to ASTM B308-10 for Aluminum-Alloy 6061-T6 Standard Structural Profiles. 3 inch aluminum splicers shall be used to create an uninterrupted edging system that has a continuous support surface on both sides of the vertical wall. Edging base shall have holes along its length for receiving 3/8-inch by 10-inch steel spikes. Install edge restraint system as per manufacturer’s recommendation.

**315-2.4 Water.** Water shall be potable and shall be free of injurious contaminants.

**315-3 CONSTRUCTION.**

**315-3.1 Acceptability Of Base for Permeable Pavers.** Contractor shall verify that base is dry, uniform, even, free of any sediment (if open-graded), and ready to support bedding, pavers and imposed loads.

Verify gradients and elevations of base are correct. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved. Compact subgrade to 85% relative compaction. Do not overcompact. Evidence of inadequate compaction of subgrade, aggregate base or overall grades shall be brought to the immediate attention of the Engineer.

Beginning of installation means acceptance of base and edge restraints.

**315-3.2 Installation of Permeable Pavers.** Spread the leveling course aggregate evenly over the compacted, dense-graded base course and screed uniformly to 1 inch to 1 1/2 inch thickness. The screeded aggregate should not be disturbed. Place sufficient aggregate to stay ahead of the laid pavers.

Ensure that pavers are free from foreign materials before installation.

Where required, install aluminum edge restraints as per manufacturer’s recommendations.

Lay pavers in the pattern and alignment shown on the Plans and as established by the approved mock-up. Maintain straight pattern lines where applicable.

Joints between the pavers shall be between 1/16 inch and 1/8 inch wide.

Fill gaps at the edges of the paved area with cut pavers or edge units.

Cut pavers to be placed along the edge with a double-bladed splitter or masonry saw.

Compact and seat the pavers into the screeded bedding using a low amplitude, 75-90Hz plate compactor capable of at least 5,000 pounds centrifugal compaction force. Note: A rubber or neoprene pad between the compactor and grids may be necessary to prevent cracking or chipping.

Vibrate and compact the pavers again, sweeping the small fraction of the No. 8 aggregate into the joints and openings until it is within 1/2 inch from the top surface. This will require at least two or three passes with the compactor. Do not compact within 3 feet of the unrestrained edges of the paving units.
315-3.3 **Joint Treatment for Permeable Pavers.** Joints between pavers shall be hand tight and uniform in thickness. Joint thickness shall not exceed 1/8 inch.

315-3.4 **Cleaning.** After completion of concrete unit paver work, paved areas shall be thoroughly swept clean and surface shall be left unsoiled. Where required, surface shall be cleaned with water or an approved cleaner.

315-3.5 **Measurement and Payment.** Precast architectural paver work will be paid at the contract unit price for each square foot of precast architectural pavers. The Contract Unit Price shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all work involved in constructing precast architectural paving, including bedding course, permeable base course, and metal edging, complete in place, as shown on the plans, as specified in the Standard Specification and these Special Provisions, or as directed by the Engineer. No separate payment shall be made for sample or mock-up panels.

ADD NEW SECTION 316 TO READ:

**SECTION 316 - OFF PLATFORM WAYFINDING SIGNAGE**

316-1 **GENERAL**
316-1.1 **Description.** Off-Platform Wayfinding signage for this project is modeled after the Metropolitan Transportation Commission’s Regional Transit Wayfinding Guidelines and Standards, 2012. In addition, the project calls for the installation of station identification signs that include Braille and raised letters.

316-1.2 **Cross Reference.** All off-platform wayfinding signage shall follow the specifications described in Division 3.1, Section 10 14 00.

316-2 **MEASUREMENT AND PAYMENT.** Off-Platform Wayfinding Signage shall be paid as lump sum that shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Off-Platform Wayfinding Signage, and related incidental work.

ADD NEW SECTION 317 TO READ:

**SECTION 317 – STAMPED ASPHALT**

317-1 **GENERAL.** Stamped asphalt shall comply with Division 2.2, Section 39-8.

317-2 **MATERIAL.** Materials for stamped asphalt shall comply with Division 2.2, Section 39-8.02.

317-3 **CONSTRUCTION.** Construction for stamped asphalt shall comply with Division 2.2, Section 39-8.03.

317-4 **PAYMENT.** Stamped Asphalt shall be paid as square feet that shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in stamping and coating the existing and new asphalt pavement at locations marked in the field by the Engineer, per these special provisions, and as directed by the Engineer.

ADD NEW SECTION 318 TO READ:

**SECTION 318 – PERVERSIOUS CONCRETE PAVEMENT**

318-1 **GENERAL.** Stamped asphalt shall comply with Division 2.2, Section 40-5.

318-2 **MATERIAL.** Materials for stamped asphalt shall comply with Division 2.2, Section 40-5.02.

318-3 **CONSTRUCTION.** Construction for stamped asphalt shall comply with Division 2.2, Section 40-5.03.

318-4 **PAYMENT.** Pervious Concrete Pavement shall be paid as square feet that shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in pre-installation meeting, protection of existing improvements, weather limitations, subgrade preparation, base installation, batch and mixing, and delivery, formwork, placement of pervious concrete, finishing, jointing, curing, protecting and cleaning, per these special provisions, and as directed by the Engineer.
PART 4 -- ROCK PRODUCTS

SECTION 400 – ALTERNATE ROCK PRODUCTS, ASPHALT CONCRETE, PORTLAND CEMENT CONCRETE AND UNTREATED BASE MATERIAL

400-4 ASPHALT CONCRETE.
REVISE SUBSECTION 400-4.1 TO READ:
400-4.1 General. Asphalt concrete shall be mixture of mineral aggregate and paving or liquid asphalt mixed at a central mixing plant.

This material will be designated by the type of asphalt concrete, class and grade i.e., “III-B2-PG 64_10. Unless otherwise specified on the plans or in the Special Provisions, III-B3-PG64-10 shall be used.
PART 5 - SYSTEM REHABILITATION

SECTION 500 - PIPELINE

500-1 PIPELINE REHABILITATION.
500-1.1 Requirements.
ADD THE FOLLOWING PARAGRAPH TO THE END OF THE SUBSECTION.
Refer to 7-11 for requirements regarding patent fees or royalties.

REPLACE SUBSECTION 500-1.1.2 TO READ:
500-1.1.2 Submittals. Ten days prior to the start of construction, the Contractor shall provide the following submittals in accordance with the requirements of 2-5.3. The Contractor shall prepare and submit for the Engineer's approval a detailed description of the pipe rehabilitation method, including, but not limited to, materials and equipment, lateral reconnection procedure and materials, operation plan, work schedule, contingencies for conflicting utilities, etc. The shop drawings shall include the location, rehabilitation method, and, when applicable, any bypass locations with sufficient detail to assure that the work can be accomplished without sewage spill. All submittals required by these specifications shall meet the requirements as shown on the Plans and in the Specifications.

The submittals shall contain:

1. Detailed description of the system and procedures including, but not limited to, pipe and fittings, lateral reconnection, sewage bypass system, trench dewatering system, protection of utilities, and any other work of temporary nature not a part of the permanent work or improvement.
2. Manufacturer's literature describing in detail the rehabilitation method procedures to be followed.
3. Shop drawings, catalog data, and manufacturer's technical data showing complete information on, but not limited to, pipe and fitting, materials composition, physical properties, launch and exit pits locations, and manufacturer's recommendation for handling, storage, and repair of rehabilitation materials and fittings if damaged.
4. Documentation summarizing the experience, qualifications, and references including the project superintendent, foreman, and machine operator.

500-1.1.4.c Sewer Flow Control.
500-1.1.4.c.1 General.

- The Contractor shall provide sewer flow control when
  a. sewage flow depth in the pipe upstream of the manhole section being worked is above the maximum allowable for television inspection, or
  b. when it is necessary to accomplish the specified sewer line work.
- Such sewer flows shall be reduced to the required level by plugging or blocking of the flow, and by pumping the flow around the section being worked.
The flow depth sizes as measured in the manhole shall not exceed that shown below for the respective pipe sizes when performing CCTV television inspection, joint testing and sealing.

<table>
<thead>
<tr>
<th>Pipe Dia</th>
<th>Max. Flow Depth</th>
<th>Pipe Dia</th>
<th>Max. Flow Depth</th>
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<tr>
<td>6 in</td>
<td>1.20 in</td>
<td>21 in</td>
<td>5.25 in</td>
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<td>8 in</td>
<td>1.60 in</td>
<td>24 in</td>
<td>6.00 in</td>
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<td>10 in</td>
<td>2.00 in</td>
<td>27 in</td>
<td>8.10 in</td>
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<td>12 in</td>
<td>3.00 in</td>
<td>30 in</td>
<td>9.00 in</td>
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<tr>
<td>15 in</td>
<td>3.75 in</td>
<td>33 in &amp; up</td>
<td>30% of Pipe Dia</td>
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<tr>
<td>18 in</td>
<td>4.50 in</td>
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</table>

The Contractor shall submit a plan for bypassing sewage around the work area and facilities where sewage flows shall be interrupted to carry the work. This bypass plan will be reviewed by the Engineer and shall be acknowledged as acceptable before any construction commences.

500-1.1.4.c.2 Plugging, Blocking and Pumping. When sewer flow control is required, the Contractor shall furnish, install and operate pumps, plugs, conduits and other equipment to divert the sewage flow. The plug shall be so designed that all or any portion of the sewage can be released. This plug shall be provided with a tag line.

The pumping system shall be of sufficient capacity to handle the existing sewage flow plus additional flow, which may result because of a rainstorm. If pumping is required on a 24-hour basis, the pump engines shall be equipped in a manner to keep noise to a minimum. Standby pumps shall be provided as required. The Contractor shall provide bypass pumping in such a manner as to not damage public or private property nor create a nuisance or health menace. The pumped sewage shall be enclosed in a hose or pipe and shall be reinserted into the sanitary sewer system. Sewage shall not be allowed to free flow in gutters, streets or over sidewalks, etc. No sewage shall flow into storm inlets or conduits. After the construction work has been completed, the sewage flow shall be restored to normal.

500-1.1.4.c.3 Payment. Payment for sewer line cleaning, debris removal and sewer flow control shall be included in the price paid for other pipeline work.

500-1.1.6 Sampling, Testing and Installation.
ADD THE FOLLOWING THREE PARAGRAPHS TO THE END OF THE SUBSECTION:

Prior to beginning work, Contractor shall clean sewer pipe of any obstruction and debris including roots in accordance with 500-1.1.4. The Contractor shall provide pre-rehabilitation CCTV inspection in accordance with section 500-1.1.5. Point Repairs, if required, shall be performed as specified in 500-1.2.
ADD NEW SUBSECTION 500-5 TO READ:

500-5 ACCEPTANCE TESTING.

500-5.1 General. The Contractor shall perform acceptance tests on all repaired, rehabilitated, or new facilities. Unless otherwise noted, no separate compensation will be paid for testing; the testing cost is to be included in the related pay items. If the work should fail to pass the tests, it is the Contractor's responsibility to correct the work and re-test with no additional compensation.

If, within the warranty period, any section of the sewer system is not acceptable due to subsequent excessive leakage or any other defects, although originally accepted, the Contractor shall repair or replace the affected portion at no cost to the Agency. It is understood that if the Contractor fails to do such work as required, the Surety shall be liable for said costs of repair or replacement.

500-5.2 Leakage Testing. All new sewers and those sewers rehabilitated by pipe expanding and cured-in-place lining methods shall be tested for leakage in accordance with 306-1.4. Sewer mains and house connection sewers in each reach shall be tested for leakage together, as an integral system, except as otherwise specified herein.

Groundwater levels in each sewer reach shall be measured prior to leakage testing. Groundwater measurements will be made at manholes and at other supplementary points as directed by the Engineer. The Engineer will calculate the groundwater hydrostatic pressure to be used in determining leakage test procedures.

Within the warranty period, infiltration of groundwater in excess of the specified maximum acceptable leakage rate shall be considered as evidence that the original leakage test was in error or that subsequent failure of the pipeline has occurred. The Contractor shall promptly correct such failures in a manner approved by the Engineer at no cost to the Agency.

500-5.3 Miscellaneous Testing. The Agency, at its discretion, may perform tests to check compliance with the specifications as they pertain to backfill compaction, concrete strength, and other such items where test performance is not specified as the Contractor's responsibility. The Contractor shall cooperate with the Agency by providing samples, making necessary excavations, and other related services necessary to carry out the testing, at no cost to the Agency. In the event of failed tests, the Contractor shall bear the correction and re-testing.

500-5.4 Acceptance. Prior to the Engineer's final acceptance of the sewer system, the Contractor shall flush and clean all system parts. The Contractor shall remove all accumulated construction debris, rocks, gravel, sand, silt, and other foreign material from the sewer system at or near the closest downstream manhole. If necessary, the Contractor shall use mechanical rodding or bucketing equipment.

Following completion of the work, including cleaning and testing, the Contractor shall conduct a CCTV inspection of the sewers as specified in 500-1.1.5. The Contractor shall correct all defects discovered by this procedure before the work under the contract will be considered for final acceptance.

500-5.5 Payment. Acceptance testing is incidental to the pipe installation and rehabilitation work. Payment, therefor, is included in the price listed in the Bid Schedule for the work to be tested. Payment will be full compensation for furnishing all labor, materials, trench shoring, and equipment to complete the testing work, including services provided to aid the Agency in performing miscellaneous testing.
PART 6 – MODIFIED ASPHALTS
NO CHANGES

***************THE END ***************
(This page intentionally left blank)
The following work embraced herein must conform to the provisions in the 2010 Edition of the “State Standard Specifications” except as noted otherwise, insofar as the same may apply, and in accordance with the 2010 Edition of the “State Standard Plans” and these Special Provisions.


ORGANIZATION

Special provisions are under headings that correspond with the main-section headings of the Standard Specifications. A main-section heading is a heading shown in the table of contents of the Standard Specifications.

Each special provision begins with a revision clause that describes or introduces a revision to the Standard Specifications as revised by any revised standard specification.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the Standard Specifications for any other reference to a paragraph of the Standard Specifications.

DIVISION I GENERAL PROVISIONS

1 GENERAL

Section 1 of the Special Provisions must conform to Section 1 of the State Standard Specifications.

2 BIDDING

Replace the headings and paragraphs in section 2 of the RSS with:

2-1 GENERAL

Refer to the requirements of Division 0 and Division 1 of these contract documents.

3 CONTRACT AWARD AND EXECUTION

Replace the headings and paragraphs in section 3 of the RSS with:

3-1 GENERAL

Refer to the requirements of Division 0 and Division 1 of these contract documents.
4 SCOPE OF WORK

Section 4 of the Special Provisions must conform to Section 4 of the Revised State Standard Specification and State Standard Specifications except as modified herein.

Replace section 4-1.05 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 4-1.07 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

5 CONTROL OF WORK

Section 5 of the Special Provisions must conform to Section 5 of the Revised State Standard Specification and State Standard Specifications except as modified herein.

Replace section 5-1.02 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.03 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.09 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.12 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.13 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.14 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Add to list in 3rd paragraph of section 5-1.20E of RSS
5. Turning service on
6. Services during construction
7. System capacity
8. Meter drop-in

Replace section 5-1.23 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.26 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.27 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Add to the list in the 4th paragraph of section 5-1.31:
4. In the City of San Leandro you must:
   4.1 Dispose of debris daily.
4.2 Dispose of food-related trash such as wrappers, cans, bottles, and food scrapes in closed containers only, and regularly remove from construction site.
4.2 Inspect chemical toilets for construction personnel for leaks before placing them into operations
4.2 Clean chemical toilets weekly

Add to section 5-1.36D:
Installation of the utilities shown in the following table requires coordination with your activities. Make the necessary arrangements with the utility company through the Engineer and submit a schedule:

1. Verified by a representative of the utility company
2. Allowing at least the time shown for the utility owner to complete its work

<table>
<thead>
<tr>
<th>Utility Relocation and Contractor-Arranged Time for the Relocation</th>
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<tbody>
<tr>
<td>Utility</td>
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<tr>
<td>PG&amp;E Gas and Electrical Facilities (City of Oakland)</td>
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## Utility Relocation

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<tr>
<th>Utility Owner</th>
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<td>AT&amp;T</td>
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**Comcast**

Ben Greenwood
707-759-4070
925-765-3017

| IB | 752+71.22 | L | 42.97' |
| IB | 823+64.07 | L | 46.25' |
| IB | 824+65.35 | L | 54.78' |
| IB | 824+83.61 | L | 46.38' |
| IB | 827+23.15 | R | 44.74' |
| E14 | 914+10.52 | L | 41.02' |
| S12 | 124+50.00 | L | 16.95' |
| IB | 504+50.00 | L | 25.14' |
| IB | 513+50.00 | L | 20.96' |

**EBMUD**

Roberts McMullin
510-287-1296

<p>| IB | 652+54.54 | R | 40.21 |
| IB | 652+81.15 | R | 42.85 |
| IB | 652+86.56 | R | 40.61 |
| IB | 653+45.55 | R | 39.69 |
| IB | 654+12.48 | R | 39.68 |
| IB | 654+12.70 | R | 46.70 |
| IB | 654+58.39 | R | 39.79 |
| IB | 653+20.39 | R | 0.64 |
| IB | 653+41.72 | R | 0.15 |
| IB | 653+23.42 | L | 47.66 |
| IB | 656+12.20 | R | 42.78 |
| IB | 656+56.95 | L | 49.88 |
| IB | 656+72.15 | L | 29.62 |
| IB | 657+03.79 | L | 33.77 |
| IB | 657+06.00 | L | 31.57 |
| IB | 659+61.30 | L | 51.81 |
| IB | 661+98.53 | R | 37.60 |
| IB | 662+28.40 | R | 38.36 |
| IB | 662+46.57 | R | 38.11 |
| IB | 662+49.06 | R | 38.11 |
| IB | 662+52.54 | R | 37.35 |
| IB | 662+33.05 | R | 37.41 |
| IB | 662+97.77 | L | 53.29 |
| IB | 663+41.09 | L | 30.64 |
| IB | 662+98.59 | R | 47.53 |
| IB | 662+98.76 | R | 29.14 |
| IB | 663+18.86 | R | 28.98 |
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PG&E
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Anne Marcus
510-437-2079
510-368-8626

OCTOBER 2015
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Replace section 5-1.42 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.43 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 5-1.46 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

6 CONTROL OF MATERIALS


Add to section 6-2.03:
The Department furnishes you with:
- Model 170E/2070L controller assembly, including controller unit, completely wired controller cabinet, and detector sensor units

The Department furnishes you with completely wired controller cabinets with auxiliary equipment but without controller unit. At least 14 days before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

Replace section 6-2.05 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Section 7 of the Special Provisions must conform to Section 7 of the Revised State Standard Specification and State Standard Specifications except as modified herein.

Replace section 7-1.02I with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.02K with:
Section 7-1.02K of the Special Provisions must conform to Section 7-1.02K of the Revised State Standard Specification and State Standard Specifications except as modified herein.

Replace section 7-1.02K(1) with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.02K(2) with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.
Replace section 7-1.02K(3) with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.02K(4) with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.02K(5) with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.02L with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.06 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 7-1.11 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.02 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.04 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.05 with:
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Replace section 8-1.06 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.07 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.10 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.13 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.14 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.02 with:
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Replace section 8-1.04 with:
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Replace section 8-1.05 with:
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Replace section 8-1.06 with:
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Replace section 8-1.07 with:
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Replace section 8-1.10 with:
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Replace section 8-1.13 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.14 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

8 PROSECUTION AND PROGRESS

Section 8 of the Special Provisions must conform to Section 8 of the Revised State Standard Specification and State Standard Specifications except as modified herein.

Replace section 8-1.02 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.04 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.05 with:
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Replace section 8-1.06 with:
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Replace section 8-1.07 with:
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Replace section 8-1.13 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 8-1.14 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

9 PAYMENT
Section 9 of the Special Provisions must conform to Section 9 of the Revised State Standard Specification and State Standard Specifications except as modified herein.

Replace the 8th through last paragraph in section 9-1.03 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.04 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.05 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.06 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.07 with:
Not Used

Replace section 9-1.11 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.15 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.16 with:
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Replace section 9-1.17 with:
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Replace section 9-1.21 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 9-1.22 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

DIVISION II GENERAL CONSTRUCTION
10 GENERAL

Add to section 10-1.02:
Do not place the uppermost layer of new pavement until all underlying conduits and loop detectors are installed.

Before starting the traffic signal functional test at any location, all items of work related to signal control must be completed and all roadside signs, pavement delineation, and pavement markings must be in place at that location.
At the end of each working day if a difference in excess of 2 inches exists between the elevation of the existing pavement and the elevation of an excavation within 5 feet of the traveled way, place and compact material against the vertical cut adjacent to the traveled way. During the excavation operation, you may use native material for this purpose except once the placing of the structural section starts, structural material must be used. Place the material to the top of the existing pavement and taper at a slope of 4:1 (horizontal:vertical) or flatter to the bottom of the excavation. Do not use treated base for the taper.

11 QUALITY CONTROL AND ASSURANCE


12 TEMPORARY TRAFFIC CONTROL


Replace “Reserved” section 12-2 with:
Refer to the requirements of Division 0 and Division 1 of these contract documents.

Replace section 12-3.05 with:

12.05 PORTABLE FLASHING BEACONS

12.05A General
Section 12.05 includes specifications for installing, removing, and moving portable flashing beacons.

Each portable flashing beacon must have:

1. Standard and base
2. Lighting unit
3. Flasher unit
4. Battery power source

Assemble units to form a complete, self-contained, flashing beacon that can be delivered to the job site and placed into immediate operation.

12.05B Materials
The lens for the beacon lighting unit must have a visible diameter of 12 inches. The lens must be glass or plastic as specified in ANSI D-10.1 for a yellow traffic signal lens.

Provide a minimum 8-inch-long visor and a backplate for the beacon lighting unit. Visors are not required during the hours of darkness.

The flasher unit must provide 50 to 60 flashes per minute with 250- to 350-millisecond dwell time.

The standard must be adjustable to provide variable mounting of the lighting unit from 6 to 10 feet, measured from the bottom of the base to the center of the lens, with provisions for securing the standard at the desired height. Securely attach the standard to the base and provide enough length of multi-conductor, neoprene jacketed cable as required for the full vertical height.
The base must be large enough to accommodate a minimum of two 12-V automotive-type storage batteries, and must be of such shape and mass that the beacon will not roll in the event it is struck by a vehicle or pushed over.

The lamp must be rated at 25 W for operation on 12-V battery current.

The flashing beacon assembly must be weatherproof and must be capable of operating a minimum of 150 hours between battery recharging or other routine maintenance.

The standard and base must be finished with 2 applications of commercial-quality, orange enamel similar in color to color no. 12473 of Federal Standard 595B. The interior of the visor and the front face of the backplate must be finished with 2 applications of commercial-quality flat black enamel.

12-3.05C Construction
Remove portable flashing beacon from the traveled way at the end of each night's work. You may store the flashing beacon at selected central locations within the highway where designated by the Engineer.

Moving flashing beacons from location to location as ordered after initial placement is change order work.

Immediately repair and repaint, or replace flashing beacons in their original locations when they are displaced or not in an upright position from any cause.

The Department does not pay for repair or replacement of portable flashing beacons.

12-3.05D Payment
Payment for portable flashing beacons is included in the payment for traffic control systems.

Replace 1st paragraph in section 12-3.06B(1) with:
Construction area warning and guide signs must have a black legend on a retroreflective, nonfluorescent-orange background. W10-1 advance warning sign for highway-rail grade crossings must have a black legend on a retroreflective, nonfluorescent-yellow background.

Add to section 12-3.12C:
Start displaying the message on the portable changeable message sign 30 minutes before closing the lane.

Place the portable changeable message sign in advance of the 1st warning sign for each:
1. Stationary lane closure

Replace "Reserved" in section 12-3.13 with:

12-3.13A General
12-3.13A(1) Summary
Section 12-3.13 includes specifications for protecting traffic and workers with an impact attenuator vehicle during moving lane closures and when placing and removing components of stationary lane closures, ramp closures, shoulder closures, or a combination.

Impact attenuator vehicles must comply with the following test levels under National Cooperative Highway Research Program 350:
1. Test level 3 if the preconstruction posted speed limit is 50 mph or more
2. Test levels 2 or 3 if the preconstruction posted speed limit is 45 mph or less

The impact attenuator vehicle must comply with the attenuator manufacturer's instructions for:
1. Support truck, except the weight of the support truck must comply with the allowable vehicle weight limits shown on the Authorized Materials List for highway safety features and the manufacturer's instructions.

2. Trailer-mounted attenuator

3. Truck-mounted attenuator

Flashing arrow signs must comply with section 12-3.03 except you may use a portable changeable message sign instead of a flashing arrow sign. If a portable changeable message sign is used as a flashing arrow sign, it must comply with section 6F.56 “Arrow Panels” of the California MUTCD.

12-3.13A(2) Definitions

impact attenuator vehicle: Support truck that is towing a deployed attenuator mounted to a trailer or a support truck with a deployed attenuator that is mounted to the support truck.

12-3.13A(3) Submittals

Submit a certificate of compliance for each attenuator used on the project.

12-3.13A(4) Quality Control and Assurance

Do not start impact attenuator vehicle activities until authorized.

Before using an impact attenuator vehicle, conduct a meeting with the Engineer, subcontractors, and other parties involved with traffic control to discuss the operation of the impact attenuator vehicle during moving lane closures and when placing and removing components of a stationary traffic control system.

Schedule the location, time, and date for the meeting with all participants. Furnish a meeting facility located within 5 miles of the job site or at another authorized location.

12-3.13B Materials


For the Trinity MPS-350 truck–mounted attenuator, the support truck must not have a fuel tank mounted underneath within 10'-6" of the rear of the support truck.

Each impact attenuator vehicle must have:

1. Inverted “V” chevron pattern placed across the entire rear of the attenuator composed of alternating 4-inch wide nonreflective black stripes and 4-inch wide yellow retroreflective stripes sloping at 45 degrees
2. Type II flashing arrow sign
3. Flashing or rotating amber light
4. Operable 2-way communication system for maintaining contact with workers

12-3.13C Construction

Except where prohibited, use an impact attenuator vehicle:

1. To follow behind equipment and workers who are placing and removing components of a stationary lane closure, ramp closure, shoulder closure, or any combination. Operate the flashing arrow sign in the arrow or caution mode during this activity, whichever applies. Follow at a distance that prevents intrusion into the workspace from passing traffic.
2. As a shadow vehicle in a moving lane closure.

Monitor placement and use of the attenuator vehicle on a regular basis and adjust the use of the attenuator to match changing field conditions as construction progresses.

After placing components of a stationary traffic control system you may place the impact attenuator vehicle in advance of the work area or at another authorized location to protect traffic and workers.
Secure objects, including equipment, tools, and ballast on impact attenuator vehicles to prevent loosening upon impact by an errant vehicle.

Do not use a damaged attenuator in the work. Replace any attenuator damaged from an impact during work activities.

12-3.13D Payment
Not Used

Replace section 12-3.14 with:

12-3.14 TEMPORARY TRAFFIC SCREEN

12-3.14A General
Section 12-3.14 includes specifications for constructing temporary traffic screen at the locations shown.

12-3.14B Materials
Temporary traffic screen panels must be new or used, CDX grade or better, plywood or weather-resistant strandboard mounted and anchored on Type K temporary railing.

Wale boards must be new or used Douglas fir, rough sawn, construction grade or better.

Pipe screen supports must be new or used schedule 40, galvanized steel pipe.

Nuts, bolts, and washers must be cadmium plated.

Screws must be black or cadmium-plated flat head, cross-slotted screws with full thread length.

12-3.14C Construction
Mount and anchor temporary traffic screen on top of Type K temporary railing.

Remove the traffic screen from the highway when the Engineer determines it is no longer required. The traffic screen that is removed becomes your property.

A lateral move of Type K temporary railing with attached temporary traffic screen is change order work if ordered and the repositioning is not shown.

12-3.14D Payment
Temporary traffic screen is measured along the line of the completed screen.

Replace section 12-3.16 with:

12-3.16 TEMPORARY SIGNAL SYSTEM

12-3.16A General
Installing temporary signal system (TSS) consists of installing and maintaining temporary traffic signal, lighting, and flashing beacons for traffic control. Maintain the traffic signal management elements, as described in Section 86-1.06B and maintain the traffic signal timing and coordination, as described in Section 86-1.06C.

The Department will furnish, as needed, 1 Model 170E/2070L traffic signal controller assembly, including wired cabinet, controller unit, and loop detector sensor units, at each location where temporary traffic signal controller assembly is required. At least 14 days before you pick up the materials, inform the Engineer of what you will pick up and when you will pick it up.

Furnish other materials and equipment for a TSS, including flashing beacons, signal heads, mast arms, luminaires, wood poles, conductors, and hardware.

Material and equipment used in the TSS may be new or used but must be suitable for the intended use.

Orient each signal face to be clearly visible to traffic approaching from the direction that the signal is intended to control.
3.16B Operation
TSS must operate at nominal 120 V(ac). Lighting must operate at 120 V(ac) or 240 V(ac).

Unless otherwise directed, the system must operate on a continuous, 24-hour basis except when it is necessary that traffic be controlled by flaggers.

The Department will perform timing for the TSS.

3.16C Maintaining Temporary Signal System
Except for the controller assembly, you are responsible for maintaining the TSS.

If components in the TSS are damaged, displaced, or cease to operate or function as specified from any cause during the progress of the work, immediately repair or replace the components, then restore to the original condition. Components include signs, generator, flashing beacons, and signal equipment.

If the TSS is out of operation, provide flaggers, at your expense, to maintain traffic control until the traffic signals are returned to service.

3.16D Conduit
At locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the trenching in pavement method as specified in section 86-2.05C.

3.16E Conductors and Wiring
Conductors must be the types specified in section 86-2.08 or Type UF cable of the size and number of conductors shown. The minimum conductor size must be no. 12.

If conductors are placed across paved areas, placement must comply with one of the following:

1. Place in a conduit
2. Suspend at least 25 feet above the roadway

Conductors placed outside of paved areas must be placed by one of the following methods:

1. Direct burial method with Type UF cable installed at a minimum depth of 24 inches below grade.
2. Placed in conduit. If Type 1 or 2 conduit is used, the minimum depth must be 12 inches. If Type 3 conduit is used, the minimum depth must be 18 inches.
3. Suspend from wood poles with a minimum clearance of 25 feet from grade at any point. Place the portions of the conductor installed on the face of wood poles in either Type 3 or Type 4 conduit.

Conductors placed across structures must be placed in a Type 1, 2, or 3 conduit. Install the conduit on the outside face of the railing and secure by a method determined by the Engineer.

Conductors to a terminal compartment or signal head on a pole may be spliced to through conductors of the same phase in a pull box adjacent to the pole. Do not splice conductors or cables except in pull boxes or in NEMA Type 3R enclosures.

3.16F Bonding and Grounding
Comply with section 86-2.10.

Provide effective grounding for the generator.

3.16G Service
3.16G(1) General
Use one of the following methods to provide power for the TSS:

1. Commercial power from an existing utility company
2. Commercial power with a generator backup
3. Generator system with an additional generator as a backup
12-3.16G(2) Commercial Power
Commercial power must be 120 V(ac) or 120/240 V(ac). Protect the power source in a locked enclosure. Provide keys to all locks.

Do not use power from private parties.

Do not use electrical power from existing highway facilities unless authorized.

Make the arrangements with the utility company for providing service.

Commercial electrical power is available at the job site.

12-3.16G(3) Generator
Generators must be 120 V(ac) or 120/240 V(ac), 60 Hz, 2.5 kW minimum, continuous duty type. Generators may be powered by gasoline, LPG, or diesel engines operating at approximately 1,800 rpm. Engines must have automatic oil feed. Generator systems must be equipped to provide automatic start-stop operation, with a 12 V starting system. Generator output circuits must have overcurrent protection with a maximum setting of 15 A or as shown.

Fuel storage must be sufficient for times when the generator system operates unattended.

Engines must be equipped with approved spark arrestors.

12-3.16G(4) Generator Operation

A generator must be provided to back up the commercial power.

An automatic transfer switch must provide the following functions:

1. Line voltage monitoring and in the event of a power outage signal the generator to start.
2. Engine start delay, adjustable from 0 to 6 seconds, to prevent starting if the power outage is only momentary and an engine stop delay, adjustable from 0 to 8 minutes, to allow the generator set to run unloaded to cool before shut down.
3. Transfer delay of 0 to 120 seconds to allow the generator to stabilize before connecting to the load and retransfer delay of 0 to 32 minutes to allow the line voltage to stabilize.
4. "Load-No Load" switch to allow a test with or without load.
5. "Normal-Test" switch that will start and run the generator in the "Test" position. "Normal" position must return the generator to automatic operation.
6. Battery charger powered by the normal line voltage.
7. Generator voltage sensor that signals for a transfer if the generator output is ready.

Provide a mechanical interlock to prevent application of power to the load from both sources and to prevent backfeeding from the generator to the line.

The automatic transfer switch must be rated at 100 A, 120/240 V(ac), 3 wire, single phase and be compatible with the generator furnished.

12-3.16H Department-Furnished Controller Assembly

Construct the controller cabinet foundation as shown for Model 332L, 334L, or 336L cabinets, including furnishing and installing anchor bolts. Install the controller cabinet on the foundation and make field wiring connections to the terminal blocks in the controller cabinet.

A listing of field conductor terminations in each Department-furnished controller cabinet will be furnished to you at the job site.

The Department or local forces will maintain all controller assemblies.
12-3.16I Detectors
Loop detector sensor units are Department-furnished as part of the controller assembly.

Loop detector lead-in cable must be Type B or Type C.
Comply with section 86-5.01A.

12-3.16J Completion and Restoration
Backfill pole holes.

The following materials may be abandoned in place when no longer required:
1. Conductors placed in slots across paved areas
2. Direct buried cables, installed 24 inches or more below the ground surface

Add to section 12-3:
12-3.18 Type Absorb 350 Temporary Crash Cushion
12-3.18A General

12-3.18A(1) Summary
Section 12-3.18 includes specification for installing, maintaining, replacing, moving, or removing Type Absorb 350 temporary crash cushion.

Type Absorb 350 temporary crash cushion must be installed where shown.

12-3.18A(2) Submittal
Submit a copy of the manufacturer’s plan and parts list as an informational submittal.

12-3.18A(3) Quality Control and Assurance
Submit a certificate of compliance for Type Absorb 350 crash cushion.

12-3.18B Material
Type Absorb 350 temporary crash cushion must be an Absorb 350 as manufactured by Barrier Systems, Inc. or approved equal, and must include the items shown for the crash cushion.

Obtain price quote from the manufacturer for the Type 350 crash cushion and submit to the Engineer for approval.

12-3.18C Construction
Install the crash cushion under the manufacturer’s installation instructions.

Place the Type Absorb 350 temporary crash cushion on a firm, smooth, stable foundation. Grade the foundation to provide a uniform bearing surface throughout the entire length of the crash cushion.

Secure the Type Absorb 350 temporary crash cushion in place before commencing work activities requiring a Type Absorb 350 temporary crash cushion.

Maintain Type Absorb 350 temporary crash cushion in place at each location show on the plans, including times when work is not actively in progress. Remove Type Absorb 350 temporary crash cushion when no longer required.

Immediately remove and replace Type Absorb 350 temporary crash cushion damaged due to your activities. Remove and replace any Type Absorb 350 temporary crash cushion damaged beyond repair. Repair of Type Absorb 350 temporary crash cushion damaged by traffic is change order work.

Attach a Type R or Type P marker panel to the front of the temporary crash cushion if the closest point of the crash cushion array is within 12 feet of the traveled way. Firmly fasten the marker panel to the crash cushion with commercial quality hardware or by other authorized methods.
Remove Type Absorb 350 temporary crash cushion, including marker panels, at the time of Contract acceptance.

After you remove Type Absorb 350 temporary crash cushion, restore any area to its previous condition or construct it to its planned condition where temporary excavation or embankment was used to accommodate the crash cushion.

12-3.18D Payment

Not Used

Add to section 12-4.01:

Payment for transporting bicyclists through a 1-way reversing traffic control work zone is included in the payment for traffic control system.

Add to section 12-4.02A:

Designated holidays are shown in Division 1, Section 01 11 00, Part 1.7.

If a designated holiday falls on a Sunday, the following Monday is a designated holiday. If November 11th falls on a Saturday, the preceding Friday is a designated holiday.

Special days are shown in Division 1, Section 01 11 00, Part 1.7.

Perform work on local streets as specified in the Lane Closure Charts. Submit a copy of the proposed truck routes, for supplying equipment and material to the project work area, to the Engineer for review and approval.

Commercial vehicles and hauling trucks are specifically routed on certain streets in Oakland by the California Vehicle Code and Oakland Municipal Code. These streets are graphically represented in the Oakland Truck Routes and Prohibited Streets Map (found at: http://www2.oaklandnet.com/w/DOWD008878). Oversized vehicles are permitted on Oakland streets by the Oakland Police Department, Traffic Section. Call (510) 777-8615 for more information.

Commercial vehicles and hauling trucks are specifically routed on certain streets in San Leandro by the California Vehicle Code and San Leandro Municipal Code. These streets are graphically represented in the City of San Leandro Truck Routes Map (found at: http://www.sanleandro.org/depts/pd/traffic_n_transportation_information/default.asp). If you have any questions, please contact the Traffic Division of the San Leandro Police Department at (510) 577-3271 or PDtranspermit@sanleandro.org.

Commercial vehicles are specifically routed for State highways by California Department of Transportation (Caltrans). The on-line color-coded “Caltrans Truck Route Map” is the official government source for truck route information along State highways (found at: http://www.dot.ca.gov/hq/traffops/engineering/trucks/truck-length-routes.htm).

Construction equipment and personal vehicles of your employees must not be parked in within the City of San Leandro without approval of the Engineer and the City of San Leandro’s City Engineer.

"No Parking – Tow Away" signs must be installed 72 hours in advance of scheduled activities that will restrict parking. Notify the City of San Leandro’s City Engineer and the Engineer 72 hours in advance of scheduled work activities. If the work is not performed during the timeframe indicated on the “No Parking – Tow Away” signs, the work will be rescheduled with at least five working days advance notice. Leave the streets open to traffic until you start the working, and will provide all barricades, signs and traffic control necessary to protect the work. Perform all re-posting of “No Parking – Tow Away” signs and re-notification occasioned by not meeting the posted schedule.

"No Parking" signs must indicate time, day, and date and the statement "Violators will be Towed at Owner's Expense - CVC 22651 For info on Towed Vehicles call (XXX) XXX-XXX"
Furnish and place “No Parking – Tow Away” signs every 25 feet where approved by the Engineer. Maintain the signs on a continual basis and replace damaged or missing signs daily, and remove the signs immediately after they are no longer needed.

If work vehicles or equipment are parked within 6 feet of a traffic lane, close the shoulder area with fluorescent orange traffic cones or portable delineators. Place the cones or delineators on a taper in advance of the parked vehicles or equipment and along the edge of the traveled way at 25-foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment. Use at least 9 cones or delineators for the taper. Use a W20-1, "Road Work Ahead," W21-5b, "Right/Left Shoulder Closed Ahead," or C24(CA), "Shoulder Work Ahead," sign mounted on a crashworthy, portable sign support with flags. The sign must be 48 by 48 inches and placed as ordered by the Engineer. If a cone or delineator is displaced or overturned, immediately restore the device to its original position or location.

Add to the RSS for section 12-4.03B:
Refer to Division 1, Section 01 55 26, Part 3.11 for liquidated damages.
Replace "Reserved" in section 12-4.04 with:

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Legend:

Refer to lane requirement charts

x The full width of the traveled way must be open for use by traffic after 3 PM.

xx The full width of the traveled way must be open for use by traffic.

xxx The full width of the traveled way must be open for use by traffic until 9 AM.

H Designated holiday

SD Special day

Replace "Reserved" in section 12-4.05B with:

See Lane Closure Charts No.7 thru 14 in Attachment 1 of these Contract Documents.

Replace section 12-5 with:

12-5 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

12-5.01 GENERAL

Section 12-5 includes specifications for closing traffic lanes, ramps, or a combination, with stationary and moving lane closures on multilane highways and 2-lane, 2-way highways. The traffic control system for a lane closure or a ramp closure must comply with the details shown.
12-5.02 MATERIALS
Vehicles equipped with attenuators must comply with section 12-3.13 of the special provisions.

12-5.03 CONSTRUCTION
12-5.03A General
During traffic striping and pavement marker placement using bituminous adhesive, control traffic with a stationary or a moving lane closure. During other activities, control traffic with stationary lane closures. Whenever components of the traffic control system are displaced or cease to operate or function as specified from any cause, immediately repair the components to the original condition or replace the components and restore the components to the original location.

12-5.03B Stationary Lane Closures
For a stationary lane closure made only for the work period, remove the components of the traffic control system from the traveled way and shoulder, except for portable delineators placed along open trenches or excavation adjacent to the traveled way at the end of each work period. You may store the components at selected central locations designated by the Engineer within the limits of the highway.

12-5.03C Moving Lane Closures
A changeable message sign used in a moving lane closure must comply with section 12-3.12 except the sign must be truck-mounted. The full operational height to the bottom of the sign may be less than 7 feet above the ground but must be as high as practicable.

A flashing arrow sign used in a moving lane closure must be truck-mounted. Operate the flashing arrow sign in the caution display mode whenever it is being used on a 2-lane, 2-way highway.

12-5.04 PAYMENT
Traffic control system for lane closure is paid for as traffic control system.

The requirements in section 4-1.05 for payment adjustment do not apply to traffic control system. Adjustments in compensation for traffic control system will be made for an increase or decrease in traffic control work if ordered and will be made on the basis of the cost of the necessary increased or decreased traffic control. The adjustment will be made on a force account basis for increased work and estimated on the same basis in the case of decreased work.

A traffic control system required by change order work is paid for as a part of the change order work.

Replace section 12-8 with:

12-8 TEMPORARY PAVEMENT DELINEATION

12-8.01 GENERAL
Section 12-8 includes specifications for placing, applying, maintaining, and removing temporary pavement delineation.

Painted traffic stripe used for temporary delineation must comply with section 84-3. Apply 1 or 2 coats.

Temporary signing for no–passing zones must comply with section 12-3.06.

12-8.02 MATERIALS
12-8.02A General
Not Used
12-8.02B Temporary Lane Line and Centerline Delineation
Temporary pavement markers must be the same color as the lane line or centerline markers being replaced. Temporary pavement markers must be one of the temporary pavement markers on the Authorized Material List for short-term day or night use, 14 days or less, or long-term day or night use, 180 days or less.
12-8.02C Temporary Edge Line Delineation
Temporary, removable, construction-grade striping and pavement marking tape must be one of the types on the Authorized Material List. Apply temporary, removable, construction-grade striping and pavement marking tape under the manufacturer's instructions.

12-8.03 CONSTRUCTION
12-8.03A General
Whenever work activities obliterate pavement delineation, place temporary or permanent pavement delineation before opening the traveled way to traffic. Place lane line and centerline pavement delineation for traveled ways open to traffic. On multilane roadways, freeways, and expressways, place edge line delineation for traveled ways open to traffic.

Establish the alignment for temporary pavement delineation, including required lines or markers. Surfaces to receive an application of paint or removable traffic tape must be dry and free of dirt and loose material. Do not apply temporary pavement delineation over existing pavement delineation or other temporary pavement delineation. Maintain temporary pavement delineation until it is superseded or you replace it with a new striping detail of temporary pavement delineation or permanent pavement delineation.

Place temporary pavement delineation on or adjacent to lanes open to traffic for a maximum of 14 days. Before the end of the 14 days, place the permanent pavement delineation. If the permanent pavement delineation is not placed within the 14 days, replace the temporary pavement markers with additional temporary pavement delineation equivalent to the striping detail specified for the permanent pavement delineation for the area. The Department does not pay for the additional temporary pavement delineation.

When the Engineer determines the temporary pavement delineation is no longer required for the direction of traffic, remove the markers, underlying adhesive, and removable traffic tape from the final layer of surfacing and from the existing pavement to remain in place. Remove temporary pavement delineation that conflicts with any subsequent or new traffic pattern for the area.

12-8.03B Temporary Lane Line and Centerline Delineation
Whenever lane lines or centerlines are obliterated, the minimum lane line and centerline delineation must consist of temporary pavement markers placed longitudinally at intervals not exceeding 24 feet. The temporary pavement markers must be temporary pavement markers on the Authorized Material List for short-term day or night use, 14 days or less, or long-term day or night use, 180 days or less. Place temporary pavement markers with additional temporary pavement delineation under the manufacturer's instructions. Cement the markers to the surfacing with the adhesive recommended by the manufacturer, except do not use epoxy adhesive to place pavement markers in areas where removal of the markers will be required.

For temporary lane line or centerline delineation consisting entirely of temporary pavement markers, place the markers longitudinally at intervals not exceeding 24 feet.

12-8.03C Temporary Edge Line Delineation
Whenever edge lines are obliterated on multilane roadways, freeways, and expressways, place edge line delineation for that area adjacent to lanes open to traffic consisting of (1) solid, 4-inch wide traffic stripe tape of the same color as the stripe being replaced, (2) traffic cones, (3) portable delineators or channelizers placed longitudinally at intervals not exceeding 100 feet. You may apply temporary painted traffic stripe where removal of the 4-inch wide traffic stripe will not be required.

The Engineer determines the lateral offset for traffic cones, portable delineators, and channelizers used for temporary edge line delineation. If traffic cones or portable delineators are used for temporary pavement delineation for edge lines, maintain the cones or delineators during hours of the day when the cones or delineators are being used for temporary edge line delineation.

Channelizers used for temporary edge line delineation must be an orange surface-mounted type. Cement channelizer bases to the pavement as specified in section 85 for cementing pavement markers to pavement except do not use epoxy adhesive to place channelizers on the top layer of the pavement. Channelizers must be one of the 36-inch, surface-mounted types on the Authorized Material List.
AC TRANSIT
INFRASTRUCTURE AND STATION PLATFORM
IB # 2016-1354
DIVISION 2 – CIVIL SPECIFICATIONS
DIVISION 2.2 SEGMENT A – CALTRANS SPECIFICATIONS

Remove the temporary edge line delineation when the Engineer determines it is no longer required for the direction of traffic.

12-8.04 PAYMENT
Payment for temporary pavement delineation is included in the payment for traffic control system.

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13 WATER POLLUTION CONTROL


Add to section 13-1.01A:
The following RWQCBs will review the authorized SWPPP:

1. San Francisco Bay RWQCB

Add to section 13-3.01A:
The project is risk level 2 in the Lower San Leandro Creek area, from Dutton Ave (Approximately Station "E14" 929+00) to end of project, and risk level 1 in all other locations.

Replace the 4th paragraph of section 13-4.03C(1) with:
The following activities must be performed at least 10 feet from concentrated flows of stormwater, drainage courses, and inlets if within the floodplain and at least 50 feet if outside the floodplain, unless otherwise authorized:

1. Stockpiling materials
2. Storing pile-driving equipment and liquid waste containers
3. Washing vehicles and equipment in outside areas
4. Fueling and maintaining vehicles and equipment

Submit a plan of stockpiling in the City of San Leandro Right-of-Way to the City of San Leandro’s City Engineer. Stockpiling in the City of San Leandro must be approved by the City of San Leandro’s City Engineer.

Add to section 13-4.03G:
Water collected from dewatering operations must not be discharged into the storm drain system.

Add to section 13-4.03G:
Dewatering must comply with the provisions of RWQCB San Francisco Regional Water Quality Control Board. This permit is available at the http://www.waterboards.ca.gov/sanfranciscobay/ Web site.

Add to section 13-6.03C:
Provide temporary drainage inlet protection around drainage inlets as changing conditions require. Drainage inlet protection must be Type 3A, Type 3B, or Type 5, as appropriate for conditions around the drainage inlet.

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14 ENVIRONMENTAL STEWARDSHIP


Add to section 14-8.02A:
Refer to the requirements of Division 1, Section 01 55 00, Part 1.9 of these contract documents.

Add between the 2nd paragraph and 3rd paragraph of section 14-9.03A:
All trucks hauling soil, sand, and other loose materials must be covered and must maintain at least two feet of freeboard. In the event citizen complaints are received by the City of San Leandro’s City Engineer concerning dust mitigation as a result of truck hauling activities, the Engineer may enforce the use of load covers for all empty trucks entering or leaving the City of San Leandro.

Air-blowers for cleaning sidewalk and streets must not be used.

You must thoroughly clean, at your own cost, any and all adjacent public right-of-ways or private properties impacted by dust or debris from your operations at the Engineer’s request.

You must suspend all work in the event air-borne dust or debris leaves the work area and causes a nuisance to adjoining property owners or public at large, at the Engineer’s request. Such suspensions must remain in effect, until the Engineer is fully satisfied that the work practices causing air-borne dust or debris have been satisfactorily mitigated and the adversely affected properties or areas have been thoroughly cleaned at your own cost.

Apply water to all unpaved construction sites twice per day.

Replace “Not Used” in section 14-9.03B with:
Recycled water from the City of Leandro Water Pollution Control Plant, 3000 David Street, San Leandro, must be used to maximum extent possible for dust control in the City of San Leandro.

15 EXISTING FACILITIES


Replace section 15-2.02B(3) with:
15-2.02B(3) Cold Planing Asphalt Concrete Pavement
15-2.02B(3)(a) General
If you do not complete HMA placement before opening the area to traffic, you must:
1. Construct a temporary HMA taper to the level of the existing pavement
2. Place HMA during the next work shift
3. Submit a corrective action plan that shows you will complete cold planing and placement of HMA in the same work shift. Do not restart cold planing activities until the Engineer approves the corrective action plan.

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Schedule cold planing activities so that not more than 24 hours elapses between the time the pavement is cold planed and the HMA is placed.

15-2.02B(3)(b) Materials
Use the same quality of HMA for temporary tapers that is used for the HMA overlay or comply with the specifications for minor HMA in section 39.

15-2.02B(3)(c) Construction
15-2.02B(3)(c)(i) General
Notify the Engineer two weeks prior to cold planing asphalt concrete pavement. The Engineer will inspect the existing pavement for moderate to high severity fatigue cracking. Remove the existing pavement and base materials at the locations marked in field by the Engineer and to the depth specified by Engineer. Scarify, grade, and compact the top of any subgrade encountered. Import borrow must comply with section 19-7. Compact subgrade to 95 percent relative compaction. Compaction must comply with ASTM D1557. Place Type A Hot Mix Asphalt to depth specified by the engineer. Apply tack coat to the edges of the existing pavement and apply prime coat to the base material prior to placing Type A Hot Mix Asphalt.

Do not use a heating device to soften the pavement.

The cold planing machine must be:

1. Equipped with a cutter head width that matches the planing width. If the cutter head width is wider than the cold plane area shown, submit to the Engineer a request for using a wider cutter head. Do not cold plane unless the Engineer approves your request.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
   2.1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating the sensor.
   2.2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.
3. Equipped to effectively control dust generated by the planing operation
4. Operated so that no fumes or smoke is produced.

Replace broken, missing, or worn machine teeth.

15-2.02B(3)(c)(ii) Grade Control and Surface Smoothness
Furnish, install, and maintain grade and transverse slope references.

The depth, length, width, and shape of the cut must be as shown or as ordered. The final cut must result in a neat and uniform surface. Do not damage the remaining surface.

The completed surface of the planed asphalt concrete pavement must not vary more than 0.02 foot when measured with a 12-foot straightedge parallel with the centerline. With the straightedge at right angles to the centerline, the transverse slope of the planed surface must not vary more than 0.03 foot.

Where lanes are open to traffic, the drop-off of between adjacent lanes must not be more than 0.15 foot.

15-2.02B(3)(c)(iii) Temporary HMA Tapers
If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, construct a temporary HMA taper. The HMA temporary taper must be:

1. Placed to the level of the existing pavement and tapered on a slope of 30:1 (horizontal:vertical) or flatter to the level of the planed area
2. Compacted by any method that will produce a smooth riding surface

Completely remove temporary tapers before placing permanent surfacing.
15-2.02B(3)(c)(iv) Remove Planed Material
Remove cold planed material concurrent with planing activities so that removal does not lag more than 50 feet behind the planer.

15-2.02B(3)(d) Payment
Payment for removal of pavement markers, thermoplastic traffic stripe, painted traffic stripe, and pavement marking within the area of cold planing is included in the payment for cold plane asphalt concrete pavement of the types shown in the Bid Item List.

Add to section 15-2.02:

15-2.02M Remove Sanitary Sewer Facility
15-2.02M(1) General
Sanitary sewer facility must be removed where shown on the plans.

15-2.02M(2) Materials
Openings into existing structures and into sewer pipe that are to remain in place must be plugged with minor concrete under section 90.

15-2.02M(3) Construction
Hot mix asphalt pavement, concrete pavement, curbs, gutters, sidewalks or driveways must be sawcut prior to trenching and excavation to remove the sanitary sewer facility. Sawcutting must be 6” for hot mix asphalt pavement and full depth for concrete. Stomping of the concrete pavement will not be allowed. The resulting trench must be backfilled and compacted per the requirements under Section 19.

15-2.02M(4) Payment
Removal of sanitary sewer pipe and lateral must be paid per linear foot. Removal of sanitary sewer manhole, cleanout and lamphole must be paid per each removal.

Payment for removal of sanitary sewer facility must include full compensation for the removal and disposal of the sanitary sewer facility; the plugging of the structures or pipe to remain in place; the sawcutting of the pavement, curbs, gutters, sidewalks, and driveways; trench excavation and shoring if required; the removal and disposal of contaminated materials not paid by separate item; the control and discharge of ground water and surface waters not paid by separate item; water pollution control; placement and compaction of backfill material; removal and placement of pavement markings, traffic striping, and pavement markers; replacement of pavement, curbs, gutters, and sidewalks, traffic island/median and driveways; landscape restoration; and replacement or restoration of all other improvements that are affected by the work. Submit a Schedule of Values to the Engineer for review and approval.

15-2.02L Remove Tree
15-2.02L(1) General
Section 15-2.02L includes specifications for removing trees.

15-2.02M(2) Materials
Not Used

15-2.02M(3) Construction
Observe all applicable tree preservation measures during tree removal activities. Refer to section 20-3.02 for detailed tree preservation specifications.

Remove trees at locations shown on the plans or approved and marked in the field by the Engineer.

Mature trees must be removed during the non-breeding season for birds, September through February. Mature trees must be removed during daylight hours when roosting is not anticipated.
All trees designated for removal, must be taken down sectionally, or directionally felled to minimize damage to adjacent tree canopies or root systems by a qualified Contract Arborist. Damage to adjacent trees must be reviewed by Project Arborist and Engineer for remedial recommendations or replacement.

All work must be done by hand, bucket truck or crane operated equipment.

Motorized equipment must operate on existing pavement and not enter tree preservation areas without prior approval. Temporary root protection matting may be required for such access to prevent rutting and compaction.

Stumps must be ground to 8 inches below grade and grindings raked and removed from site; backfill holes with approved topsoil and mulch per direction by the Engineer. Coordinate with underground utilities locators prior to grinding. All stump grinding must be performed by the Contract Arborist. For tree pits where a new tree is proposed, the stump may be ground out completely (as determined by the Contract Arborist) to allow the proposed tree to be planted. Backfill as above. Only trees with stumps within deep excavations may have stumps removed by excavator. Stump excavation must be performed under the direct supervision of the Contract Arborist.

Removal of shrubs designated for removal for each phase must be cut and stumps ground out or hand dug to remove stumps. Prior to removal, verify with the Engineer.

All debris generated by tree and stump/root removal must be removed from the job site as part of the tree removal operation and no separate payment must be made. The area beneath the sidewalk, curb, gutter and street pavement section voided by removal of debris generated by stump/root removal must be replaced with selected material.

All organic material generated by street tree removal must be cleaned from the street and sidewalk and left in a neat pile at curb side and the area made safe until you can be removed. All wood, soil, etc. debris must be removed each day unless directed otherwise by the Engineer.

Accumulation of flammable material is not allowed.

15-2.02M(4) Payment
Not Used

Add to section 15-2.09:

15-2.09E Relocate Fire Hydrant
15-2.09E(1) General
Section 15-2.09E includes specifications for relocating fire hydrant.

15-2.09E(2) Materials
Not Used

15-2.09E(3) Construction
Coordinate with agencies including the City of Oakland, East Bay Municipal District, and the local Fire Department prior to any construction activities that may impact fire safety equipment including fire hydrants.

15-2.09E(4) Payment
Not Used

15-2.09F Relocate Manhole
15-2.09E(1) General
Relocating manhole includes relocating manhole cover and frame. Coordinate with agencies impacted by relocation.
Replace the header of section 15-2.10B with:

Adjust Frames, Covers, Grates, Manholes, Cleanouts, Hand Hole, Valves, and Meters and Fire Hydrants

Replace 1st sentence of 1st paragraph of section 15-2.10B with:

Adjust frames, covers, grates, manholes, cleanouts, hand holes, valves, and meters and fire hydrants by lowering before cold planing and raising after paving or surfacing.

Replace 7th and 8th paragraph of section 15-2.10B with:

If no item is described for adjust (1) frame, (2) covers, (3) grates, (4) manholes, (5) cleanouts, (6) hand hole, (7) valve, and (8) meters and (7) fire hydrants, payment of adjusting these materials is included in the payment for the type of pavement or type of surfacing involved.

If no item is shown for adjust (1) frame, (2) covers, (3) grates, (4) manholes, (5) cleanouts, (6) hand hole (7) valve, and (8) meters and (7) fire hydrants, payment for adjusting these materials is included in the payment for the type of excavation shown in the Bid Items List.

Add the following to section 15-2.03A(1):

Prior to construction or demolitions, the Engineer must provide a list of items to be salvaged.

Replace section 15-2.03A(2)(b) with:

15-2.03A(2)(b) Department Salvage Location

A minimum of 2 business days before hauling salvaged material to the Department salvage storage location, notify:

1. Engineer
2. District Regional Recycle coordinator

Engineer will provide Department salvage storage location.

Parking space meter must be hauled to the City of Oakland salvage storage location. Engineer will provide the City of Oakland salvage storage location.

Replace section 15-2.03A(4) with:

15-2.03A(4) Payment

Payment for salvaging items is included in the payment for work involved.

Replace section 15-2.03C with:

15-2.03C Salvage Irrigation Facilities

For irrigation facilities that are shown to be removed, Engineer must provide a list of items to be salvage. With each delivery to the salvage location, include a list of the quantity and size of each item.

Replace section 15-2.05C with:

15-2.05C Abandon Culverts and Pipelines
15-2.05C(1) General

Abandon culverts or pipelines by removing portions of the culverts or pipelines, filling the inside, and backfilling the depressions and trenches to grade. As an alternative to abandoning a culvert or pipeline, you may remove the culvert or pipeline, dispose of it, and backfill.

Notify the Engineer before abandoning a culvert or pipeline.

15-2.05C(2) Materials
Openings into existing structures that are to remain in place must be plugged with minor concrete under section 90.

15-2.05C(3) Construction

Wherever culverts or pipelines intersect side slopes, remove them to a depth of at least 3 feet. Measure the depth normal to the plane of the finished side slope. Abandon the remaining portion of the culvert or pipeline.

Culverts or pipelines that are 12 inches or more in diameter must be completely filled by authorized methods. Backfill with sand that is clean, free draining, and free from roots and other deleterious substances. As an alternative to sand, you may backfill with one of the following:

1. Controlled low-strength material under section 19-3.02F
2. Slurry cement backfill under section 19-3.02D

Ends of culverts and pipelines must be securely closed by a 6-inch-thick, tight-fitting plug or wall of commercial-quality concrete.

15-2.05C(4) Payment

If backfilling inside the culvert or pipeline is required, payment for backfilling inside the culverts or pipelines is included in the payment for abandon culvert or abandon pipeline. Payment for backfilling outside the culvert or pipeline is included in the payment for abandon culvert or abandon pipeline.

Add section 15-2.07E:

15-2.07E Modify Inlet to Manhole

Modify storm drain inlets by converting to manholes in accordance with the Plans, as specified herein, or as directed by the Engineer.

Excavate and remove structures to a depth of at least 1 foot below the grading plane.

Convert to manhole with minor concrete. Minor concrete must contain at least 590 pounds per cubic yard of cementitious material.

Backfill to match the grading plane.

Frame and cover in the City of Oakland must be in accordance with City of Oakland Standard Details or as directed by the Engineer. Frame and cover must be purchased from the City of Oakland. Maintain records of manhole cover and frames purchased (material, tax, and delivery cost), and submit them to the AC Transit for reimbursement. All new City of Oakland manhole covers and metal frames shall be ordered by the City of Oakland and furnished by the District. The Contractor shall submit to the Engineer for approval the proposed schedule for number and type of manhole covers and frames required at each location and dates the manhole covers and frames are needed for each location. The schedule shall reflect the following requirements:

1. City of Oakland shall not store any manhole frames and covers.
2. A manhole cover and frame can take 6 weeks to fabricate.

The schedule and quantity shall be confirmed each month and revised as necessary. Revised schedules must be approved by the Engineer. The Engineer will order the manhole covers and frames according to the approved schedule. The Contractor shall pick up the manhole covers and frames from the supplier as directed by the Engineer.

Delete the 4th paragraph of section 15-3.01 in the RSS for section 15-3.01.
Add to section 15:

15-7 PRE/POST CONSTRUCTION SEWER CCTV INSPECTION

15-7.01 GENERAL

15-7.01A Summary

Section 15-7 defines the requirements for internal closed circuit television (CCTV) inspection of the existing EBMUD sewer pipelines before and after construction.

Inspect the EBMUD sewer interior using a color CCTV and document the inspection on a digital recorder. Inspection video must be submitted in movie file format (.mpg, .mpeg) and saved on DVDs for submittal. Inspections must be performed in accordance with National Association of Sewer Service Companies (NASSCO) Pipeline Assessment and Certification Program (PACP). Inspection software must be NASSCO PACP v6.0.1 certified.

15-7.01B Submittal

Submittals must be provided to the Engineer for review. After review, the material will be returned with the following actions defined:

1. NO EXCEPTIONS TAKEN
2. MAKE CORRECTIONS NOTED
3. REVISE AND RESUBMIT
4. REJECTED – RESUBMIT.

The following submittals must be provided:

1. Verification of Experience
   1.1 Submit list of five (5) similar pipeline projects within the past three (3) years of pipelines 24 inches in diameter or larger.
   1.2 Demonstrate that the assigned field personnel have a minimum of three (3) years of experience in similar pipeline projects. The reference projects must contain a minimum of 15,000 lf of CCTV pan and tilt.

2. Verification of Certification and Training:
   2.1 Submit the NASSCO PACP/MACP Certification numbers for each operator employed on this project.
   2.2 Every operator employed on this project must be trained and successfully certified by NASSCO PACP/MACP.

3. Product Information:
   3.1 Submit manufacturer's product literature for all video equipment including but not limited to the following:
      3.1.1. Cabling
      3.1.2. Camera
      3.1.3. Monitor
      3.1.4. Footage counter
      3.1.5. Video titling device
      3.1.6. Recorder

You must be responsible for modifications to the equipment and/or inspection procedures to achieve report material of acceptable quality. No work must commence prior to approval of the material by the Engineer. Once accepted, the report material must serve as a standard for the remaining work.

Maintain a copy of all inspection documentation (tapes, databases, and logs) for the duration of the work and for one year thereafter. Submit all inspection documentation to EBMUD.

Submit CCTV inspection reports within two weeks of performing the CCTV work.

Two copies of all inspection videos in sequential order from upstream manhole to downstream manhole saved in mpg or mpeg format on DVDs; electronic version of still images saved in jpeg format on DVDs; a
Microsoft Access database conforming to the NASSCO PACP v6.0.1 database standard populated with all inspection and defect information; and hard copies and electronic files in .pdf format of the inspection logs must be submitted to the Engineer for review and approval. DVDs or sections thereof that do not conform to the specifications must be re-recorded in the field at your own expense. Original DVDs and re-recorded runs must be edited to provide a record with all inspections in sequential order from upstream to downstream. DVDs not in sequential order are unacceptable.

The CCTV inspection report must include video recordings, still images, and NASSCO PACP required inspection forms and defect codes. Provide equal documentation on both the videos and forms. Maintain a copy of all report material. Provide comments as necessary to fully describe the existing condition of the sewer, both through the voice over on the videos and on the inspection forms. Still images must further document both typical sewer features and defects. The still images must be copied to a DVD and submitted to the Engineer along with the videos, logs and inspection database. Still image and video file names must be consistent between files supplied on the DVDs and the corresponding fields in the inspection database.

15-7.01C Quality Assurance
The nature of the pre-construction and post-construction inspections will be to document the pipeline conditions before and after construction in the vicinity of the sewer.

You must meet the requirements for experience, certifications, training and related items as indicated in 15-7.01B.

The Engineer will review videotapes and logs to ensure compliance with the requirements listed in this specification and contract documents. Review by the Engineer must in no way diminish the your full responsibility for compliance with the contract documents. If the CCTV documentation is determined not to be adequate as required in this section, the sewer must be re-surveyed by CCTV.

15-7.02 MATERIAL
15-7.02A Television Inspection Camera
The cameras must provide color images and must be operative in 100 percent humidity/submerged conditions. The CCTV camera equipment must provide a view of the pipe ahead of the equipment and of features to the side and rear of the equipment through turning and rotation of the lens. The camera must be capable of tilting at right angles along the axis of the pipe while panning the camera lens through a full circle about the circumference of the pipe. The lights on the camera must also be capable of panning 90 degrees to the axis of the pipe. If in the determination of the Engineer, the equipment proves to be unsatisfactory, it must be replaced with adequate equipment. The camera unit must have sufficient quantities of line and video cable to inspect sewers with access as far apart as 800 feet.

15-7.02B CCTV Camera and Electronic System
The gray scale must show equal changes in brightness ranging from black to white with a minimum of five stages.

With the monitor control correctly adjusted, the six colors - Yellow, Cyan, Green, Magenta, Red, and Blue, plus Black and White, must be clearly resolved with the primary colors in order of decreasing luminance. The gray scale must appear in contrasting shades of gray with no color tint.

The picture must show no convergence or divergence over the whole of the picture. The monitor must be at least 13 inches diagonally across the picture tube.

The live picture on the CCTV monitor must be capable of registering a minimum of 500 lines horizontal resolution and be a clear, stable image with no interference.

Lighting intensity must be remote controlled and must be adjusted to minimize reflective glare. Lighting and camera quality must provide a clear, in-focus picture of the entire inside periphery of the sewers and laterals for all conditions except submergence. Under ideal conditions (no fog in the sewer), the camera lighting must allow a clear picture up to five pipe diameter lengths away for the entire periphery of the sewer. The lighting must provide uniform light free from shadows or hot spots.
Camera focal distance must be remotely adjustable through a range of 6 inches to infinity.

The monitor and software must also be able to capture and save screen images of typical sewer details and all defects. Screen image files must be named using a convention that includes upstream and downstream manhole numbers, inspection date (YYYYMMDD), and approximate location of the image from the start of the inspection.

15-7.02C Video Recording

The video and audio recordings of the sewer inspections must be made using digital video equipment. The digital recording equipment must capture sewer inspection on DVD with each sewer reach inspection recorded as an individual movie file (.mpeg, .mpg). The files must be named according to a convention that includes the U upstream and D downstream manhole numbers and the inspection date (YYYYMMDD), or per requirements established elsewhere in the Specifications. Video and audio recordings must be transferred onto non re-recordable DVDs upon completion.

The audio portion of the composite video must be sufficiently free from electrical interference and background noise to provide complete intelligibility of the oral report. Audio must be recorded by the operating technician on the inspection video as the sewer is inspected and must include the sewer location, identification of beginning and terminating manholes including location (address or cross streets), inspection direction, length of inspection, side sewer identification, flow information, complete descriptions of the sewer line conditions as they are encountered, description of any rehabilitation work encountered, reason for termination, and other relevant commentary to the inspections. In addition, the audio reports must include the distance traveled on the specific run, a description of abnormal conditions in the sewer and side sewer connections as they are encountered, explanations for pausing, backing up, or stopping the survey, and the final measured center to center distances between consecutive manholes. Audio dubbing after the inspection is prohibited.

The reaches must be inspected from upstream to downstream, wherever possible. The images recorded on the CCTV video must be the same images that are required to be displayed on the CCTV monitor. The footage counter must be zeroed at the beginning of each inspection and at each intermediate manhole along the inspection run. The video recorder must be paused if the camera progress is stopped for a period longer than 30 seconds due to breakdown of the equipment, or any purpose other than analyzing conditions of the sewer. The operator must document the delay on the recording when progress resumes.

The equipment used for the inspection must provide for simultaneous monitoring of the in-sewer inspection by the Engineer. Equipment that does not allow for out of sewer observation of the inspection will not be allowed.

Typed labels must be attached to the face of each DVD. The typed index labels must include the following information:

1. Content (CCTV)
2. Contractor name
3. Type of survey (CCTV)
4. Interceptor name
5. Reaches included (from Manhole Number ## to Manhole Number ##)
6. Date of survey
7. Work order number (if applicable)
8. Sheet number in plans

The inspection video must be delivered on a medium that is not re-recordable. Maintain a copy of all inspection documentation (DVDs, databases, and logs) for the duration of the work and one year thereafter.

15-7.03 MATERIAL

15-7.03A General

The CCTV camera must be positioned as close to the spring line as possible while maintaining the required equipment stability. During CCTV inspections, and continuously until completion of liner installation and inspection, provide temporary dry conditions in the sewer pipelines. Inspect and
document all manholes encountered during the inspection activities. The camera must pan the periphery of the manhole from casting to invert. Inspections must be conducted during low flow periods to increase the viewable sidewall area of the pipe.

The speed that the camera or survey unit is conveyed through the sewer while performing general inspections must be uniform and must be limited to a maximum of 30-feet per minute. The survey unit must be slowed, stopped, or backed-up to perform detailed inspections of significant features. The camera must be stopped at all defects, changes in material, water level, size, side connections, manholes, junctions, or other unusual areas. When stopped at the defect or feature, the operator must pan the camera to the area and along the circumference of the pipe. The operator must also record audio of the type of defect or feature, clock position, footage, extent or other pertinent data. Still photographs or screen captures must be taken at all defects and general line condition photographs must be taken at least every 200 feet.

During periods of camera advancement along the reach, the operator must pan to view the flow line conditions along both sides of the pipe and the crown at regular intervals. This may be done while the camera is moving forward as long as the recorded picture quality is not adversely affected. When viewing the flow line area, the camera must be returned to the forward position providing a full view of the pipe before panning to view the opposite side of the sewer or the crown conditions.

At the your own discretion or direction of the Engineer, the camera must be stopped or backed up (when conditions allow) to view and analyze conditions that appear to be unusual or uncommon for a sound sewer. The lens and lighting must be readjusted, if need be, in order to ensure a clear, distinct, and properly lighted feature. The video recorder must be paused if the camera progress is stopped for a period longer than 30 seconds due to breakdown of the equipment, or any purpose other than analyzing conditions of the sewer. The operator must document the delay on the recording when progress resumes.

15-7.03B Linear Measurement

Measure the camera progress along the full length of each reach. The length counter must be zeroed at the beginning of each inspection, and at any intermediate manhole. In the case of resuming an inspection at an intermediate point along the pipeline, the length counter must start at the last point recorded. Ensure that the counter starts to register immediately when camera progress starts. The device must be observable at ground level. Markings on the cable, instruments requiring observation inside a manhole, or correction of the length for the depth of the manhole are not acceptable.

Prior to commencing inspections, demonstrate compliance with the linear measurement tolerance specified below:

1. The equipment must measure the location of the camera unit in 1-foot increments from the beginning of each continuous section. This footage location must be displayed on the CCTV monitor and recorded.
2. The accuracy of the measured location must be within $+0.5\%$ of the actual length of the sewer reach being surveyed, or 1 foot, whichever is greater.

15-7.03B CCTV Monitor Display

The images displayed on the CCTV monitors must be a view of the pipe above the water surface as seen by the CCTV camera as the unit is conveyed through the sewer.

The camera lighting must be fixed in intensity prior to commencing the survey and the white balance set to the color temperature emitted. In order to ensure color constancy, ideally no variation in illumination must take place during the survey.

15-7.03B Data Display

The CCTV images must include an initial data display that identifies the sewer reach being surveyed and a survey status display that provides continuously updated information on the location of the survey unit as the survey is being performed. These data displays must be in alphanumeric form. The size and position of the data must not interfere with the main subject of the monitor picture.
The on-screen display should be white during inspections where the background behind the display is dark and, conversely, black where the background is light.

At the beginning of each reach of sewer being inspected, the following information must be electronically generated and displayed on the CCTV monitors as well as included in the audio track:

1. Date of survey  
2. Interceptor name/location  
3. Manhole number to manhole number (in order of inspection)  
4. Direction of survey (upstream or downstream)  
5. Time of start of survey.

During inspections, the following information must be electronically generated, automatically updated, and displayed on the CCTV monitors:

1. Survey unit location in the sewer line in feet and tenths of feet from adjusted zero  
2. Sewer diameter  
3. Abbreviated manhole reference numbers (upstream and downstream manholes in order of survey direction).

15-7.03B Manhole Number, Inspection Forms, and Defect

Use the EBMUD’s manhole numbering system when performing the inspections for this project. The entire manhole number must be used when referring to an upstream/downstream manhole for a pipe reach. Defect codes must conform to those specified in NASSCO PACP.

15-7.03B Inspection Obstructions

If the camera cannot pass the entire sewer reach from its starting direction, the reach must be inspected as much as possible from both upstream and downstream directions. If the pipe cannot be fully inspected from either the upstream or downstream manholes you must promptly notify the Engineer. Such notification must be written and include manhole to manhole reach numbers and the reason why inspection cannot be completed.

If any of your equipment becomes stuck in the sewer, you must be responsible for all costs associated with extracting the equipment from the sewer.

15-7.04 PAYMENT

Payment for pre/post construction sewer CCTV inspection is included in the payment for the sanitary sewer facility involved.

DIVISION III GRADING

19 EARTHWORK

Replace the 2nd, 3rd, and 4th paragraphs of section 19-2.03B with:

Dispose of surplus material. Ensure enough material is available to complete the embankments before disposing of it.

Replace “Reserved” in section 19-3.01A(2)(a) with:

Submit structural backfill soil samples to Engineer to confirm structural backfill complies with 19-3.02B and for compaction test.

Add between the 3rd and 4th paragraph of section 19-3.02B:

Structure backfill passing through No. 200 Sieve must have less than 15 percent non-plastic fines. Structure backfill material must have a liquid limit less than 25 and plasticity index less than 12.
Replace the 4th paragraph of section 19-3.02F with:

If you propose using controlled low-strength material, submit a mix design including test data before excavating the trench where controlled low-strength material is to be used. When tested under ASTM D 4832, the material must have a 28-day compressive strength at least 400 psi for pipe culverts.

Replace the 2nd sentence of the 1st paragraph of section 19-3.03E(1) with:

Backfill layers must be at most 0.67 foot thick and brought to near optimum moisture content before compacting. When backfilling deeper than 5 feet, backfill layers must be at most 1 foot thick. Compaction may be done by ponding and jetting only when requested by the Engineer. When compacting by ponding and jetting, the thickness must be at most 4 feet.

Add to list in 7th paragraph of section 19-3.03E(1):

7. Backfilling deeper than 5 feet.

Add to section 19-5.03A:

Prior to excavation, pothole utilities beneath new structural section and determine the exact location and depth of utilities.

At locations directly above the utilities and 3 feet on either side of the utility where the grading plane is less than 2 feet above the existing utilities, the placement and compaction of base material must be performed as follows:

1. Base material less than a 12 inch clearance from the utility must be placed and compacted with hand tools (jumping jacks, walk behind rollers, etc.).
2. Base material greater than a 12 inch clearance and less than a 24 inch clearance from the utility, may be compacted with conventional equipment, but vibrators must not be activated on rollers within this zone.

A 6 inch section of controlled low-strength material may be placed in lieu of hand compaction. No additional compensation will be provided for placing controlled low-strength material. Controlled low-strength material must comply with section 19-3.02F and 19-3.03I. Compaction above 6 inch section of controlled low-strength material must comply with section 19-5.

Add to the paragraph in section 19-5.03C:

Unless otherwise authorized, compact material without adding water.

Add before 1st paragraph in section 19-8.02:

Subgrade enhancement geotextile must be Class B1.

20 LANDSCAPE

Add to section 20-1.01A of the RSS:

20-1.01A(1) Reference Documents

Model Bay-Friendly Landscape Maintenance Specifications: serves as a reference document to provide language as needed to improve the environmental standards of ongoing landscape maintenance contracts.
**Bay-Friendly Landscape Guidelines:** fully describes the seven Bay-Friendly principles, offering 55 practices in sustainable landscape design, construction, and maintenance.

Additional Bay-Friendly resources found at www.BayFriendly.org

### 20-1.01A(2) Abbreviations

<table>
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<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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<tr>
<td>IPM</td>
<td>Integrated Pest Management</td>
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<tr>
<td>OMRI</td>
<td>Organic Materials Research Institute</td>
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Replace “Reserved” of section 20-1.01B of the RSS with:

**compost:** The product of controlled biological decomposition of organic materials, often including urban plant debris and food waste. It is an organic matter resource that has the unique ability to improve the chemical, physical and biological characteristics of soils or growing media. It contains plant nutrients but is typically not characterized as a fertilizer. (Excerpted from US Compost Council, Field Guide to Compost Use)

**IPM:** A holistic approach to mitigating insects, plant diseases, weeds, and other pests. It involves the use of many strategies for managing, but not eliminating pests. Integrated Pest Management uses cultural, mechanical, physical, and biological control methods before using pesticides to control pests and diseases in the landscape. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, the least toxic and the least persistent pesticide that will provide adequate pest control is applied.

**OMRI:** A national nonprofit organization founded in 1997 to support the organic community. OMRI reviews products to determine their suitability for producing, processing and handling organic food and fiber under the USDA National Organic Program Rule (OMRI General Materials List)

**pesticide:** As defined in Section 12753 of the California food and Agricultural Code, a pesticide includes any of the following: “(a) Any spray adjuvant. (b) Any substance, or mixture of substances which is intended to be used for defoliating plants, regulating plant growth, or for preventing, destroying, repelling, or mitigating any pest, which may infest or be detrimental to vegetation, man, animals, or households, or be present in any agricultural or nonagricultural environment whatsoever”. Antimicrobial agents are excluded from the definition of pesticide.

**sheet mulching:** Sheet mulching uses a layer of paper or cardboard underneath the mulch to enhance weed suppression and soil building benefits. This layered mulch system is often used during landscape construction to optimize mulch benefits and encourage plant establishment.

Replace section 20-1.02C of the RSS with:

Synthetic pre-emergents and pesticides are prohibited unless approved by the Engineer. Integrated Pest Management (IPM) practices must be used to control pests and diseases associated with landscaped areas. Pesticides that are not allowed by OMRI in its generic materials list are prohibited.

Utilize integrated pest management (IPM) practices during installation and maintenance to control pests and disease in the landscape. IPM uses cultural, mechanical, physical, and biological control methods before using pesticides. Chemical controls are applied only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, the least toxic and the least persistent pesticide that will provide adequate pest control is applied. Refer to BFL Guidelines and Maintenance Specification for more information.

Preferential use should be given to the following weed and pest controls:

1. Cultural/Mechanical/physical methods must be used as the first choice in weed management.
2. Monitor planting areas frequently to identify and eradicate weeds early in the growth stage prior to their setting seed.
3. Cut or pull weeds using hand operated equipment where possible.
4. Mulches must be maintained at all times over soil surface that is not covered by vegetation.

If allowed on this project by the Engineer, apply all chemicals in a safe manner and according to label instructions and Agency, State and Federal requirements. A California Chemical Applicators license is required for chemical applications. Mix and apply chemicals to protect against accidental spills and drift to non-target areas, and to insure safety of the applicator. Any spilled chemicals, as well as contaminated soil, water, and/or landscape materials must be removed from the Project and disposed of in accordance with the Agency requirements. Maintain applicator’s licenses and records of applications as required by the State.

A Chemical Work Report must be completed for each chemical application. Submit chemical usage reports to the County Agricultural Department.

Maintain records of all pest management activities. Each record must include the following information:

1. Target pest
2. Type and quantity of pesticide used
3. Site of the pesticide application
4. Date the pesticide was used
5. Name of the pesticide applicator
6. Application equipment used
7. Prevention and other non-chemical methods of control used

Submit the pest management record to Engineer on monthly basis.

Least toxic herbicides may be employed as a last resort, such as:

1. Fatty acid potassium salts (herbicidal soaps e.g. Safer's Superfast Weed and Grass Killer, or approved equal, Dr. Bronner's Peppermint Anti-Bacterial Soap, or approved equal)
2. Acetic and citric acids (e.g. Nature's Glory Weed and Grass Killer RTU, or approved equal)
3. Clove, citrus, mint and thyme oil (e.g. Matran II, or approved equal, Xpress, or approved equal)
4. Corn gluten
5. Low-toxic, low-residual herbicide [e.g. glyphosate (Round-up, or approved equal), glufosinate-ammonium (Finale, or approved equal), pelargoic acid (Scythe, or approved equal)]

Restricted herbicides that may not be used because they have been identified as ground water contaminants are (trade names in parentheses):

1. Atrazine
2. Simazine
3. Bromacil
4. Prometon
5. Bentazon
6. Norflurazon

Restricted herbicides that may not be used because they have been identified as a compost contaminant are:

1. Picloram
2. Clopyralid

Add section 20-1.02D(1) to the RSS:

20-1.02D(1) Imported Topsoil

Imported Topsoil must be a harvested soil from fields or development sites. The organic content and particle size distribution must be the result of natural soil formation. Manufactured soils where coarse sand, composted organic material or chemical additives have been added to the soil to meet the requirements of this specification section must not be acceptable. Imported topsoil must be from a source outside selected by you and in compliance with the requirements specified herein. The engineer may
make such inspections and perform such tests as deemed necessary to determine that the material meets the requirements.

Designate the proposed import sources in advance and must provide source samples and soils test of material to the Engineer.

Provide imported planting topsoil only if existing topsoil at tree and median planting areas is determined to be agriculturally unsuitable or if insufficient amounts of existing topsoil are available. Use imported topsoil mix that has a minimum of 5% and up to 10% organic matter (with 20% or more compost content). Soil portion must be sandy loam as defined by USDA. All material must be free of trash and debris, or any other deleterious materials. Imported topsoil must be fertile, agricultural soil, free of impurities, plants, seeds, weeds and roots. Top soil must have the same relative composition and structure, a friable sandy loam character, and be free of roots, clods and stones larger than 1 inch in greatest dimension, pockets of coarse sand, noxious weeds, seeds, brush, and other litter. It must not be infested with nematodes or other undesirable insects and plant disease organisms. Soil must contain sufficient quantities of nitrogen, phosphorus, potassium, calcium and magnesium to ensure a medium for sustained healthy plant growth and must meet the following criteria:

The imported soil must not contain any detectable concentration of chemicals analyzed for by EPA Method 8080, EPA Method 8240/8260, and EPA Method 8270; or any petroleum hydrocarbon identified by EPA Method 8015 - modified for TPH as gasoline, diesel and oil and grease.

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<th>Element</th>
<th>Concentration Limit</th>
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<tr>
<td>Arsenic (As)</td>
<td>Total arsenic less than 7 mg/kg</td>
</tr>
<tr>
<td>Cadmium (Cd)</td>
<td>Total cadmium less than 35 mg/kg</td>
</tr>
<tr>
<td>Chromium (Cr)</td>
<td>Total chromium less than 700 mg/kg</td>
</tr>
<tr>
<td>Lead (Pb)</td>
<td>Total lead less than 200 mg/kg</td>
</tr>
<tr>
<td>Mercury (Hg)</td>
<td>Total mercury less than 4 mg/kg</td>
</tr>
<tr>
<td>Selenium (Se)</td>
<td>Total selenium less than 200 mg/kg</td>
</tr>
<tr>
<td>Zinc (Zn)</td>
<td>Total zinc less than 1,000 mg/kg</td>
</tr>
</tbody>
</table>

### Agricultural Suitability

<table>
<thead>
<tr>
<th>Property</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salinity (ECe x 10) (3))</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Sodium (SAR)</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Boron (PPM in Saturated Extract)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Reaction (pH of Saturated Paste)</td>
<td>5.5</td>
<td>7.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silt</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>Clay</td>
<td>10%</td>
<td>25%</td>
</tr>
<tr>
<td>Coarse Sand</td>
<td>5%</td>
<td>20%</td>
</tr>
<tr>
<td>Gravel (Maximum Aggregate Size 13 mm)</td>
<td>0%</td>
<td>15%</td>
</tr>
<tr>
<td>Decomposed Organic Matter</td>
<td>5%</td>
<td>10%</td>
</tr>
</tbody>
</table>

At least 15 days before scheduled use, a soil report for the proposed source of topsoil must be submitted to the Engineer for approval. Submit a written request for approval, which must be accompanied by a written report of a testing agency registered by the State for agricultural soil evaluation, which states that the proposed source complies with these specifications. Topsoil must not be incorporated in the landscape planting work until the Engineer has approved the Soil Analysis Report.
Submit soil samples to Soil and Plant Laboratory, 1101 S. Winchester Blvd., Suite G-173, San Jose, CA 95128 (408) 727-0330 (or other laboratory approved by the Engineer). Laboratories that participate in the North American Proficiency Testing Program (NAPT) are recommended. See www.usual.usu.edu/napt/ for participating laboratories.

Request test No. A 05-2, including: soil fertility, pH, salinity, nitrate, ammonium, phosphate, calcium, magnesium; agricultural suitability, boron, sodium, absorption ratio (SAR); particle size appraisal, organic content, USDA particle size distribution; soil amendment and fertilizer recommendations. Provide the Soil Lab with the plant list for horticultural suitability and where such plants will be placed in relation to the soil sample sites.

In addition, request a noxious and invasive weed test.

Add section 20-1.02D(2) to the RSS:

**20-1.02D(2) Existing Topsoil**

Existing topsoil is defined as soil found in place in the designated landscape area, including soil compacted in place as part of the earthwork specified for the project. Existing topsoil must conform to the Agricultural Suitability and other criteria as specified in 20-1.02D(1). Do not remove and store subsoil. Do not take topsoil from within drip line of existing trees to be retained.

You must take soil samples to ensure that all representative soil types within planting areas are analyzed for agricultural suitability. Site soil must not be amended and incorporated in the landscape planting work until the Engineer has approved the Soil Analysis Report.

Any existing topsoil must be tested and must conform to the Agricultural Suitability as specified for imported topsoil in section 20-1.02D(1). In addition, request a germination (bioassay) test for each location listed below to identify the presence of any organic or inorganic herbicides. These trials require four to five weeks to complete. Your submittal for a soil analysis must consist of core samples of representative site soil and/or fill soil, which will be in contact with plant roots and import topsoil. Sample to be taken at actual curbside tree planting location and not contain any plant or organic material from the soil surface.

You must submit a plan with proposed sample locations for review and approval by the Engineer. Final sample locations must be as directed by the City Engineer with additional sample locations required at the discretion of the City Engineer. The proposed sample locations must be based on the following criteria:

For tree planting in curbside locations take one representative sample each along the following corridor segments.

1. E14th Street, between Sunnyside Drive and Toler Avenue
2. Davis Street

For tree planting in median locations take one representative sample each along the following corridor segments. Sample to be taken at actual median tree planting location.

1. International Boulevard between 36th and 49th Avenues
2. International Boulevard between 49th and 64th Avenues
3. International Boulevard between 64th and 81st Avenues
4. International Boulevard between 81st and 91st Avenues
5. International Boulevard between 91st and 104th Avenues
6. One sample from a standard, not bioretention, planting area in the Elmhurst off-street parking lot
7. One sample each for the two landscaped medians in San Leandro.

If any imported topsoil is needed, analyze one representative sample for every 3,000 cubic yards of import soil.

Each sample of native soil must be a core sample taken from the rooting depths of the proposed plantings. Typical rooting depths are as follows:
Stockpile existing topsoil found to be agriculturally suitable in storage piles at the planting site, or where designated by the Engineer. Construct storage piles no higher than six feet and so as to freely drain surface water. Construct storage piles no higher than six feet and to freely drain surface water. If required by the Engineer, cover storage piles to prevent windblown dust and erosion.

Remove noxious weeds, rocks over one inch in diameter, and debris from topsoil and dispose off site in accordance with local ordinances. Amend prior to reuse as specified in the soil analysis report to meet required organic matter content. Apply non-synthetic fertilizers and other amendments, including appropriate quantities of compost to bring soil organic matter content to a minimum of 5%, as specified in the soils analysis report, to the surface of the aerated soil/subgrade.

Submit soil samples from this material to determine an organic and other amendments. Utilize stockpiled, amended site soil as described under section 20-3.03C(2)(a)(ii).

Add section 20-1.02E to the RSS:

**20-1.02E  Drain Rock**

Drain rock for drainage sumps at transplanted palm trees locations must be 3/4-inch to 1 1/2-inch hard, clean rock, free of organic matter and deleterious substances.

Add section 20-1.02F to the RSS:

**20-1.02F  Irrigation and Aeration Tube Assembly**

Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or Shop Drawings indicating size, materials, and quantities of items being supplied.

Irrigation and aeration tube assembly shown on the plans must consist of:

1. 4-inch perforated, single wall, high-density polyethylene (HDPE) pipe with soil-tight performance, conforming to requirements of ASTM F405 and AASHTO M 252;
2. 9-inch by 9-inch square, 9-inch deep housing spigot adapter, such as #931, manufactured by NDS, or approved equal and matching 9-inch square cover grate, made from structural foam polyolefin with UV inhibitor and open surface area of 39.50 square inches; and,
3. Corrugated, polyethylene (PE) snap tee fitting compatible with 4-inch perforated pipe and conforming to requirements of ASTM F667.

Assemble as shown on the Plans and per the manufacturer’s recommendations.

Replace 1st paragraph of section 20-2.01A(3)(b) of the RSS with:

The use of synthetic pre-emergents and pesticides requires approval by the Engineer.

If the application of pesticides is approved by the Engineer, notify the engineer of application times at least 24 hours before each application.

Replace section 20-1-1.03C(C) of the RSS with:

Control weeds by hand pulling, use pesticides only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, the least toxic and the least persistent pesticide that will provide adequate pest control is applied. Refer to BFL Guidelines and Maintenance Specification for more information.

If weeds are to be controlled by hand pulling, hand pull weeds before they reach the seed stage of growth or exceed 4 inches in length, whichever occurs first.

Dispose of hand pulled weeds the same day they are pulled. Dispose of removed groundcover within 3 days.

OCTOBER 2015
Replace item 4 of section 20-2.01A(3)(b) of the RSS with:

4. Drip emitter tubing

Replace “Reserved” of section 20-2.01A(4)(a) of the RSS with:

Provide at least one person who must be present at all times during execution of irrigation and must be thoroughly familiar with the type of materials being installed and the material manufacturer's recommended methods of installation and who must direct all work performed under this section.

In addition to complying with all pertinent codes and regulations, comply with the latest rules of the National Electrical Code and the Electrical Safety Orders of the State of California, Division of Industrial Safety for all electrical work and materials.

Replace the 3rd paragraph of section 20-2.01A(4)(b)(i) of the RSS for section 20 with:

Supply lines on the discharge side of the valve must be tested in conformance with Method B only. Testing by Method A is not allowed.

Supply lines installed by trenching and backfilling and supply lines that are completely visible after installation must be tested by Method B.

Test irrigation supply line in conduit by Method A with the testing period modified to 0.5 hour and no allowable pressure drop.

Replace each occurrence of “sprinkler” in the heading and section 20-2.01A(4)(c) of the RSS with:

bubbler

Replace the section 20-2.01B(2) of the RSS with:

Not Used

Replace each occurrence of “sprinkler” in section 20-2.01B(3) of the RSS with:

bubbler

Replace each occurrence of “sprinkler” in section 20-2.01C(1) of the RSS with:

bubbler

Replace 7th to 8th paragraph of section 20-2.01C(2) of the RSS with:

Trenches for irrigation supply lines and conduits 3 inches and larger must be:

1. Lateral lines
   1.1 15 inch minimum cover in planting areas measured from the top of the installed pipe.
   1.2 24 inch minimum cover under paving measured from the top of the installed pipe.
   1.3 5 times the pipe or conduit diameter deep measured from the top of the installed pipe.
   1.4 2 times the pipe or conduit diameter wide measured from the top of the installed pipe.

2. Main lines
   1.1 18 inch minimum cover in planting areas measured from the top of the installed pipe.
   1.2 24 inch minimum cover under paving measured from the top of the installed pipe.
   1.3 5 times the pipe or conduit diameter deep measured from the top of the installed pipe.
   1.4 2 times the pipe or conduit diameter wide measured from the top of the installed pipe.

Trenches for irrigation supply lines and conduits 2-1/2 inches or less in diameter must be:

1. Lateral lines
   1.2 15 inch minimum cover in planting areas measured from the top of the installed pipe.
   1.3 24 inch minimum cover under paving measured from the top of the installed pipe.

2. Main lines
   1.2 18 inch minimum cover in planting areas measured from the top of the installed pipe.
   1.3 24 inch minimum cover under paving measured from the top of the installed pipe.
When two pipes are to be placed in the same trench, maintain a six-inch space between pipes as minimum. No pipe must be installed directly over another.

Replace each occurrence of “sprinkler” in section 20-2.01C(5) of the RSS with:

bubbler

Replace the section 20-2.01C(6) of the RSS with:

Not Used

Add to section 20-2.02C of the RSS:

20-2.02C(8) Relocate Irrigation Facility

Relocate irrigation controller as shown or as directed by the Engineer and install under section 20-2.

Add to section 20-2.03B(1) of the RSS:

Backflow prevention assembly and enclosure must be of the type and manufacturer shown on the plans, or approved equal.

Add to section 20-2.03B(3) of the RSS:

Backflow blanket must be installed on the backflow assembly, green color, as manufactured by Febco, or approved equal. Coordinate with the Engineer to schedule and complete testing of backflow prevention unit by an authorized agency, to insure that its operation is in accordance with the requirements set forth by local codes and Standard Specifications.

Replace the item 5 of 1st paragraph of section 20-2.02C(7) of the RSS with:

5. Be powder coated by the manufacturer, in the City of Oakland, the Color to match City Standard RAL 6009.

Replace the section 20-2.04 of the RSS with:

Replace “conductors” in 1st and 2nd paragraph of section 20-2.05B of the RSS with:

conductors/irrigation wiring

Add to 1st paragraph of section 20-2.05C(3) of the RSS with:

6. Installed within the City of San Leandro

Replace item 3 of the 1st paragraph of section 20-2.07B(2) of the RSS with:

3. Be fully automatic and capable of operating a complete full year master schedule to allow 12 month programming.

Replace item 9 of the 1st paragraph of section 20-2.07B(2) of the RSS with:

9. Be capable of operating 7 regular irrigation programs
   9.1 Be cable of syringe/propagation program, with individual station Cycle & Soak watering
   9.2 Be able to calculate the actual finish times in AM or PM for each program.
   9.3 Be capable of stacked or simultaneous program operations.

Add items of the 1st paragraph of section 20-2.07B(2) of the RSS with:

18. Have a water budget feature that provides monthly water volume budgets proportionate to historical ET and interactive with all programs, and able to alert user when controller’s water usage is more than a user set water budget.
19. Have programming based on a 7, 14, 21 or 28 day scheduling and be able to irrigate in minutes, inches, and percent of ETo and/or soil moisture content.
21. Have the ability to display area, plant and/or equipment descriptions for each station.
22. Be capable of programming all or a group of stations with the same run time and soak-in time by using a Copy key.
23. Be capable of operating a test program without affecting the controller’s normal program station times or without terminating a regular watering schedule.

24. Be a complete English and Spanish operator’s manual built in the controller and viewed in the controller’s display.

25. Have internal non-volatile memory capable of lifetime program memory retention without the use of batteries.

26. Be capable of reading a flow sensor and automatically “learn” each station’s average gallon per minute flow rate on a continuous basis.

27. Be a built-in amperage meter to accurately measure and diagnose valve solenoid electrical problems such as ‘No Current’, ‘Station Short’, ‘Under Current’, ‘Over Current’, etc.

28. Be capable of receiving on site, daily ET weather data and automatically determine station run times without the use of central software.

Add to section 20-2.07B(2)(a) of the RSS:

For those controllers operating as a satellite, they must be capable of irrigating the program entered by the central base computer or by programming at the satellite location, without having to go back to the central to accept the change. The controller must allow individual station operation of any field satellite units. Controller must also be capable to remotely perform all satellite keystroke operation from the central base computer utilizing an on-screen graphics replica of the satellite controller panel.

1. The controller must be able to log for each station for the last 30 watering days the following information:
2. Time and date irrigation ran
3. Number of repeat cycles run
4. Programmed minutes and actual minutes run
5. Programmed inches and actual inches applied
6. Manual & Test minutes
7. No Water days programmed
8. Hold-Over Time
9. Actual GPM flow rate that night compared to Learned or Limit value
10. Alert Flags

The controller must have an operator-set water window. Irrigation will not continue past a set end time. Remaining run-times will be carried over in a hold-over table to be applied at next scheduled irrigation.

Multi-level password protection settable using central software. Controller will log when user signed in and when user signed out.

Radio remote receiver board, must be built-in the controller and a hand-held radio remote transmitter will be supplied so that the end user can trouble shoot valves remotely without having to go the controller itself.

Controller must have a detailed water usage report categorizing for each month the usage during scheduled irrigation, during test and manual key operation, and when valves are bled manually or quick couplers are used.

The controller must communicate with a central computer using an Ethernet network designed to connect the controller with serial interface to an existing network using the TCP/IP protocol. The Ethernet option must be integrated into the controller and must not require a separate power source. The controller must be model –EN when one controller is sharing one Ethernet connection, and must be model –MEN when the controller is connected to the Ethernet jack and is also sharing this jack with –ME option controllers. The user must supply an Ethernet (RJ45) connection at the controller location with the network set to have access to the connection. The Ethernet network must be set to assign a static IP address to the irrigation controller.

Add to section 20-2.07B(3) of the RSS:

Custom Enclosure must be of the type and manufacturer shown on the plans. TBD
Replace heading and section 20-2.07B(4) of the RSS with:

20-2.07B(4) Weather Monitoring

The central control system must include a remote connected ET gage (model ETG) where shown on the plans and specifications. The ET measuring device must be powered by the selected field controller designated as a −G model. ET is measured directly in 0.01 inch increments and pulses from the gage are sent directly to the field controller. The daily, on-site ET data is then stored in a 28 day table in the controller.

Paige P-7171-D cable installed in conduit is run from the location of the ET gage back to the controller designated as the −G model. Maximum length of one chain is 1,000 feet. Runs are to be direct pulls without underground splices.

Top surface of the gage should be 3’-4” above grade. The location should be representative of the area to be irrigated, free of any obstructions to sunlight and wind. The location of the gage should be located in an area where water from bubbler heads does not hit the top surface of the gage. A factory-direct field service technician must verify correct placement of the ET gage.

A vandal-resistant stainless-steel enclosure, model ETGE, must be used to protect the ET gage. The ET gage must be mounted on a poured concrete base 18”x18”x 6” with the enclosure metal base and stake imbedded into the slab with horizontal plate 1 inch below the poured concrete, with finish grade 2 inch below top of concrete base.

The central control system must include a remote connected rain bucket (model RB-1) where shown on the plans. The rain-measuring device must be wired using the 60 feet of 2 conductor cable supplied with the rain bucket to the selected field controller designated as a -RB model. The cable should be installed in conduit and the connections are to be made at a terminal strip inside the enclosure. Maximum length of cable run is 200 feet.

The rain bucket must accurately measure rainfall in 0.01 inch increments by means of a tipping and emptying device mounted below the center of the collection dish.

The rain bucket controller must provide programming parameters for rain as recommended by the manufacturer and the City Maintenance Staffs of the Oakland and San Leandro.

The same manufacturer as the irrigation control system must supply the ET Gage and the tipping rain bucket.

Rain sensor units must be one Rated 24 V(ac) to 30 V(ac).

Add to section 20-2.07B of the RSS:

20-2.07B(5) Flow Monitoring

The Model FM flow meter must use two #14 AWG, one red, and one black in 1 inch PVC conduit to connect to the irrigation controller. The maximum wire run between flow meter and controller must be 2000 feet. The flow meter sends low voltage digital pulses back to the controller and therefore all electrical connections must be waterproof and resist any moisture entry.

It is intended that all wire runs between the controller and flow meter be direct pulls and have no splices. If wire splices are unavoidable, they must be installed in a valve box with Spears DS-100 connectors with Spears sealant or 3M Scotchlok No. 3570 connector sealing pack used.

Each flow meter must have the following characteristics:

1. Housing to be a Schedule 80 polyvinyl chloride tee or bronze tee
2. Have a pulsing output that operates at 9VDC and a pulse rate that is proportionate to the GPM
3. Fully compatible with the internal interface at each field controller
4. Powered by the controller
5. Replaceable metering insert
6. Must feature a six-bladed design with a proprietary, non-magnetic sensing mechanism
7. Be by the same manufacturer as the irrigation controller.
Single controller must be able to receive up to three separate flow meter inputs on projects consisting of more than one water source for irrigating landscape. The controller must sum up the readings of all flow sensors connected. The irrigation controller is specified as a –F controller. The first flow meter must be wired to the irrigation controller using standard red and black flow meter wires from controller. The second and third flow meters must be wired using additional wire harness supplied when controller is specified as a –F option.

Several controllers up to eight can share one or multiple points of connection with multiple flow sensors when each controller has been specified with the –FL option and with the appropriate hardwire link (-M, - MD, ML, etc.) will allow the user to link several controllers with the standard 4 conductor communication cable.

This option allows several controllers to share the irrigation programs and flow information between themselves for:

1. Monitoring of system flows
2. Avoiding water window by maximizing number of valves on without exceeding system flow capacity
3. Turning OFF valves with excessive flow rates due to broken lateral lines.
4. Tracking water usage and comparing to a water budget
5. Elimination of relays when sharing pumps and master valves
6. All this is done in the field without the need for a central computer

Several controllers up to eight can share one or multiple points of connection with multiple flow sensors when each controller has been specified with the –FL option and with radio link capability known as the –SR communication option when hardwire is not feasible or cost effective. This allows the user to link several controllers with unlicensed frequency hopping radios.

20-2.07B(6) Computerized Central Control System

The computerized central control system must be installed in conformance with the manufacturer’s instructions and must consist of:

1. Central control computer and software
2. Satellite irrigation controllers
3. Irrigation controller enclosure cabinets
4. Ethernet network,
5. Radio communication options, phone communication options, or 2-wire path cable
6. Flow/weather sensor options

Central control computer must consist of the following:

1. The computer for the computerized central control system must be IBM or 100% compatible, 80586 (Pentium) minimum 600MHz.
2. The computer must be capable of performing Multi-Tasking, (the ability of the base station to perform multiple functions concurrently) i.e. perform other tasks such as word processing or data manipulation while the irrigation software system functions are performed in the background.
3. Windows 95/98/XP/XP Pro/NT 4.0 (SP4)/2000 (ME not supported)
4. The computer must have 128MB RAM (256MB of RAM recommended) and 300 MB of hard disk space for data storage (10G recommended).
5. The computer must have a 17” True-Color monitor.
6. The computer must have two (2) serial ports, one (1) parallel port, one (1) keyboard port, one (1) printer port, and one (1) 3.5” High Density Floppy Diskette Drive, (1) 52x CD ROM drive and an internal 100 mb Zip drive.
7. The computer must have 28.8 K or faster internal modem.
8. The computer must have a Microsoft compatible mouse.

Central control software must be a Windows based software, manufactured by the same manufacturer as the irrigation control system and must be able to be loaded on any computer that meets the above specifications.
Irrigation Central Control Software must consist of the following:

1. The software must be capable of operating up to 9,999 field controllers.
2. The system must be fully programmable providing the operator with absolute and full control of the entire control system. Total and complete flexibility of operation of any station on any satellite unit must be possible at any time. The system must provide a degree of flexibility such that in effect, each station of the satellites capable of being controlled as if completely independent. A given satellite unit and a given station of that satellite may receive many different commands and each command must be effectively executed without interference with any other command.
3. All programming must be maintained in the computer and at the field satellite units. It must be possible to alert central user of any changes or reprograms in the network from the field satellite unit. The field control must allow manual operation and program change of any satellite at any time whether or not the computer has that satellite under control. Password protection for unauthorized program changes must be incorporated into the field satellites.
4. The system must be capable of integrating with ET gages and Tipping Rain Buckets for the purpose of monitoring daily weather conditions (rain and Evapo-transpiration) and automatically calculate a daily Evapo-transpiration (ETo) value. The entire system or any portion of the system will then be automatically adjusted (daily) as to station operating time, according to this ETo value. The system must still allow the operator the opportunity to use his expertise and input to have each station adjust automatically to compensate for different types of soils, grasses, plant materials, exposures, etc. The system must store indefinitely all ETo data to allow for accurate reporting and comparing of seasonal/historic site ETo information.
5. The system must not be limited to the control of irrigation only, but must also be capable of controlling other functions such as lighting, security systems, valves, fountains, etc. In addition, control-type instruments for the monitoring of such things as pressure, flow, moisture, rainfall, wind speed, pumps, etc. must be able to be integrated into the system.
6. The system must incorporate direct communication of both central data exchange and field input devices such as flow/weather and moisture sensors without the use of interface devices or equipment. The fields units must be capable of utilizing any combination of hardwired, standard telephone, point-to-point local radio (450-470 MHz), or Ethernet network using the TCP/IP protocol. The Satellite controllers capable of directly receiving, storing, and operating commands down loaded from the central computer. The central computer must have the ability to be turned off during system operation.
7. The central control software must not conflict with other software programs running on the same computer.
8. All schedules and information relating to the schedules must be maintained and held in both the central control computer (base) and the field satellite controller.
9. The central software must allow for the uploading and downloading of all programs and log data by controller or groups of controllers.
10. The system must provide for rain shutdown of all or selected individual field programs. This feature can also be used for emergency shutdown of all field units that may be operating at the time.
11. The system must allow direct real-time access to run stations, run programs, check for flows, check master valve operation, and turn controllers on or off.
12. Print alerts each day based on operator-set filters. This feature prints only program changes and problem flags selected by the operator.
13. Automatically creates permanent files each time log or program data is uploaded.
14. Allows all program data, log data, summary data and alert data for each controller to be selectively printed by controller or group.
15. Automatically uploads weather data from the ET gage and Tipping Rain Bucket and re-distributes to all field units.
16. The field controllers must be capable of monitoring flow and alerting the operator of both high and low flow situations on a per-station basis and also alert for both high and low current (amperage) required by solenoids on a per-station basis.
17. Intuitive Windows-based menu driven format requires no special training to operate.
18. Failure of the central control system or communication links to the field controllers must not affect normal, water management operation of irrigation controllers.
19. Water usage data is automatically retrieved monthly from each controller and written to a text file for easy placement into windows graphing programs.

20. Allows user to view and / or override any changes made at irrigation controllers. The user can identify who went in any field unit, what was done, and when that user left, through the use of a multi-level password protection feature.

21. Central Control System Alarms

Software must report the following alarm conditions:

1. Communication failures and successes (identifies type of problem, time, location).
2. Excessive and low flow conditions - time (AM/PM) when occurred, mainline unscheduled flow, individual valve and field controller.
3. Weather data report.
4. Manual watering and manual operation in the field (controller/satellite) and time.
5. Current (amperage) alarms both high and low and output Shorts due to solenoid failure.
6. Alarms must be able to be processed and responded to at both the field controller location and the central computer.
7. Alarms must be reported at upload time (in AM after irrigation is completed or at designated time by operator).
8. Reports must also include logged times.
9. Example Alarm: High Flow

Field controller monitors flows real-time continuously for single or multiple valve operation.

When excessive flow occurs by a selected percent over normal, or over a limit value, the following will happen.

Controller will isolate the problem valve and shut down just that valve and flag it, while irrigating all other valves. Controller able to do this even when irrigating up to three valves at the same time.

Irrigation will continue on all other programmed stations if flow is normal. An alarm will be generated at the controller location and will be sent to the central computer when the next scheduled or manual polling occurs. The system will measure valve each new watering night and continue to shut down and flag problem until fixed. If flow exceeds a user set main line break limit, both for during irrigation and all other times, the controller will close the master valve and display a ‘Mainline Break’ alert on the window of the controller.

Alarms are reported at the AM upload, and are present on printer and/or screen when operator water manager arrives in AM.

Hand-held Radio Remote Transmitter must be as indicated on the plans.

Central Communication/Radio hardware must be as indicated on the plans.

Replace section 20-2.08B(5) of the RSS:

In the City of Oakland:

1. PVC Pipe conduit must be schedule 40 and comply with ASTM D 1785.
2. Fitting must be schedule 80.

In the City of San Leandro;

1. PVC Pipe conduit used for lateral pipes must be schedule 40 and comply with ASTM D 1785.
2. PVC Pipe conduit used for mainline pipes must be schedule 80.
3. Fitting must be schedule 80.

Add to section 20-2.09A(4) of the RSS:

Verify and be familiar with the location, size and material at the existing source of water supply to the irrigation system, as shown on the plans. Source of supply and point of connection must be the existing components at approximate locations as shown on plans.
Replace section 20-2.09B(4) of the RSS with:

Drip irrigation tubing to be continuous self-cleaning, pressure compensating with built-in check valve; and have integral and evenly spaced pressure compensating check valve emitters welded to the inside of the tubing that contains recycled content.

Drip irrigation tubing must be nominally sized to 1/2 inch low-density linear polyethylene tubing with recycled content qualifying for maximum LEED credits.

Drip irrigation tubing must be constructed with pressure compensation, continuously self-cleaning, integral emitters with an internal check valve at following spacing:

1. 12 inches on center
2. 18 inches on center
3. 24 inches on center

The exterior of the tubing must be brown in color and conform to an outside diameter of 0.66 inches and an inside diameter of 0.56 inches.

Individual pressure compensating emitters must be welded to the inside wall of the tubing as an integral part of the manufacturing process. These emitters must be constructed of a two piece plastic emitter housing containing a continuously self-flushing molded silicone diaphragm. The emitter must have a built-in check valve that will hold back a 4.6 feet column of water. The emitter must be installed into the tubing so that the inlet to the emitter is toward the center of the tubing cross section. The emitter must also have a built-in physical root barrier whereby the water must exit the emitter from one location and must exit the tubing from a second location. This physical barrier must create an air gap inside the exit path of the emitter.

Each emitter must have the ability to independently regulate discharge rates, with an inlet pressure range of 14.5 pounds per square inch to 58 pounds per square inch, at a constant flow and with a manufacturer’s coefficient of variability of 0.03 or less. Recommended operating pressure must be between 14.5 pounds per square inch to 50 pounds per square inch. The emitter discharge rate must be:

1. 0.26 gallons per hour
2. 0.4 gallons per hour
3. 0.6 gallons per hour
4. 0.9 gallons per hour

The emitter discharge rate must utilize a combination of turbulent flow and reduced pressure compensation by molded silicone diaphragm. The emitters must be capable of continuously cleaning themselves while in operation. The drip irrigation tubing must be available with the following spacing between emitters unless otherwise specified:

1. 12 inches
2. 18 inches
3. 24 inches

For subsurface installation, Drip irrigation tubing pipe depth must preferably be 5 inches with a minimum of 4 inches to a maximum of 6 inches. Maximum system pressure must be 50 pounds per square inch for maximum fitting integrity. Filtration must be 120 mesh or finer. Bending radius must not be smaller than 7 inches or tubing kinking may result.

For under mulch installations, 6 inch metal wire staples (TLS6) must be installed 3 feet to 5 feet on center, and two staples must be installed over every change-of-direction fitting.

The emitter plug ring must be a pre-formed plastic ring with a rounded inside plug that can be used to plug a drip irrigation tubing or emitter outlet.

Add between the 3rd and 4th paragraph of section 20-2.09B(5) of the RSS:

Lateral pipes in the City of San Leandro must be schedule 40 pipe.
Mainline pipes in the City of San Leandro must be schedule 80.

Add to section 20-2.09B(5) of the RSS:

20-2.09B(5)(a) Polyvinyl Chloride Pressure Rated Pipe Conduit

PVC pressure rated pipe conduit must be Type I Grade II pressure rated pipe and comply with ASTM D1784 Class 12454-B. The inside diameter of pipe must be the same size as iron pipe.

PVC pressure rated pipe conduit must be marked at intervals not to exceed 5 feet with the following information:

1. Manufacturer's name
2. Nominal pipe size
3. PVC type and grade
4. S.D.R. rating class
5. NSF approval

PVC Type I must be threaded pipe.

PVC pressure rated pipe conduit fittings be PVC Type II, Schedule 40 NSF approved

Caution must be utilized in handling Type I pipe due to the possibility of cracking or splitting when connection is plastic to metal, male adapters must be used unless otherwise noted or detailed. The Male adapter must be hand tightened, plus one turn with a strap wrench. Joint compound must be non-lead base, Teflon paste or equal.

20-2.09B(5)(b) Polyvinyl Chloride High Impact Pipe

PVC high impact pipe must be Type I Grade II High Impact Pipe. The outside diameter of pipe must be the same size as iron pipe.

PVC high impact pipe must be marked at intervals not to exceed 5 feet with the following information:

1. Manufacturer's name
2. Nominal pipe size
3. PVC type and grade
4. S.D.R. rating class
5. NSF approval

PVC high impact pipe conduit fittings must be PVC Schedule 80, Type II, NSF approved.

Threaded PVC high impact pipe conduit must be Schedule 80, Type 1120.

Solvent for all PVC pipe must be #711 Gray, along with #P-70 primer, NSF approved.

Add to section 20-2.09B of the RSS:

20-2.09(6) High Density Polyethylene Pipe

Irrigation supply lines installed within hardscape, across streets, sidewalks, median islands and similar features must be installed in high-density polyethylene pipe (HDPE) schedule 80. HDPE must be joined per section 20-2.09C(5).

Sleeving/crossovers must comply with ASTM F2160. Sleeving/crossovers must be a minimum of 4 inch diameter and at least two times the total sum diameter of all pipes contained within sleeve. Sleeves must extend 12 inches beyond edges of hardscape. You are responsible for coordinating sleeve and pipe locations with other trench work and paving installations prior to installation.
Replace each occurrence of “sprinkler” in section 20-2.09C(1) of the RSS with:

bubbler

Replace section 20-2.09C(3) of the RSS with:
Install sub-surface drip irrigation tubing under manufacturer's instructions.
Install a manual flush valve as recommended by the drip emitter sub-surface assembly manufacturer.
The emitter plug ring must be constructed of an injection-molded plastic of a diameter slightly larger than the outside diameter of the drip irrigation tubing. The circular design must be open on one end to enable it to be slipped over the tubing. Within the interior of this ring opposite the open end is a rounded plug made to press-fit into the water outlet of the emitter to prevent water emission.
Slip the emitter plug ring over the drip irrigation tubing and push the plug into the tubing outlet hole until it seats securely in the hole.

Add to section 20-2.09C of the RSS:

20-2.09C(5) HDPE Pipe Butt Welding Technique.
The mirror welding machine used for the HDPE Pipe Butt Welding Technique must comply with following requirements:

1. Heating Plate
   1.1 Electric heating plates for general fusion used must be controlled thermostatically and capable of being adjusted over a temperature range from 150°C to 300°C.
   1.2 For welding of HDPE, the temperature thermostat must be set according to manufacturer’s recommendation.
   1.3 The mirror (heating plate) must be equipped with a thermometer or other built-in temperature-measuring device and must have sufficient area to adequately cover the ends of the pipe to be joined.

2. Alignment jig must consist of the following:
   2.1 Two fixed and two moveable clamping blocks for holding the two parts to be fused in moveable axial alignment
   2.2 One shaver for simultaneously preparing the ends to be joined, and appropriate adapters “inserts” for different pipe sizes.

3. Shield for Mirror welding Assembly must use a shield that permits welding operations to continue regardless of weather conditions, and serve as a windbreaker to prevent rapid cooling of weld seam.

The welding operation procedures stated below should be regarded as a general guideline only. The manufacturer of the HDPE pipe should be asked to supply specific recommendations for welding of their products or materials. The welding machine supplier must supply detailed welding procedure for their machines.

Heat fusion bonding is a combination of temperature and force resulting in two mating surfaces flowing together to produce a joint. Fusion bonding occurs when the joint cools below the melt temperature of the material. There is a temperature range within which any particular material may be satisfactorily joined. The specified temperature used requires consideration of the properties of the specific material, the fusion equipment being used and the welding environment.

The butt-welding must be completed in phases using several parameters. These phases are as follows:

1. The alignment of the pipe
2. The shaving of the surfaces of the pipe ends
3. Cold matching of the HDPE pipes
4. Cleaning of surfaces
5. Heating of surfaces
6. Fusion of surfaces
7. Cooling of weld joint

The parameters used during welding are as follows:
1. Bead-up pressure in bars or psi
2. Bead-up height in mm or inches
3. Heat soaking time in seconds
4. Heat soaking pressure in bars or psi
5. Transfer time in seconds
6. Fusion pressure in bars or psi
7. Cooling time in minutes

These parameters are for information only and must be compared with the parameters given by the HDPE pipe manufacturer and the welding machine supplier.

20-2.09C(5)(a) Welding Preparation

The welding zone must be protected from unsuitable weather conditions (e.g. humidity effects, wind and temperatures below 0°C). The surfaces to be joined must be undamaged and free from impurities or loose particles.

20-2.09C(5)(b) Alignment of HDPE Pipes

The pipes must be aligned when they are clamped into the mirror welder in such a way that the surfaces are in the same plane (parallel) to each other. The HDPE pipes can be positioned directly into the welding machine. Install the correct adapter insert for the size of pipe diameter to be used and tighten them to the machine.

Position the pipe in a way that approx. 1-3/4 inch is protruding behind the last clamp. This will allow approx. 1/2 to 3/4 inch to shave from, and the remaining 1 to 1-1/4 inch for welding.

Once the pipe has been placed in position, the top clamps can be closed. Tighten the top clamp nuts evenly in order to get a totally circular pipe; an even clamping pressure must be achieved. Then, make the first dry matching (press the two pipes to each other) and check the amount of shaving that will be required.

20-2.09C(5)(c) Shaving of Surface

After the dry matching is completed, open up the pipes and introduce the shaver. Turn the shaver on and adjust to suitable speed.

Press the two pipes together, and shave until a continuous strip of HDPE is peeling off on both sides of the shaver. Once constant peeling off is observed, release the pressure on the pipes and separate the pipes. Do not turn off the shaver until the pipes are apart. If the shaver is stopped during shaving, the shaver will create an end cut mark and the shaving operation will have to be repeated.

Remove the shaver, match the pipes again, and check the pipe for proper alignment. If, even when continuous peeling off is achieved on each side of the shaver, the pipes do not match properly, check that the clamps are not pressing on to the pipe with different pressures. Re-tightening the nuts slightly on either side. If this does not help, open up one clamp and insert a shim in between the jaws and the pipe. The shim will concentrate the pressure on to the pipe and move the pipe into alignment. It is important to remember that, if the clamp has been opened during operation, the shaving operation must be repeated.

Once the pipes are correctly aligned, separate the pipes again for cleaning. Remove chips inside the pipes on both sides, all chips scattered under the pipes, and also inside the machine. Otherwise, they will stick to the mirror (heat plate) later while re-heating. Remove the chips by using a brush or a small hook made out of a thin steel wire. Never put any dirty gloves inside the pipe or remove the chips with your hands. Do not touch the shaved pipe ends. Clean the surface with a clean rag and mineral spirits/alcohol before introducing the mirror.

20-2.09C(5)(c) Heating of Surface

Before heating the surface, have all parameters available for this operation. Check the mirror temperature. The mirror has a yellow or red lamp, which tells if the mirror has reached working temperature. To make sure there is no cold air flowing through the pipe, place some plastic bags on each
end of the pipe, this will prevent the air from cooling the mirror on one side. Confirm the pipe has a good fit, then remove the shaver and introduce the mirror.

Push the pipes together against the mirror and raise the pressure to the Bead-up pressure. This pressure needs to be maintained until the Bead-up height has been reached. The bead up height is the height of the bead, which is pressing up against the mirror.

As soon as the Bead up height has been reached, release the pressure down to the Heat Soak pressure. Heat soak pressure is the pressure maintained during the Heat Soak time.

As soon as the heat soak time has elapsed, separate the pipes, remove the mirror, and then press together.

20-2.09C(5)(e)  Fusion of Surfaces

This operation has to be done quite fast, since there is actually a time limit “Transfer time” from the removal of the mirror until the two pipes are pressed together and reached the Fusion pressure.

Fusion pressure is the pressure that must reach during the Transfer time and maintained during the Cooling time.

20-2.09C(5)(f)  Cooling of Joint

Cooling time is the time in which the pipe has to be left undisturbed.

Under no circumstances must the clamps be opened or the pressure released until the cooling time has elapsed.

20-2.09C(5)(g)  Checks of Weld Seam

The mirror-welding machine, if coupled to a data log, will give a printout confirming the parameters used during welding of a specific seam and approval/rejection of the welded seam.

Replace section 20-2.10B(2) of the RSS with:

Not Used

Replace each occurrence of “sprinkler” in section 20-2.10 of the RSS with:

bubbler

Replace heading and section 20-2.10B(4) of the RSS with:

20-2.10B(4)  Tree Well Bubbler Assemblies

Each tree well bubbler assembly in the City of Oakland, must include a bubbler, with riser, check valve, 4-inch grate cap, swing assembly, ½” male NPT inlet and 4-inch diameter basket weave canister.

In the City of San Leandro the assembly must include a Toro 514-20 Series bubbler or City of San Leandro Engineer approved equal, with riser, check valve, 4-inch grate cap, swing assembly, ½” male NPT inlet and basket weave canister body, riser, swing joint, perforated drainpipe, and drain cap.

In the City of San Leandro the perforated drainpipe must be commercial grade, rigid, PVC pipe with holes spaced not more than 6 inches on center on 1 side of the pipe.

Drain cap must be commercially available, 1 piece, injection molded drain grate manufactured from structural foam polyolefins with UV light inhibitors. Drain grate must be black.

Pea gravel for filling the drainpipe must have a maximum diameter of 1/2 inch. Pea gravel must be naturally rounded aggregate, clean, washed, dry and free from clay or organic material. In the City of San Leandro the crushed rock for filling the drainpipe must be graded such that 100 percent passes the 3/4-inch sieve and 100 percent is retained on the 1/2-inch sieve. Crushed rock must be clean, washed, dry, and free from clay or organic material.
Replace section 20-2.10C of the RSS with:

Install tree well bubbler assembly as shown.

Add to section 20-2.11B(2) of the RSS for section 20 with:

Ball Valves in the City of San Leandro must be KBI PVC Ball valve or City of San Leandro Engineer approved equal, and must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonshock working pressure for 3/4 to 4 inch valves, min</td>
<td>235 psi</td>
</tr>
<tr>
<td>Nonshock working pressure for 6 inch valves, min</td>
<td>150 psi</td>
</tr>
<tr>
<td>Seats</td>
<td>PTFE</td>
</tr>
<tr>
<td>O-ring seals</td>
<td>EPDM or fluoroelastomer</td>
</tr>
</tbody>
</table>

Ball valve in the City of San Leandro must be the same size as the supply line that the valve serves.

Add to section 20-2.11B(2) of the RSS:

Valves must be of the manufacturer shown on the plans or approved equal.

Ball valves must be installed in suitable valve boxes as shown on the plans. Valve boxes must be of the manufacturer shown on the plans or approved equal.

Replace section 20-2.11B(5) of the RSS with:

Not Used

Replace each occurrence of “3/4” in section 20-2.11B(9) of the RSS with:

1

Add to section 20-2.11B(9) of the RSS:

Quick coupling valve must have locking cover. Upon completion of the Contract and prior to final acceptance, Supply the City and AC Transit with 3 lose quick coupler brass keys and brass hose ells before Contract acceptance. The coupler keys and hose ells must be of the same manufacturer as the coupling valve.

Add to section 20-2.11B(10)(a) of the RSS:

Valves must be of the manufacturer shown on the plans or approved equal.

Remote control valves must be installed in suitable valve boxes as shown on the plans. Valve boxes must be of the manufacturer shown on the plans or approved equal.

Add to section 20-2.11B(10)(b) of the RSS:

20-2.11B(10)(b)(i) Low Volume Control Zone Kits

The low volume control zone kits must be a completely assembled and comprised of the following:

1. 1 inch 24VAC valve
2. 3/4 inch disk filter
3. Low flow pressure regulator

The low volume control zone kits must be designed to:

1. Operate zones ranging from 0.25 gallons per minute 4.4 gallons per minute
2. Provide filtration of 140 mesh
3. Downstream outlet pressure of 42 pounds per square inch.

20-2.11B(10)(b)(ii) High Volume Control Zone Kits

The how volume control zone kits must be a completely assembled and comprised of the following:

1. 1 inch 24 VAC valve
2. 3/4 inch disk filter
3. High flow pressure regulator

The high volume control zone kits must be designed to:

1. Operate zones ranging from 4.5 gallons per minute to 17.6 gallons per minute
2. Provide filtration of 140 mesh
3. Downstream outlet pressure of 45 pounds per square inch.

20-2.11B(10)(b)(iii) 24 VAC Valve

The valve must be a 1 inch S-80 Electric Control Valve must have 1 inch threaded inlet and outlet connections. The valve body must be made of glass reinforced polyamide. The diaphragm must be made of natural rubber and the diaphragm seat made of glass reinforced polyamide. Spring must be made of SST302. Nuts, bolts and washers should be made of SST 304.

The valve must be an electric on/off valve and must be capable of opening when an electric signal is sent by a controller. The minimum operating pressure is 7 pounds per square inch. The maximum operating pressure is 145 pounds per square inch. The minimum operating flow is 0.01 gallons per minute and the maximum operating flow is 44 gallons per minute.

The solenoid must operate within a plus minus 10% of the nominal voltage. For example, a 24 VAC will be able to actuate between 22 volts and 26 volts. In addition, an inrush and holding currents are necessary to maintain the valve in open position, of 220 milliampere and 95 milliampere, respectively. The solenoid must include a manual override that simulates activation of the controller, when the controller is not engaging the solenoid. If the controller is engaging the solenoid, the manual override is not functional.

For latching solenoid operation, in addition to a 9 volt battery operation, a minimum pulse length must be required of 25 milliseconds.

A manual flow control stem must be used to limit the maximum flow across the valve, and as a manual shutoff of the valve if necessary.

Valves are to be equipped with internal filters and a clog free labyrinth mechanism to assure that the top cap of the valve is receiving clean water at all times.

Water temperature must not exceed 140°F.

20-2.11B(10)(b)(iii) Disk Filter

The purpose of the disc filter is to capture and retain water-transported debris or sediment.

The filter must be a multiple disc filter with color-coded filter elements indicating the mesh size of the element being used. The discs must be constructed of chemical-resistant thermoplastic for corrosion resistance. The disc filter body must be molded of black plastic with male pipe threads for both inlet and outlet. The disc filter must be capable of periodic servicing by unscrewing a threaded cap or unlatching the band. The disc filter ring color-coding must be Black 140 Mesh. The 3/4 inch DFV model must have an integral manual shut-off valve.

The filter must be capable of filtering suspended particles from water. The filter must be capable of operating in a range of flows up to 17 gallons per minute.

20-2.11B(10)(b)(iii) Low Flow Pressure Regulator

The low flow pressure regulator must be a spring-operated, in-line piston-type regulator. The body must be molded of black plastic with 3/4 inch female/female pipe threaded inlet and outlet. Directional arrows must show flow direction of water.

The low flow pressure regulator must be able to respond immediately to any inlet pressure variation. The regulator must be capable of regulating downstream pressure to 42 pounds per square inch. The Pressure Regulator must operate in a flow range of 0.25 gallons per minute 4.4 gallons per minute. Maximum pressure at inlet must not exceed 145 pounds per square inch.
The purpose of the Pressure Regulator is to control downstream pressure at the following:

1. 15 pounds per square inch
2. 20 pounds per square inch
3. 25 pounds per square inch
4. 35 pounds per square inch
5. 42 pounds per square inch

Unregulated pressures in excess of the recommended operating ranges can diminish and disable line flushing valves or cause the integrity of the drip irrigation tubing/emitter fittings connection to weaken and/or fail.

20-2.11B(10)(b)(iii) High Flow Pressure Regulator

The high volume pressure regulator must be a spring-operated piston-type regulator with an externally accessible regulation unit that can be serviced without removing the valve body from the piping. The body must be molded of black plastic with 3/4 inch FPT x FPT threaded inlet and outlet.

The high volume pressure regulator must have a built-in indicator that indicates when it is operating. It must be able to respond immediately to any inlet pressure variation. The regulator must be capable of regulating downstream pressure to 45 pounds per square inch. The Pressure Regulator must operate in a flow range of 4.5 gallons per minute to 17.5 gallons per minute in the 3/4 inch configuration and 11 gallons per minute to 35 gallons per minute in the 1-1/2 inch configuration. Maximum pressure at inlet must be 145 pounds per square inch.

The purpose of the pressure regulator is to control downstream pressure at or below the specified system operating pressure.

The purpose of the Pressure Regulator is to control downstream pressure at the following in 3/4 inch or 1-1/2 inch configurations:

1. 15 pounds per square inch
2. 20 pounds per square inch
3. 25 pounds per square inch
4. 35 pounds per square inch
5. 45 pounds per square inch

Unregulated pressures in excess of the recommended operating ranges can diminish and disable line flushing valves or cause the integrity of the Techline®/Techlite fittings connection to weaken and/or fail.

Replace section 20-2.11B(11) of the RSS with:

Not Used

Replace the 1st paragraph of section 20-2.11B(11) of the RSS with:

Install control valves:

1. In box parallel to edges and adjacent to walk wherever possible.
2. Center valve box over remote control valve to facilitate servicing of valve

Replace section 20-2.11C(3) of the RSS with:

Not Used

Add to section 20-2.11C of the RSS:

20-2.11C(6) Disk Filters

Disc filters can be installed downstream of the remote control valve to allow for periodic servicing when the remote control valve is not operating. It can be installed upstream of the remote control valve if the disc filter is specified with manual shut-off valve or when a line-sized shut-off valve is also specified to allow for periodic servicing with a pressurized main line. Recommended installation of disc filters must be as specified. It may be installed below grade positioned in a valve box large enough to remove the disk
filter cap and internal disc element, or above grade. A gravel sump in the bottom of the valve box is recommended.

Replace section 20-2.14A(2)(b) of the RSS with:

Not Used

Replace “sprinklers” in 5th sentence of 3rd paragraph of the section 20-2.14A(2)(b) of the RSS with:

sub-surface drip emitters

Add to section 20-3.01B(2)(a) of the RSS:

It is the intent of the contract drawings and specifications to provide planting with trees, shrubs, vines, and groundcovers in vigorous growth, ready for use.

Any items not specifically shown on the plans or called for in the specifications, but normally required to conform to such intent, are to be considered part of the work.

Certificates of inspection required by law for transportation must accompany invoice for each shipment of trees. Submit five copies of certificates to the Engineer after acceptance of material. Inspection by Federal or State Governments at place of growth does not preclude rejection of trees at project site.

Arrange to secure all plant material noted on the plans and have them available for inspection and approval by the Engineer.

Plant materials must be furnished in quantities required to complete the work as indicated on the plans and must be of species, kinds, sizes, and spacing as shown on the plans.

Plants must be symmetrical, typical for variety and species, sound, healthy, vigorous, and free from plant disease and insect pests or their eggs.

Plants must be nursery grown under climatic conditions similar to those of the job site.

All trees and shrubs must be container grown or established "boxed out" field grown materials.

Plants must not be pruned prior to delivery, except as authorized by the Engineer.

Add the following to section 20-3.01B(1):

Commencement of planting operations must presume that areas to be planted have been fully examined and conditions have been determined to be satisfactory. Coordinate tree-planting operations with installation of deep watering system, drain installation, and work of other trades. At the nursery and upon delivery, plants must be subject to inspection and approval by Engineer for conformity with this section. The Engineer reserves the right to examine and reject any plant material deemed in unhealthy or otherwise unsatisfactory condition during planting or throughout the Guarantee period. Notify the Engineer a minimum of 48 hours prior to commencement of tree planting. Examine areas to receive planting prior to commencement of work. Items to be examined include irrigation installation, drainage installation and completed work of other trades.

Add the following to section 20-3.01B(2)(a):

Carefully pack trees to prevent breaking, damage to bark, branches and root systems, and root ball cracking. Provide adequate ventilation. Protect root balls from sun, drying wind and frost. Do not drop trees from vehicles. Legibly label trees with correct botanical name and common name. Store packaged materials in dry locations away from contaminants. Separate pesticides from other landscape materials, if used.

Replace section 20-3.01B(2)(b) of the RSS with:

Not Used

Replace header and paragraphs of section 20-3.01B(2)(c) of the RSS with:

20-3.01B(2)(c) Sod
Not Used
Add section 20-3.01B(2)(d) to the RSS:
Trees must conform to American Association of Nurseriesmen’s specifications true to name and uniformly matched in size for the species/variety in the container sizes shown on the Plans and with a branching configuration recommended by ANSI Z60.1 for the genus, species and/or variety specified in the plant legend. Trees must be first quality, with well-developed, firmly rooted (not rootbound) systems in their containers with normal, well-developed trunk, limbs, stems evenly and radially distributed (plant canopy) around the trunk and rootcrowsns. Plant material is required to be free of disease, insects, insect eggs, larvae and weeds.

Prior to planting, plant materials deemed unsuitable must be rejected either during or after site delivery by the Engineer. Plant materials damaged during delivery, off-loading, or as a result of neglect or abuse while plant materials are in a pre-plant, on-site holding area will be rejected. Plant material will be rejected if their containers are cracked and/or broken. Plant materials will be rejected if rootballs are lopsided or collapsed, dried out and/or rootballs determined by the Engineer to have been recently removed from their containers. Plant material will be rejected if a substantial loss of rooting soil within the containers is present or substantial loss of foliage is present as a result of recent (pre-delivery) pruning by the nursery is evident. Trees will be rejected if root-crown is observed to appear kinked, girdled or circled. Tree will be rejected if no central leader exists, trunk is noticeable bowed, abraded and/or old or new scarring is present. Container sizes larger then what is specified on the plans may be used with approval by the Engineer, but at no extra cost.

Trees must be measured when branches are in their normal position. Height and spread dimensions specified refer to main body of plant and not branch tip to tip. Caliper measurements must be taken at a point on the trunk 6 inches above natural ground line for trees up to 4 inches in caliper and at a point 12 inches above natural ground line for trees over 4 inches in caliper. Trees that meet the measurements specified, must possess normal balance between height and spread.

Trees must not be pruned before delivery. Trees, that upon delivery have damaged or crooked leaders, or multiple leaders, unless specified, will be rejected. Trees with abrasions of the bark, sun scalds, disfiguring knots or fresh cuts of limbs over 3/4” inch in diameter which have not completely callused will be rejected. Trees must be able to stand on their own trunks once nursery stakes are removed.

Trees must be subject to inspection and approval by Engineer at place of growth and upon delivery for conformity to the Contract Documents. Such approval must not impair the right of inspection and rejection during progress of the work. Submit to Engineer a written request for inspection of trees at place of growth. Written request must state the place of growth and quantity of trees to be inspected. Engineer reserves right to refuse inspection at this time if, in his judgment, a sufficient quantity of trees is not available for inspection.

Substitution of trees will not be permitted unless authorized in writing by Engineer. If proof is submitted that any tree specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract price. These provisions do not relieve responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

Replace section 20-3.01B(3) of the RSS with:

20-3.01B(3) Organic Soil Amendment
Organic soil amendment must be a well decomposed, stable and weed free compost. It must be derived from one or more of the following materials: agricultural crop residues or herbivore animal manures or food waste or urban plant debri. It must not contain mixed solid waste. The product must contain no substances toxic to plants, will possess no objectionable odors and must not resemble the feedstock (the original material from which it was derived). Compost must be tested through the US Composting Councils USCC Seal of Testing Assurance Program (STA). A lab analysis must be performed by a STA certified laboratory using the test methods used in the Seal of Testing Assurance program found in the Test Methods for Examination of Compost and Composting Manual (TMECC). Verifying current participation in the STA program can be confirmed by logging onto the USCC website at www.compostingcouncil.com. The compost lab analysis must be submitted as part of the “Compost
Technical Data Sheet before delivery of compost. The compost laboratory report must confirm the following compost parameters.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Reported as (units of measure)</th>
<th>General Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH²</td>
<td>pH units</td>
<td>6.0-8.05</td>
</tr>
<tr>
<td>Soluble Salt Concentration</td>
<td>dS/m (mmhos/cm)</td>
<td>Maximum 6, less than 4 preferred</td>
</tr>
<tr>
<td>Boron</td>
<td>Ppm</td>
<td>Soluble must &lt;2.5</td>
</tr>
<tr>
<td>Moisture Content</td>
<td>% wet weight basis</td>
<td>30-60 %</td>
</tr>
<tr>
<td>Organic Matter Content</td>
<td>% dry weight basis</td>
<td>30-65%</td>
</tr>
<tr>
<td>Carbon Nitrogen Ratio</td>
<td>ratio of Carbon to nitrogen</td>
<td>25:1</td>
</tr>
<tr>
<td>Bulk Density</td>
<td>dry lbs/cubic yard</td>
<td>Between 500-1,100</td>
</tr>
<tr>
<td>Particle Size</td>
<td>% pass in a select mesh size, dry weight basis</td>
<td>98% pass through 3/4” screen or smaller</td>
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<tr>
<td>Stability³ Carbon Dioxide Evolution Rate</td>
<td>Mg CO2-C per g OM per day</td>
<td>&lt;8</td>
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<tr>
<td>Maturity³ (Bioassay) Seed Emergence and Seed Vigor</td>
<td>%, relative to positive control</td>
<td>Minimum 80%</td>
</tr>
<tr>
<td>Physical Contaminants (inerts)</td>
<td>% dry weight basis</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Chemical Contaminants⁴</td>
<td>mg/kg (ppm)</td>
<td>Meet or exceed USEPA Class A standard, 40CFR: 503.13, Tables 1 and 3 levels</td>
</tr>
<tr>
<td>Biological Contaminants⁵</td>
<td></td>
<td>Meet or exceed US EPA Class A standard, 40 CFR, 503.32(a) levels</td>
</tr>
</tbody>
</table>

(Table modified from the US Composting Council Landscape Architectural Specifications)

1. Recommended test methodologies are provided in Test Methods for the Examination of Composting and Compost (TMECC, The US Composting Council)
2. It should be noted that the pH and soluble salt content of the amended soil mix is more relevant to the establishment and growth of a particular plant, than is the pH or soluble salt content of a specific compost (soil conditioner) used to amend the soil. Each specific plant species requires a specific pH range. Each plant also has a salinity tolerance rating, and maximum tolerable quantities are known. Most ornamental plants and turf species can tolerate a soil/media soluble salt level of 2.5 dS/m and 4 dS/m, respectively. Seeds, young seedlings and salt sensitive species often prefer soluble salt levels at half the aforementioned levels. When specifying the establishment of any plant or turf species, it is important to understand their pH and soluble salt requirements, and how they relate to existing soil conditions.
3. Stability/Maturity rating is an area of compost science that is still evolving, and as such, other various test methods could be considered. Also, never base compost quality conclusions on the result of a single stability/maturity test.
4. US EPA Class A standard, 40 CFR § 503.13, Tables 1 and 3 levels = Arsenic 41ppm, Cadmium 39ppm, Copper 1,500ppm, Lead 300ppm, Mercury 17ppm, Molybdenum 75ppm, Nickel 420ppm, Selenium 100ppm, Zinc 2,800ppm.
5. US EPA Class A standard, 40 CFR § 503.32(a) levels = Salmonella <3 MPN/4grams of total solids or Fecal Coliform <1000 MPN/gram of total solids.
6. Landscape architects and project (field) engineers may modify the allowable compost...
Replace section 20-3.01B(4)(b) of the RSS with:
Non-synthetic fertilizers as recommended by the soils report. Synthetic, quick-release fertilizers must not be permitted. Fertilizers prohibited in the Generic Materials List by the Organic Materials Review Institute (OMRI) are prohibited in the project.

Appropriate fertilizers must be determined from soils analysis results with recommendations from soils lab and approval from the Engineer. Fertilizer to be organic and non-synthetic, following Bay Friendly Guidelines. For bidding purposes only, assume the use of feather, blood, and bone meal, fishmeal, kelp or compost tea (per Bay Friendly Landscape Guidelines, http://www.stopwaste.org/docs/bay-friendly_landscape_guidelines_-_all_chapters.pdf) Fertilizer must be delivered to the site in containers labeled in accordance with the applicable State of California, Department of Agriculture, regulations, bearing the warranty of the producer for the grade furnished. It must be uniform in composition, dry, and free flowing.

For bidding purposes provide fertilizer as follows:

1. Planted Areas: Pelleted type, with analysis of 6-20-20 (N-P-K), and granular type 16-6-8 (N-P-K).

Replace section 20-3.01B(4)(c) of the RSS with:
Not Used

Replace section 20-3.01B(4)(d) of the RSS with:
Not Used

Replace heading and section 20-3.01B(7) to the RSS with:
20-3.01B(7)(a) Submittals
Submit for acceptance by the Engineer manufacturer’s product and installation information for root barriers indicating size, materials, and quantities being supplied.

20-3.01B(7)(b) Materials
Root barrier must be an injection molded or extruded modular panel made of high-density polypropylene or polyethylene plastic with UV inhibitors.

Each panel must:
1. Be at least 1/16-inch thick
2. Have at least 4 molded root-deflecting vertical ribs 0.5- to 0.8-inch wide, 6 to 8 inches apart
3. Have a locking strip or an integral male-female sliding lock designed to resist slippage between panels
4. Be at least 2 feet wide and 2 feet in depth

In the City of Oakland use 18-inch deep root barrier UB 18-2 as manufactured by Deep Root Partners, or approved equal.

In the City of San Leandro use 24-inch deep root barrier UB 24-2 as manufactured by Deep Root Partners, or approved equal.

20-3.01B(7)(c) Construction
Prior to commencing installation of root barriers, verify that adjacent work is complete and that conditions are acceptable for installation of root barriers. Request a review of the root barrier layout by the Engineer to determine adjustments on site from locations shown on plans. Proceed with installation only after unsatisfactory conditions have been corrected.
All root barriers must be installed per manufacturer’s specifications in locations and per the details shown on the Plans. The vertical root directing ribs must be facing inwards to the root ball and the top edge must be aligned relative to the adjacent grade, curbs or tree grates as shown on the Plans. Each of the required number of panels must be joined in a linear fashion and placed along the adjacent hardscape as shown on the Plans.

Add the following to section 20-3.01B(10) of the RSS:

The type of tree stake must be as required above except as follows:

For securing trees planted in tree wells with relocated tree grates, use a single, grate-attachable steel stake with adjustable height strap-bar, UV-resistant adjustable PVC strap with two sets of bolts/washers/nuts, such as the “Grate Stake Tree Stake System”, available from J.R. Partners, or approved equal. Stake must be 6-foot tall, Schedule 40 pipe, 3/4” diameter (1.05-inch outside diameter), and 0.113-inch wall thickness, with a black powder-coat finish. Pipe must conform to ASTM A53.

Add the following to section 20-3.01B(11) of the RSS:

Plant ties must be as required above except as follows:

Strap for securing trees to steel stake attached to relocated tree grates must be 1/4-inch by 1-inch by 18-inch, flexible PVC with UV inhibitors.

For trees installed with tree guards, secure tree with ties made of 100% nylon and flexible nylon hose, such as manufactured by Zip-It tree ties, or approved equal.

Replace section 20-3.02 of the RSS with:

20-3.02A General

20-3.02A(1) Summary

Section 20-3.02 includes specifications for preserving existing trees, transplanting palm trees, and maintaining existing planted areas.

The preservation of existing trees includes the protection and stress reduction of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent. Tree preservation work is to be coordinated with all demolition, construction and landscaping activities in the vicinity of existing trees identified on the Plans for protection and preservation.

Transplant palm trees between March 15 and October 15.

20-3.02A(2) Definitions

Certified Arborist: Credential of an individual arborist issued and administered by the International Society of Arboriculture. This credential must be current and valid to qualify to use the copyrighted designation of “Certified Arborist”. Refer to www.isa-arbor.com for additional information.

Project Arborist: Arboricultural consulting firm contracted to provide technical assistance and advice. Duties include the following: site investigation and documentation (design phase inventories, assessments, root investigations, etc.); develop tree preservation plans, methods, details and specifications; and provide final document review and monitoring of the Contract Arborist. The Project Arborist must be an Owner and acts specifically on Owner concerning tree related issues. Project Arborist must have authority over the Contract Arborist and any disputes must be decided by the Project Arborist and Engineer.

Contract Arborist: Arboricultural contracting firm implementing the approved tree preservation plans on site. All crews conducting arboricultural operations on site must consist of at least one Certified Arborist who directly oversees all work by that crew. Arboricultural operations include, but are not limited to, pruning, tree protection device installation and maintenance (fence, matting, etc.), root pruning, air tool root excavation/exploration (SSAT), soil care activities, soil testing, mulch application, tree inspections,
pesticide/chemical applications and tree removal. Special qualifications submittal is required for review and approval below. Contract Arborist will be sub-contracted by you or owner, at the owner’s discretion.

Tree Protection Area (TPA): Area of Critical Root Zone surrounding individual trees or groups of trees to be protected during construction.

Critical Root Zone (CRZ): Estimated area surrounding each tree is based upon an industry standard “rule of thumb” of 1.5 feet of radius per inch of diameter at breast height (DBH). CRZ is described as the minimum area of tree roots required to be protected to maintain tree health and stability. Any impacts within the CRZ must be mitigated based on severity up to and including tree removal if the impact or disturbance is severe.

Tree Protection Action Key (TPAK): Matrix provided on plan sheets for each tree indicating designated protection and stress reduction measures specified in this document.

Supersonic Air Tool (SSAT): Hand held tool designed to focus highly compressed air (90-125 psi) provided from a large air compressor (185-375 cfm) at speeds close to 1400 mph at the tip of the tool. Widely used by arboricultural firms and consultants for multiple purposes including but not limited to: root collar investigation, CRZ investigation, root pruning (especially large roots > 1.5” diameter or where existing underground cables or conduits are located), radial mulching and restoration of compacted soils, excavation for utilities within protected CRZs to minimize root damage from construction.

Crown Pruning: Action by the Contract Arborist of pruning specific tree limbs to improve tree health, reduce hazard, and / or provide construction clearance.

Supportive Cabling: Installation of supportive cabling for designated tree branches due to weak branch attachments.

Root Pruning: Action indicated in TPAK to provide a more suitable cut for protected tree roots to minimize ripped or torn roots during excavations and grading with standard construction equipment. Various methods may be used.

Mulching of Trees: Application of a wood mulch product to areas surrounding designated trees. Mulch increases moisture-holding capacity, helps mitigate soil compaction, and increases needed soil organic composition.

Limits of Disturbance (LOD) (also called Limits of Construction): Specific outer limits of all construction activities for the entire project.

DBH (Diameter at Breast Height): Tree trunk diameter measured at 4.5 feet above grade.

20-3.02A(3) Submittals
Submit a work plan for transplanting palm trees. The work plan must include methods for lifting, transporting, storing, planting, guying, detailed schedule for species-specific watering and maintaining each tree to be transplanted. Include root ball size, method of root ball containment, and a maintenance program for each tree.

Maintaining existing planted areas adjacent to . The work plan must include weed control, fertilization, mowing and trimming of turf areas, and watering.

Product Data: For each type of product indicated.

Certification: For each phase, the Contract Arborist must certify for each tree designated to remain has been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

Qualification Data: For Contract Arborist Firm Qualifications, submit to the Engineer firm and individual qualifications as follows.

1. Submit a minimum of two resumes and detailed qualifications from staff or team individuals assigned to this project as detailed under Quality Assurance below.
2. Provide references for above from a minimum of three commercial, nongovernmental or
governmental projects for whom similar tree preservation programs have been successfully
implemented. Include the following information: Project name, size and scope; Number of trees
involved; Scope of services provided; and name and contact for project owner, designer, or
contractor.

Pedestrian/Property Protection Plan: Contract Arborist to submit a written plan describing all protective
measures proposed to be used to minimize potential impact to pedestrians, parked cars, workers and
other public and private property. Protection measures must be required for all onsite tree care activities
including but not limited to Supersonic Air Tool excavation, root pruning, canopy pruning, etc.

Maintenance Prescription: Contract Arborist must submit for care and protection of trees as a result of
construction, changes in weather patterns or events, and response in health from individual trees during
and after completing the Work.

Site Documentation: Submit reports to Contractor and Project Arborist at intervals determined by the
Engineer containing complete documentation of all tree impacts and tree preservation activities including
but not limited to: root pruning, tree protection fencing, excavation within critical root zones, tree
fertilization or other treatments, etc. Documentation must include tree numbers of trees impacted and/or
treated. Photographic records are to be included as requested by the Project Arborist.

20-3.02A(4) Quality Control and Assurance
Inspect for deficiencies of existing planted areas in the presence of the Engineer. Complete the inspection
within 15 days after the start of job site activities. Deficiencies requiring corrective action include:

1. Weeds
2. Dead, diseased, or unhealthy plants
3. Missing plant stakes and tree ties
4. Inadequate plant basins and basin mulch
5. Other deficiencies needing corrective action to promote healthy plant life
6. Rodents and pests

On-site Arborist (individual) Qualifications. An arborist certified by the International Society of
Arboriculture (ISA) and licensed in the jurisdiction where project is located. All work performed by
Contract Arborist including any oversight and documentation work, must be performed or directly
supervised by at least one onsite arborist with these minimum qualifications.

Contract Arborist Firm Qualifications. Contract Arborist Firm must comply with the following:

1. Established business with documented experience of at least five years.
2. Experience working on a minimum of three commercial, nongovernmental or governmental projects
where similar tree preservation programs have been successfully implemented.
3. Properly licensed and insured to perform arboricultural work in the jurisdiction where the project is
located.

Provide names of each individual to comply with the following:

1. Certification by ISA (Certified Arborist or Board Certified Master Arborist) or Registered Consulting
Arborist from the American Society of Consulting Arborists (ASCA)
2. Provide biographies with individual(s) names, certifications, and each anticipated role in this project.
“Role(s)” must be defined as one or more of the following: Project Manager, Technical oversight,
Field Arborist / Technician.

Publications listed herein are part of this work to extent referenced:

1. ANSI A300 Standard Practices for Trees, Shrubs, and Other Woody Plant Maintenance
2. Part 1-2001, Tree Pruning;
3. Part 2-3004, Fertilization;
4. Part 3-2000, Cabling, Bracing, Guying of Established Trees;
6. ANSI Z133.1 - 1994 and most recent updates, Tree Care Operations - Safety Requirements
Fertilizer will be applied in strict accordance with the manufacturers label instructions and applicable federal, state, and local requirements. Fertilizer, soil conditioners, and applications must be approved by the Engineer prior to application. Material Safety Data Sheets (MSDS) will be available for fertilizers in the Contract Arborists’ possession while on the site.

Pre-Construction Meeting: Conduct meeting at the project site prior to commencement of any project related site activities.

Contract Arborist, Project Arborist, and Contractors, subcontractors must attend, as well as the local agency inspector or arborist as applicable.

Review methods and procedures related to tree protection and preservation including, but not limited to, the following:

1. Construction schedule - verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
2. Enforcement of requirements for tree protection areas
3. Responsibilities of all parties, including coordination, access and timing requirements
4. Field quality control

Prior to salvaging, boxing, moving, and relocating palm trees to new locations as shown on the plans, the project arborist must conduct diagnostic testing of each palm to determine if the palms have Pink Rot, Sudden Crown Drop, or other disease that would impact or prevent their ability to survive the stress of the transplant.

Only palms identified by the arborist as viable for transplanting must be transplanted. Palms must not be transplanted if they are too diseased and must instead be removed as described in the tree and stump removal section of these Special Provisions and following appropriate horticultural practices.

A minimum of 5 years of palm removal and planting experience is required for performing transplanting palm trees including testing, removal, boxing, storage, transport, and installation of all palm trees.

Transplant palm trees from their existing to the new locations shown on the drawings on the same day whenever feasible. Where this is not feasible, limit the storage time for salvaged, boxed palms at the project site to a minimum in order to prevent exposure to weathering, vandalism or damage from work of other trades. If temporary storage at the job site is not feasible, propose suitable off-site storage locations for approval by the Engineer. Damaged materials will be rejected. Remove all damaged materials from the job site immediately, and replace at no additional cost.

**20-3.02A(5) Project Conditions**

The following practices are prohibited within all tree protection areas except as specifically indicated herein:

1. Storage or stockpiling of construction materials, chemicals, debris, or excavated materials
2. Parking vehicles, trailers or equipment
3. Unnecessary foot traffic
4. Erection of sheds or structures
5. Impoundment or discharge of water
6. Excavation or other digging unless otherwise indicated
7. Attachment of signs or other materials to, or wrapping materials around trees or plants unless otherwise indicated

Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

**20-3.02B Materials**

**20-3.02B(1) Root Protection Mat**

Root Protection Matting (RPM) geocomposite material comprised of a triplanar geonet structure with thermally bonded nonwoven geotextiles on both sides.

1. Material must be SynTec ROADRAIN T-7 or approved equal.
2. For short duration applications (1-2 pass/1 day or less), ¾” plywood, AlturnaMATS, or approved equal; or 1-inch thick steel plates may be used in lieu of RPM.

3. Submit shop drawings / cut sheets and material samples for review by Project Arborist and the Engineer.

20-3.02B(2) Trunk Protection Wrap
Trunk protection wrap must be provided to tree trunks when construction activities are expected to be in close proximity. Trunk protection wrap must be SynTec ROADRAIN T-7 or approved equal.

Alternative methods and materials may be submitted for review.

20-3.02B(3) Tree Protection Fence
Tree protection fence must be galvanized steel chain link fence fabric of 10-11 gauge wire fabric; 6 feet high; with 1.9-inch diameter line posts; 2-3/8-inch diameter terminal and corner posts; with tie wires, hog ring ties, gates, and other accessories for a temporary fence system.

20-3.02B(4) Wood Chip Mulch
As specified under landscape materials section of these specification. Green chips or mulch aged less than 6 months must not be used. Walnut mulch must not be used.

20-3.02C Construction
20-3.02C(1) Tree Preservation Measures
20-3.02C(1)(a) General
Refer to the TPAK for specific measures determined for each tree.

Installation/implementation of the following measures must be performed in the field by an ISA Certified Arborist as provided by the Contract Arborist.

All work, substitutions and/or modifications must be subject to review and approval by the Owner and Project Arborist.

All work must conform to applicable federal, state and local regulations and industry standards.

The Contract Arborist must be responsible for all items in this section.

20-3.02C(1)(b) Coordination of Tree and Plant Protection and Transplants.
The work of the Contract Arborist coordination to include but not limited to the following:

1. Place utility markers at existing underground conflicts.
2. Coordinate necessary survey layout of proposed construction elements in order to provide accurate locations for tree protection measures.
3. Layout location of designated tree protection based upon proposed construction and methods of construction for that area.
4. Site walk with Project Arborist and the Engineer to verify location of all tree protection measures prior to execution.
5. Notify Engineer and Project Arborist if construction adjacent to tree protection does not appear to follow specifications or prior agreement or conflicts with tree protection seem eminent.
6. Coordinate with Engineer and Contractor for access of deliveries, crews, equipment, start up, and cleanup of each item of work.
7. Provide “as built” of any change to location of tree protection.
8. Attend progress meetings as requested.
9. Provide submittals as required.
10. Notify Engineer and Project Arborist of any breach or damage to tree protection requiring attention.

Prepare a resolution plans for all existing underground utility conflicts marked in the field by the Contract Arborist.

20-3.02C(1)(c) Pruning and Supportive Cabling
20-3.02C(1)(c)(1) Tree Canopy and Clearing Pruning

Specific canopy pruning for tree health, risk reduction, and construction clearance per plan documents.

Size, health, species, and impact from proposed construction will be taken into consideration in determining pruning type for each designated tree. Risk Reduction Pruning will remove dead, dying, and declining limbs 2-inch diameter and larger. No interior green branching including sprouts will be removed unless approved by Project Arborist.

Meet with Engineer and Contract Arborist at site to determine overhead clearance conflicts between trees and construction equipment/activities to prevent breakage, impacts, or aesthetic concerns. Project Arborist may be consulted if questions arise.

All work must comply with ANSI A-300 arboricultural standards. An aerial assessment must be made for all trees climbed to report any structural weakness of concern to the Project Arborist and Owner.

Prior to climbing any tree a risk assessment will be performed using visual, sounding, or basic drilling as needed by the Contract Arborist. Trees deemed high risk should not be climbed; alternative methods should be used and the tree reported to the Project Arborist and Owner immediately.

20-3.02C(1)(c)(2) Support Cables

Supportive Cabling of weak unions may be recommended by the Contract Arborist if the need is discovered during pruning operations. ANSI Standards apply. Cabling may be included only if submitted to and approved by the Engineer.

20-3.02C(1)(d) Root Pruning

Purpose of the root pruning is to provide a more suitable cut so as to not rip or tear roots during excavations and grading with standard construction equipment. The exact location and depth along the LOD or edge of utility excavation will be determined during the layout by an ISA Certified Arborist.

Root Pruning for urban sites with specimen trees or for transplanting requires the use of SSAT excavation for hand pruning. Refer to SSAT specifications in this section.

Sufficient moisture is necessary for reducing the level of dust, increase work efficiency, and provide a hospitable environment for the tree roots and pedestrians.

At a pre-work site inspection by the Contract Arborist more than 72 hours in advance of work start, subsurface probing to 24 inches to 36 inches with a tile probe or similar method will determine if sufficient soil moisture exists. If sufficient moisture is not found, immediate coordination with the site managers must be made to irrigate the proposed work areas. Methodology may be soaker hose, sprinklers, soaker cans with small drilled holes to release water slowly or other methods. A second follow up inspection must be made to determine final sufficiency to begin.

All root pruning operations must be performed by the Contract Arborist and directed in the field by an ISA Certified Arborist with documented experience in similar SSAT excavation and root pruning.

20-3.02C(1)(e) Tree Protection Fence

Type and placement of fence to be designated per details.

Attach tree protection area signs at 30-foot spacing facing construction LOD. For fence lower than 6 feet in height, attach minimum 3 strips glow-flagging 2-inch long for each fence panel.

Tree protection area signs must be high visibility and all weather to last the duration of the project / phase. Phone number of responsible contact person must be included on sign.

Install after root pruning if shown, and prior to demolition, clearing and excavation.

Install at 6-inch to 12-inch outside (construction side) of the Root Prune line or within the Root Prune trench.

Silt fence will be outside (construction side) the tree protection fence. Trenchless installation method must be employed per Detail if Root Protection Matting is designated.
Exact placement of fence will be determined by walking the site with the Project Arborist, Contract Arborist, and Engineer.

Sequencing of the tree protection fence will be determined during the initial site walk. In any case, no construction activities must occur in each phase or section until approved protection is installed.

20-3.02C(1)(f) Root Protection Mat (RPM)

The purpose of the RPM is to reduce compaction, rutting, and contamination of soils and root systems of trees to be retained should staging, temporary stockpile, or equipment access be required within the CRZ areas due to extreme site constraints.

RPM must be used for all access within CRZ areas of trees to remain. Matting is not required where existing pavement or concrete will remain undisturbed.

Trees anticipated receiving temporary or repetitive materials staging, footing traffic, or equipment access within protected root zone are to receive RPM. Wood chip mulch 12-inch must be installed under matting to further protect soils and roots.

If short duration access is needed, such as one day or less, the use of “Al-turnaMATS”, ¾” plywood, 1-inch steel plate, or approved alternative may be needed to avoid rutting and compaction. These materials may be shifted and re-used as work progresses.

All-weather staging, stockpile, or other repetitive construction operations may require 12-inch stone layer over RPM to allow heavy vehicles have the potential to cause dynamic compaction yet without rutting original surface soils and roots. In this situation, the stone may be contained by silt fence or super silt fence where adjacent to or within a TPA.

All temporary RPM areas to be used beyond a single day or beyond continuous on site supervision of the Contract Arborist must be surrounded by temporary tree protection fence as per specifications. For temporary staging of soils beyond 24 hours “trenchless” silt fabric must be installed on the lower / downhill side or as directed by the Project Arborist.

If a Silt Fence is required for Erosion Control in RPM areas, installation of silt fence must be coordinated with the Contract Arborist and must be performed by the Contract Arborist to prevent damage to tree roots from trenching operations. Erosion control socks may be used in lieu of silt fabric if approved by the Engineer.

20-3.02C(1)(g) Trunk Protection Wrap

Temporary trunk protection to cover the root flare and up to 12’ height, or to the scaffold branches, or as determined for the situation.

Tree trunk (or limbs, as determined by Project Arborist) must be wrapped with geocomposite material. More than one layer may be installed to reach suitable protection from the equipment or operations designated for work in the area. Attach with banding or strong tape that will not girdle the tree during the project timeframe. No nails or other devices are to penetrate the trunk.

Wrap must be removed promptly after construction is complete.

20-3.02C(1)(h) Excavation (Tree Protection Area)

20-3.02C(1)(h)(1) Hand Excavation within Tree Protection Areas

For excavation within CRZ areas of trees to remain, the intent is to minimize tree and root damage from excavation activities.

Excavation must be performed using SSAT, hand tools (shovels, etc), or other approved non-damaging method. Roots must not be damaged by the excavation except for approved root pruning.

Refer to “Supersonic Air Tool Excavation” and “Construction Oversight by Arborist” specifications in this section for additional requirements.

All work must be directly supervised by ISA Certified Arborist (provided by the Contract Arborist) in collaboration with the Owner’s trades and subcontractors.
RPM must be installed along trench sides to allow for temporary soil stockpile and access.

Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the plans. Roots must be uncovered and care taken to avoid damage to roots and bark.

Contract Arborist must prune the exposed roots. Excavation must not extend beyond the line where roots were pruned.

Proceed with conventional excavation methods or with hand excavation methods if clearance to the tree is inadequate for equipment access.

Tree roots must not be cut.

20-3.02C(1)(h)(2)  Supersonic Air Tool (SSAT) Excavation

Refer to “Hand Excavation within Tree Protection Areas” specification in this section for additional requirements.

At a minimum, all SSAT work must include the use of a barrier system such as temporary walls or tents to protect property and pedestrians from flying debris.

Excavate along the edge of the proposed trench closest to the trees to be protected as shown on the plans. Roots must be uncovered and care taken to avoid damage to roots and bark.

Excavation must proceed per the “Hand Excavation within Tree Protection Areas” specification in this section.

20-3.02C(1)(h)(3)  Special Demolition of Hardscape within Tree Protection Areas

Sidewalks and other hardscape items to be removed from within Tree Protection Areas (TPAs) must be removed under direct supervision of the Contract Arborist. Site restoration, if required, must also be supervised by the Contract Arborist.

No mechanized equipment must enter the TPAs. All work must be either done by hand (with hand-operated equipment such as jackhammers) or with equipment staged outside the TPA. Alternatives for specific situations must be reviewed by Project Arborist and Engineer.

Sequence of work must be reviewed and coordinated with the work of the Contract Arborist by the construction manager, contractor, Contract Arborist, Project Arborist, Engineer, and owner as appropriate for the project. Methods of protection of overhead branches, trunks, and roots must be reviewed. Refer to specifications for approved methods of temporary wrapping, or selective pruning.

Small equipment may operate upon existing hardscape or upon designated root protection matting if approved by the Project Arborist and Engineer. All staging or stockpiling of materials must occur outside the TPA.

Demolition of paving must not damage protected roots outside the limit of work nor below existing hardscape. Approved options include jackhammer and pick up by hand or break up by small excavator operating upon existing hardscape. Once hardscape is removed, no equipment must operate upon stone base unless inspected and approved by arborist as roots may have grown into base below hardscape.

Refer to “Hand Excavation within Tree Protection Areas” and “Supersonic Airtool Excavation” specifications in this section.

20-3.02C(1)(h)(4)  Excavation for Proposed Sidewalk within Tree Protection Areas

Excavation for site preparation must be done by SSAT or by hand.

Excavation must be done under direct supervision by the Contract Arborist.

Excavation for base preparation must not damage tree roots, trunks or branches. Areas must be assessed for overhead clearance prior to commencement.

Excavation must be the minimum necessary to achieve the required grades for the new sidewalk section. Sidewalk section and required grades must be determined by the Engineer.
Compaction of the new aggregate base must be the minimum necessary as dictated by the Engineer.

Refer to “Hand Excavation within Tree Protection Areas” and “Supersonic Airtool Excavation” specifications in this section.

**20-3.02C(1)(h)(5) SSAT Landscape Planting Excavation**

Proposed landscape planting within critical root zones within TPAs must be reviewed by the Contract Arborist, Contractor, and Engineer in the field to determine potential for damage to priority roots of select trees and layout the limit of work.

Pre-watering of the proposed areas of excavation during summer and fall months is recommended to maintain root / soil moisture.

The Contract Arborist must provide a qualified arborist crew experienced with the SSAT and landscape planting excavation to protect adjacent natural resources and construction work, open the excavation, hand prune minor roots, and identify and protect priority roots to remain. Coordination with the appropriate subcontractor must be made to determine appropriate width, depth, and sequencing.

**20-3.02C(1)(i) Wood Chip Mulch**

Mulching for the duration of construction for protection and stress reduction. Mulching will increase moisture-holding capacity, minimize soil compaction, and increase needed organic composition.

Mulch area options:

1. For individual trees designated on the TPAK within the TPA or curvilinear TPA install mulch to a radius equal to trunk diameter inches equated to mulch ring diameter in feet (24-inch trunk diameter = 24-inch diameter mulch ring).
2. Where planting pit or tree lawn areas are restricted by hardscape or other restrictions, mulch the greatest area possible.
3. Either option may be used as appropriate for the area.

For privately owned trees, any installation is contingent upon receipt of owner’s permission. Owners may decline.

Motorized equipment must not enter the TPA unless specifically approved by the Project Arborist and specific conditions met (RPM, AlternaMATS, or approved equal etc). Any such motorized equipment must be operated by a certified arborist while inside the TPA.

Do not allow mulch to contact trunk/ root flare.

Mulch depth must be 3-inch to 4-inch.

Mulch must remain for the duration of construction and may remain permanently if the owner approves.

If the mulch is to be removed after construction, it must be removed by hand only. No equipment may be used.

**20-3.02C(1)(ii) Overhead Clearance**

Trees to remain must be assessed prior to construction for overhead clearance for construction activities. Contract Arborist must recommend either canopy pruning, temporary guying/tying of select limbs, or alternative construction methods.

Pruning for clearance must not remove branches above 12 foot or over 6 foot diameter.

All pruning you propose and/or Contract Arborist propose must first be reviewed and approved by the Owner and Project Arborist.

Equipment exhaust should be directed away from trees as much as possible. Stationary equipment must not exhaust directly under or towards trees.
Use appropriate equipment near trees to ensure that trees are not damaged by construction. Provide any specialized equipment needed at no additional cost to the owner.

Any pruning must also conform to the pruning specifications in this section.

20-3.02C(2) Transplant Palm Tree

Relocate, store (if necessary), test, monitor, maintain, water, and fertilize of all palm trees per these Special Provisions.

Transplanting two palm trees at the open space at E12th and 2nd Avenue must include salvaging of irrigation parts, modifications and adjustments to the existing irrigation system and the reinstallation and reconnection of irrigation system parts at the new palm tree locations.

Submit for acceptance by the Engineer manufacturer's product, installation, and maintenance information for any products used in transplanting palm trees.

Workers assigned to this work must be tooled and trained to perform the transplanting, storage (if necessary) and maintenance of the palm tree species subject to relocating. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.

Submit for acceptance and approval by the Engineer and Project Arborist a detailed watering schedule and procedure specific to the species of transplanted palm trees and local site and climatic conditions.

All palm trees identified on the plans for relocation must be set plumb and roots at proper finished grade. If any palm begins to lean due to settling or for any other reason, necessary adjustments must be made to straighten it as soon as possible. Any adjustments necessary to straighten palms must be made by the installation contractor at no charge to the City within 12 months after planting.

Ensure the planting hole has proper drainage. Inform Engineer if conditions are detected that inhibit to optimal health and rigorous growth.

Do not proceed with digging of drainage sumps under palm trees until verification has been completed that no conflicts exist between underground utilities and holes for drainage sumps. If no conflicts with underground utilities are found, proceed with construction of drainage sumps to the depth indicated on the Drawings.

Drainage within the root zone must be monitored by determining the presence or absence of water at the bottom of drainage inspection tubes installed. No standing water must be present in the tube.

If standing water is discovered, its depth below grade must be recorded, all water must be pumped out and watering schedule adjusted to prevent reoccurring standing water.

Monitor the following: Soil moisture content, Drainage (inspection tubes), Components of the irrigation system and make adjustments as required.

Monitor the soil moisture content and irrigation system and make all adjustments to the approved palm tree watering schedule or irrigation system as required.

Responsible for fertilization and maintenance of palm trees.

The soil surrounding the bases of palms must be maintained clear of groundcovers and weeds to a distance of 18 in.

All weeds must be hand pulled. The use of herbicides for a radius of 12 feet is not allowed. Provide Fungicide applications as required.

No additional soil may be added over the rootball or the backfill sand.

Injury of any kind to the trunks or bases of palms must be avoided.
The leaves should be untied 6 to 8 weeks after installation, or at the commencement of the rainy season, whichever comes first.

Ensure that the re-established irrigation system (only applicable to the two transplanted palm trees at the open space) conforms to the recommendations detailed in the installation specifications. During the establishment period, only the drip system must be activated. The bubbler system will not be used until after the palms become established in their new locations.

Water from spray heads, which may be irrigating other nearby plants, must not be allowed to strike the trunks or bases of the palms.

The palms must not be pruned during the establishment period other than to remove dead and broken leaves as they may periodically appear. Live leaves must not be removed. (Removal of dead and broken leaves is necessary only for appearance and hazard reduction, not for the health of the palms.)

When leaves are removed, they must be cut back to the level from which they emerge. All inflorescences (flower and fruit stalks) must also be removed at that time. If inflorescences cannot be removed in their entirety, as much should be removed as possible.

The spear leaf in the center of the crown must never be pruned or disturbed in any way as serious decline or death of the palm can result.

If pruning is scheduled at the same approximate time as a fungicidal spray application, the pruning must be completed first. This will allow more thorough spray coverage and will help protect pruning wounds from infection.

Before pruning any individual tree, sterilize all pruning tools by soaking them in a solution of 1 part Clorox bleach and one part water for a minimum of 5 minutes. All portions of cutting blades must be submerged. Non-mechanized pruning tools or reciprocal saws with replaceable blades are recommended. Chain saws may not be used without additional specifications for tool sterilization and written permission from the project palm specialist.

It is imperative that all pruning tools be sterilized each time before pruning each individual tree. Non-sterilized pruning tools can transmit Fusarium wilt, a disease that is both fatal and incurable.

Do not use climbing spurs on palm trees for pruning or for any other reason. If the crown of a palm tree cannot be reached by an aerial lift trunk or device, it should be climbed with the aid of a ladder, with both the ladder and the climber securely tied in. There are also climbing techniques that involve the use of climbing lines in such a way that neither ladders nor spurs are necessary.

Any pruning operations, which are not specified above, must adhere to the general recommendations of the following publications:


20-3.02C(4) Field Quality Control and Monitoring
20-3.02C(4)(a) Tree Condition Monitoring
An ISA Certified Arborist (provided by the Contract Arborist) must perform monitoring twice per month year round to monitor insects, disease, soil moisture levels, weather, and health changes on all trees designated on Tree Protection Action Key.
The monitoring will include a report that details problematic areas that have been addressed, treatments provided to reduce the problem, and anticipated treatments forecast for 30 days. This report will be forwarded to the Project Arborist, Engineer and Owner for documentation.

Any treatments recommended by the Contract Arborist not already included in the project scope must be noted in the reports for review by the Project Arborist and Engineer. No additional work is to be performed unless approved in writing by the Engineer.

20-3.02C(4)(b) Contract Arborist (Construction Oversight)

Any work within CRZs of retained trees must be directly supervised by the Contract Arborist.

If roots are encountered during excavations, work must progress as directed by the Contract Arborist. Contract Arborist, in coordination with the construction and design teams, must determine appropriate means and methods to address the roots. Options may include, but not be limited to, severing the roots, hand or SSAT excavation. Tree roots must not be cut.

Refer to “Hand Excavation within Tree Protection Areas” specification in this section.

All work must be documented thoroughly, including photo documentation. Refer to site documentation submittal requirements.

20-3.02C(5) Contractor Damages and Penalties

20-3.02C(5)(a) Remedial Measures

Any damage caused to the trees by the work of this contract through negligence must be immediately remedied at no additional cost to the Owner.

Remedial work may include pruning, cabling, or any other measures up to and including removal and replacement, as determined by the Project Arborist and Engineer.

Remedial work must be performed by the Contract Arborist, as approved by the Project Arborist and Engineer.

All required remedial work must be performed to the satisfaction of the Project Arborist and Engineer, at no additional cost to the owner.

20-3.02C(5)(b) Tree Replacement

If a new tree sustains damage after it was planted due to tree preservation related activities follow replacement procedure described in Section 20-4.01B. If an existing tree identified as to-be-protected on the Plans is damaged or in poor health, as determined by the Project Arborist and Engineer, the tree must be replaced with a new tree of equal size caliper and species as that of the damaged tree. Replacement must occur within one month after determination of the condition by the Project Arborist and Engineer.

If a replacement tree of equal size caliper is not possible as determined by the Project Arborist and Engineer, it must be replaced on an inch for inch basis with new trees of a minimum caliper size of 2-inch to 3-inch.

If the damage or poor health of the tree are the result of negligence as determined by the Project Arborist and Engineer, replacement trees must be supplied and installed at no additional costs to the owner, including all incidental costs including the costs of inspection of the tree at the nursery and any other incidental costs associated with tree replacement.

20-3.02D Payment

Not Used

Add to the 1st paragraph of section 20-3.03C(2) of the RSS:

Detailed layout within the planting areas must be performed and approved by the Engineer prior to planting.

Delete the 2nd paragraph of section 20-3.03C(2) of the RSS.
Delete the 3rd paragraph of section 20-3.03C(2) of the RSS.

Delete the 5th paragraph of section 20-3.03C(2) of the RSS.

Add to section 20-3.03C(2) of the RSS:

Section 20-3.03C(2)(a) Earthwork and Topsoil Placement

Section 20-3.03C(2)(a)(i) Drainage, Detrimental Soils and Obstructions

Notify the Engineer in writing of any and all observed soil or drainage conditions that are detrimental to the growth of trees. State the encountered condition and submit a proposal to the Engineer for how to improve drainage.

Sample tree pits must be filled with 2 feet of water prior to planting and must drain overnight. If pit fails to drain overnight, submit in writing a proposal for the correction to the Engineer before proceeding with work. Number to be tested must be one (1) pit per every five (5) pits. If rock, underground construction work, tree roots or other obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the Engineer. Provide one (1) deep watering and aeration assembly per tree well and two (2) deep watering pipes at each palm tree location as indicated on the Drawings.

Where new trees are placed in areas with existing concrete sidewalk without existing tree wells, sawcut tree wells into existing concrete sidewalks in locations and of sizes indicated on the Drawings. Remove all concrete debris and aggregate from tree well areas and prepare for tree planting as per these Special Provisions.

Section 20-3.03C(2)(a)(ii) Topsoil Preparation and Conditioning

Weed and Debris Removal: Ground areas to be planted must be cleaned of weeds and debris prior to any soil preparation or grading work. Noxious weeds and grasses must be removed by the roots wherever they are found at any stage of the work. Weeds and debris must be disposed of off the site.

Soil contaminated by cement, paint, plaster, herbicides, or other construction debris must be removed from the site and replaced with clean topsoil at no extra cost to the Client. Replacement soil must conform to requirements spelled out in section 20-1.02D(1) and be approved by the Engineer prior to placement.

Do not proceed with soil fracturing until verification has been completed that no conflicts exist between underground utilities and soil fracturing activities. If no conflicts with underground utilities are found, follow the following process:

After grading and removing all plants and debris from the surface, spread 2 inches to 3 inches of compost over the surface of the soil. Loosen the soil to depths specified below, using a backhoe to dig into the soil through the compost. Lift and then drop the loosened soil immediately back into the hole. The bucket then moves to the adjacent soil and repeats the process until the entire area indicated has been loosened.

Loosen soil in shrub planting areas to a depth of 18 inches and in tree planting areas to a depth of 24 inches at curbside locations and 36 inches in median locations prior to adding topsoil and/or amendments. Loosen soil in entire tree well area at curbside and median tree locations. Do not loosen soil, scarify or till within the drip line of existing trees to be retained.

Soil must not be worked when moisture content is so great that excessive compaction will occur nor when it is so dry that dust will form in air or that clods will not break readily. Water must be applied, if necessary, to bring soil to an ideal moisture content for tilling and planting.

After soil fracturing is complete, amend import or site soil to meet required organic matter content for topsoil per soils report. Apply non-synthetic fertilizers and other amendments, including a minimum of 4 cubic yards of compost per 1000 square feet of planting area (or 1.3 inches per square foot) appropriate quantities of compost to bring soil organic matter content to 5%, as specified in the soils analysis report, to the surface of the aerated soil/subgrade. For bid purposes assume 3 inches of quality compost applied to all areas to receive planting. Mix to the depth required to achieve 8 inches of settled topsoil/amendment mix.
Soil amendments must be uniformly and thoroughly mixed into the soil to the required depth as indicated on soil analysis report.

All planting pit surface should be disturbed by scarifications (3 inches at sides, 6 inches at bottom). Do not loosen soil, scarify within drip line of existing trees to be retained.

When weeding, soil preparation, and soil conditioning have been completed and placed soil has been thoroughly water settled, all planting areas must be fine graded for placement of planting. Subgrades must have been established under other portions of the work. No soil preparation must be done until rough grades to 0.10 foot of finished grades have been approved by the Engineer. Finish grade in planting beds and tree wells must be established by taking into account the depth required for topsoil and amendments, plant container size, and layers of decomposed granite, wood chip mulch, sheet mulch or pea gravel, where applicable. If subgrades are improperly compacted, do not proceed until condition is corrected to the satisfaction of the Engineer. Imported or site topsoil and amendments must be installed in all planting areas and in new turf areas designated to receive topsoil. Install and rototill to a depth of 8”. Rake beds to smooth and remove surface rocks larger than 1 inch in diameter. Finish grades must be smooth and even, free of abrupt changes of plane or low points. Minor changes may be ordered by the Engineer to satisfy design intent.

Finish grade of tree wells and median planting areas relative to adjacent hardscape edges as shown on the Drawings.

Replace 5th sentence of the 3rd paragraph of section 20-3.03C(3)(a) of the RSS with:
Groundcover plants in areas with an irrigation system must be watered by sub-surface drip emitters.

Replace each occurrence of “sprinkler” in section 20-3.03(3)(a) of the RSS with:
bubbler

Replace section 20-3.03C(3)(b) of the RSS with:
Planting holes must be sized according to the plans or larger if necessary to permit handling and planting without injury or breakage of the root ball or root system. Any plant with a broken or cracked root ball before or during planting must not be planted.

Containers must be opened and removed in such a manner that the root is not injured. Balled plant wrappings must be loosened or cut back after plant is positioned in the planting hole.

All planting holes must be backfilled with site or imported topsoil amended as per recommendations in the soils report.

After planting, the plant must be plumb, with the root crown at its natural growing depth with respect to finish grade. Planting must be governed by the following requirements:

1. A layer of prepared soil mix must be deposited in the planting hole.
2. The plant must be set approximately at the center of the hole.
3. Prepared soil mix must be deposited in the remainder of the hole to finish grade.
4. The backfill must be thoroughly water-settled and additional prepared soil mix added to fill any remaining void below finish grade.
5. Install irrigation and aeration tube assembly at new trees as shown on the Plans. Position vertical tube of assembly as follows:

   5.1 In tree wells for Ginkgo biloba at curbside stations: aligned with lightport in tree grate. Final lightport location must be determined prior to ordering tree grates. Locations may vary based on presence of trench drain extension through tree well and tree grate manufacturer’s instructions for locating lightport in 4-foot by 8-foot tree grate.

   5.2 In tree wells for all other curbside trees: between tree trunk and curb.

   5.3 For median trees: between tree trunk and curb. Use same of two median curbs for the length of the corridor or provide Engineer with Shop Drawing or Diagram that depicts your recommended locations along the corridor.

6. Remove nursery stakes after planting. Stake tree in accordance with 20-3.03C(3)(b) with the following exceptions:

   6.1 Trees planted with tree guards do not require stakes and must be tied to the tree guard using ties.
conforming to Section 212-1.5.3. Attach ties to tree guard as indicated on the Plans and following the manufacturer’s recommendations.

6.2 Trees planted in tree wells covered by existing tree grates must be tied to single steel stake complying to Section 212-1.5.3. Attach steel stake to tree grate using the stake manufacturer’s recommended hardware and installation instructions. Tie tree to steel stake using the stake manufacturer’s recommended hardware and straps and following the manufacturer’s installation instructions.

7. The area around plant must be regraded to finish grade. The excess soil must be disposed of.

Protect trees at all times prior to planting from sun or drying winds. Trees that cannot be planted immediately on delivery must be kept in the shade; wilt protected and must be kept well watered. Carefully excavate planting pit and provide utility protection as shown on plans.

After removing trees from container, scarify sides of root ball to prevent root-bound condition. Place root ball on subgrade compacted to 95%. Set tree plumb and brace rigidly in position until planting soil has been tamped solidly around the ball and roots. When trench has been backfilled approximately 2/3 full, water root ball thoroughly, saturating root ball, before installing remainder of the backfill to top of trench, eliminating all air pockets.

20-3.03C(3)(b)(i) Planting in Bioretention Areas

For planting in the bioretention areas of the Elmhurst Parking lot:

1. Refer to original construction plans for the parking lot for the location of bioretention soils.
2. Prior to planting, remove all rubble, debris, dust and silt from the top of the bioretention soil that may have accumulated after the initial installation of the biotreatment soil. If Engineer determines that too much rubble, debris, dust and silt is present, Contractor shall remove and replace biotreatment soil consistent with the original specifications for the biotreatment soil.
3. If Engineer determines that the bioretention soil has settled since its original placement, install additional bioretention soil as necessary to meet the original finish grade indicated on the original construction plans for the parking lot.

Replace section 20-3.03C(3)(d) of the RSS with:

Not used.

Replace section 20-3.03C(3)(e) of the RSS with:

Not used.

Replace section 20-4.01B of the RSS with:

Plant establishment period: After planting is completed, a written notification will be issued to you by the Engineer to establish the effective beginning date of the plant establishment period. The plant establishment period must be for a period of 36 calendar months and will be extended by the Engineer if the planted material areas are improperly maintained, appreciable plant replacement is required during the establishment period, or if other corrective work becomes necessary.

All newly planted trees, with the exception of trees located in medians in San Leandro that are watered by an irrigation system, must be truck-watered for the length of the plant establishment period. Watering must occur at amounts and intervals that result in healthy tree growth. Prior to commencement of the maintenance and plant establishment period, provide to the Engineer and Project Arborist for approval a detailed watering schedule that outlines watering intervals and amounts for the duration of the maintenance and plant establishment period.

If a new tree sustains damage after it was planted or, as determined by the Project Arborist, is in poor health, replace the tree within one month of determination of this condition by the Project Arborist. Replacement of failed trees just before the end of the 3-year plant establishment period is not acceptable. If an existing tree identified as to-be-protected on the Plans is damaged or in poor health, as determined by the Project Arborist and Engineer follow replacement procedure detailed in section 20-3.02C(5)(b). New trees requiring replacement due to your activities or negligence must be replaced at no additional cost to the Owner.
Add to 20-4.01C(1) of the RSS:
Keep a detailed log of plant establishment activities performed and submit a copy to the Engineer with each payment request.

Replace 1st paragraph of section 20-4.03A of the RSS with:
All planting areas must be kept free of litter and debris and must be weeded, cultivated, fertilized, and mulched.

Add between 1st and 2nd paragraph of section 20-4.03A of the RSS:
Maintain all planted areas on a continuous basis as they are completed during the progress of the work and during establishment period, and must continue to maintain them until final acceptance.

Protect adjacent walls, walks and utilities from damage or staining by soil.

Add between 7th and 8th paragraph of section 20-4.03A of the RSS:
Proper performance of irrigation systems must be checked at intervals not to exceed 10 days. Any required repairs or adjustments to irrigation systems must be performed immediately.

Every 9 months after installation of decomposed granite in tree wells and medians and just before the end of the 36-month maintenance period, apply additional layers of decomposed granite where the subgrade or planting soil have subsided. Layers of decomposed granite must added until curbside tree wells are flush with the adjacent sidewalk surface or curb and until the original finished grade in medians has been reestablished. Material and installation of additional layers must be as shown on the Palms and per these Special Provisions.

Where berms are used to hold irrigation water from truck watering, these must be remove at the end of the 36-month maintenance period.

Replace 2nd paragraph of section 20-4.03B of the RSS:
Remove plant growth of proposed and existing ground cover that extends onto sidewalks, maintenance bands in medians or curbs.

Add to section 20-4.03B of the RSS:
Conduct pruning of trees and other plants as designated by the Engineer at the start of the plant establishment period and as part of the plant establishment work under the supervision of the Project Arborist. Prune at least annually as recommended by the Project Arborist to properly develop structure and health of trees and shrubs and for median trees to establish and maintain clearances from and above travel and BRT lanes as required by the City of Oakland.

Replace section 20-5.02B(4) of the RSS with:
Not Used

Replace section 20-5.02B(5) of the RSS with:
Not Used

Delete the 1st paragraph of section 20-5.02C(1) of the RSS.

Delete the 1st and 2nd sentence of 2 paragraph of section 20-5.02C(1) of the RSS.

Replace 3rd entry in 1st list of section 20-5.02B(2) of the RSS
3. Construction heart grade redwood certified by the Forest Stewardship Council (FSC) and complying with section 57-2.01B(2).

Replace section 20-5.02C(3) of the RSS with:
Not Used

Replace section 20-5.02C(4) of the RSS with:
Delete 1st paragraph of section 20-5.03A(2) of the RSS.

Replace section 20-5.03A(3)(b) of the RSS with:
Excavate or grade areas to receive inert ground cover or mulch to the depth shown. Maintain the planned flow lines, slope gradients, and contours of the job site. Grade subgrade to a smooth and uniform surface and compact to not less than 85 percent relative compaction.

Replace section 20-5.03A(3)(c) of the RSS with:
Not Used

Add to Section 20-5.03A(3)(d) of the RSS:
Weed control fabric under decomposed granite must be manufactured from thermally spun bonded polypropylene fabric and must conform to the following:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Standard</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab Tensile Strength</td>
<td>ASTM D-4632</td>
<td>175 x 115 lbs.</td>
</tr>
<tr>
<td>Grab Tensile Elongation</td>
<td>ASTM D-4632</td>
<td>24 x 20%</td>
</tr>
<tr>
<td>Trapezoid Tear</td>
<td>ASTM D-4533</td>
<td>75 x 60 lbs.</td>
</tr>
<tr>
<td>UV Resistance</td>
<td>ASTM D-4355</td>
<td>70%</td>
</tr>
<tr>
<td>Water Flow Rate</td>
<td>ASTM D-4491</td>
<td>12 gal/min./SF</td>
</tr>
</tbody>
</table>

Staples must be 2 inches wide, 8 inches in length, and 11 gauge wire.

Replace section 20-5.03B of the RSS with:
Not Used

Replace section 20-5.03C of the RSS with:
Not Used

Replace section 20-5.03C(2) of the RSS with:
Gravel mulch for filling the void space under tree grates and in tree grate center opening where required on the Drawings must be clean and graded, washed river-run gravel conforming to ASTM C33, No. 7.

Replace section 20-5.03D(1) of the RSS with:
Protect adjacent areas and improvements during delivery and storage. Protect all materials from damage caused by moisture, erosion and theft.

Examine areas to receive the decomposed granite. Surfaces should be clean of extraneous material, properly graded, constructed and of the correct moisture content to receive the surface layer of decomposed granite. Notify the Engineer of any defects, which might affect the installation of the material. Arrange for repairs after the Engineer's review and before continuing work.

Delete “gray or” in item 1 of 1st paragraph of section 20-5.03D(1) of the RSS.

Replace section 20-5.03D(3) of the RSS with:
Do not place decomposed granite during rainy conditions.

Protect adjacent areas and improvements during delivery and storage. Protect all materials from damage caused by moisture, erosion and theft.
Examine areas to receive the work of this Section. Surfaces should be clean of extraneous material, smooth, sound, properly compacted, graded, constructed and of the correct moisture content to receive the surface layer of decomposed granite. Adjacent concrete paving must have been installed and completed at locations where decomposed granite is to be placed. Notify the Engineer of any defects, which might affect the installation of these materials. Arrange for repairs after the Engineer's review and before continuing work.

Install weed barrier fabric before placing decomposed granite in medians and tree wells as shown on the Drawings. Surfaces to receive weed barrier fabric must be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Align fabric and place in a wrinkle-free manner. If necessary, overlap adjacent runs of the fabric from 12 to 18 inches unless specified otherwise by manufacturer’s installation instructions. Spread each overlapping run in the same direction. Fasten fabric with staples flush with the adjacent fabric to prevent movement of fabric by placement of decomposed granite.

Repair or replace fabric damaged during placement of decomposed granite with sufficient fabric to comply with overlap requirements.

Place decomposed granite in areas shown on the Drawings. Place to avoid segregation of materials in maximum layers of 4 inches. Compact by wetting. Roll with a hand operated roller to a smooth uniform surface texture to a maximum of 80% relative compaction. Consult with project arborist to determine weight of roller and the proper compaction rate for decomposed granite within drip line of existing trees identified on the Drawings as to remain and to be preserved. Repeat filling, compaction, and rolling until surface pavement achieves a level surface. Avoid damaging new and remaining existing trees and adjacent curbs, paved surfaces, or potentially present edge restraints during compaction and rolling. Damaged trees and other materials must be replaced immediately and at no additional cost to Owner. Do not leave adjacent soil overly compacted. Make any adjustments needed to assure proper drainage of water over the adjacent concrete and off the pavement. Final thickness of compacted work must be as shown on the Drawings or as directed by the Engineer or project arborist with a maximum variable tolerance of 1/2 inch. Make measurements by means of test holes taken at random in the finished surface. Repair test holes after inspection.

Leave decomposed granite and all adjacent pavement surfaces smooth and free of debris and extraneous material resulting from the work and the work site clean.

Add to 3rd paragraph of section 20-5.03D(3) of the RSS:
Avoid damaging trees and edge restraint during compaction and rolling. Damaged materials will be replaced immediately and at your expense. Finish adjacent shoulders and slopes to required grade as shown on the Drawings. Do not leave adjacent soil overly compacted.

Add to 4th paragraph of section 20-5.03D(3) of the RSS:
Leave adjacent soils or planted areas clean of debris and excess crushed rock.

Add between the 4th and 5th paragraph of section 20-5.03D(3) of the RSS:
Make any adjustments needed to assure proper drainage of water over the adjacent concrete and off the pavement. Final thickness of compacted work must be as shown on the Drawings with a maximum variable tolerance of 1/2 inch. Make measurements by means of test holes taken at random in the finished surface. Repair test holes after inspection.

Replace “Reserved” in section 20-5.03E(2)(f) of the RSS with:
Cardboard for the installation of sheet mulch where indicated on the Drawings must be 100% recycled B Flute Cardboard Rolls. Rolls of recycled cardboard are available through:

A. North Bay Paper in Petaluma, (800) 734-2772, or approved equal.
B. Monahan Paper in Oakland, (510) 835-4670, or approved equal.
C. Urban Farmer Store in Richmond, (510) 524-1604, or approved equal.
Add the following at the end of section 20-5.03E(3) of the RSS:

Sheet Mulch in plating areas along San Leandro Boulevard: After the soil preparation has occurred and 5 gallon and larger plant materials have been planted the “sheet mulch” shall be installed in locations identified on the plans.

Apply a minimum of two layers of 100% recycled B flute cardboard as a biodegradable weed barrier to the entire planting area, completely covering all existing soil and remaining herbaceous vegetation, if any. Wet cardboard while applying to prevent it from blowing away. Sheets of cardboard shall overlap a minimum of 8”. Cardboard shall abut directly against edge of pavement, curbs, boulders or other site features. Cardboard shall not cover tree and shrub root crowns. Excess cardboard shall be folded under itself when abutting against hardscape objects or root crowns areas, as opposed to being cut, avoid excessive cardboard scraps. This folding under process is greatly aided when the cardboard is wet.

All cardboard scraps shall remain separated from other construction debris and shall be disposed at the local recycling facility. Apply compost and mulch. Apply 3” of mulch on top of the compost to obtain a 3 inch minimum depth of combined compost and mulch above the cardboard. Mulch will protect compost during the planting of 1 gallon and 4” pots and the laying out of drip lines. Keep root crowns of all plants clear of compost, mulch and debris.

Replace section 20-5.02E(2)(b) of the RSS with:

Not Used

Replace section 20-5.02E(2)(c) of the RSS with:

Not Used

Add to item 1 of 1st paragraph of section 20-5.03E(2)(e) of the RSS:

Mulch must be recycled chipped wood mulch for areas indicated on the Drawings.

Mulch must be provided from on-site chipping of demolished trees and vegetation (excluding self sowing weeds or seeds) and supplemented, as needed, by “Arborist Mulch” recycled from local, organic materials such as, tree trimmings, plant or clean wood waste free of eucalyptus, resin, tannin, salts or other compounds detrimental to plant life. Other recycled mulch materials including peach pits, grape seeds can be found at www.BayFriendly.org and shall be approved by Owners Representative. Sizes of chipped mulch must be in the range of 3/4 to 2 inches. Sources of recycled mulches can be found at www.BayFriendly.org and shall be approved by the Engineer.

20-5.03E(2)(e)(i) Composted Mulch for Bioretention Areas in Elmhurst Parking Lot

To alleviate concerns over floating mulch in bioretention areas, use the following composted mulch for bioretention areas in the Elmhurst Parking lot:

Composted mulch must consist of organic green materials, yard trimmings, brush, and leaves. Mulch must be free of manures, residential curbside pick-up, biosolids, eucalyptus, resin, tannin, salts or other compounds detrimental to plant life, such as “Midnight Mulch”, produced by Vision Recycling, or approved equal.

Material must first be ground to 4-inch particles and then undergo a thermal composting process. After composting material must be screened with three screens to consist of material ranging in size between 1/2-inch and 1 1/2-inch. Aged mulch must be of a black to dark brown color. Resulting compost mulch must meet Class A: Processes to Further Reduce Pathogens (PFRP) requirements for composting and have reached temperatures over 130 Degrees Fahrenheit for 15 days and been turned 5 times within those 15 days.

Replace “Reserved” in section 20-5.03E(2)(f) of the RSS with:

Cardboard for the installation of sheet mulch where indicated on the Drawings must be 100% recycled B Flute Cardboard Rolls. Rolls of recycled cardboard are available through:

A. North Bay Paper in Petaluma, (800) 734-2772, or approved equal.

B. Monahan Paper in Oakland, (510) 835-4670, or approved equal.
Add the following at the end of section 20-5.03E(3) of the RSS:

Sheet Mulch in plating areas along San Leandro Boulevard: After the soil preparation has occurred and 5 gallon and larger plant materials have been planted the “sheet mulch” must be installed in locations identified on the plans.

Apply a minimum of two layers of 100% recycled B flute cardboard as a biodegradable weed barrier to the entire planting area, completely covering all existing soil and remaining herbaceous vegetation, if any. Wet cardboard while applying to prevent it from blowing away. Sheets of cardboard must overlap a minimum of 8”. Cardboard must abut directly against edge of pavement, curbs, boulders or other site features. Cardboard must not cover tree and shrub root crowns. Excess cardboard must be folded under itself when abutting against hardscape objects or root crowns areas, as opposed to being cut, avoid excessive cardboard scraps. This folding under process is greatly aided when the cardboard is wet.

All cardboard scraps must remain separated from other construction debris and must be disposed at the local recycling facility. Apply compost and mulch. Apply 3” of mulch on top of the compost to obtain a 3 inch minimum depth of combined compost and mulch above the cardboard. Mulch will protect compost during the planting of 1 gallon and 4” pots and the laying out of drip lines. Keep root crowns of all plants clear of compost, mulch and debris.

Replace “Reserved” in section 20-5.05B of the RSS with:

20-5.05B Bollards
20-5.05B(1) General
20-5.05B(1)(a) Submittals
Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or shop Drawings indicating size, materials, finishes, color and quantities of furnishings being supplied.

20-5.05B(2) Materials
Bollards, except where noted on the Drawings, must be Dumor, 36” high, Schedule 40 steel pipe bollard, model 400-36 S-1 (embedded), or approved equal; with factory-applied powder coat finish; color to match color of canopy on BRT platforms. If requested by the Engineer, reflective tape applied to bollard must be 4-inch wide 3M 3431 Engineering Grade Prismatic Reflective Tape, or approved equal.

All elements of the bollard must be free of fins, abrasions, sharp edges and other surface defects.

20-5.05B(3) Construction
Protect adjacent areas and improvements during delivery and storage. Protect all materials from damage caused by moisture, erosion and theft. Deliver materials in original containers with labels intact and exposed for inspection.

Prior to commencing installation, verify that adjacent work is complete and that conditions are acceptable for installation of bollards. Proceed with installation only after unsatisfactory conditions have been corrected. Install bollards in locations shown on the plans.

Install bollards in locations shown on the plans and per the manufacturer’s installation instructions and these specifications. Bollards must be set plumb and true to line and must present a neat and finished appearance.

20-5.05B(4) Payment
Not Used

Replace “Reserved” in section 20-5.05C of the RSS with:

20-5.05C Tree Grates, Tree Grate Frames and Tree Guards
20-5.05C(1) General
20-5.05C(1)(a) Submittals
Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or shop Drawings indicating size, materials, finishes, color and quantities of furnishings being supplied.

20-5.05C(2) Materials

20-5.05C(2)(a) Tree Grate and Frames

Tree grates, except where noted on the Drawings, must be Urban Accessories “Chinook” RCT custom-sized to 4-foot by 8-foot, or approved equal; Material: 100% recycled grey iron, conforming to ASTM A48 class 35b, hardness 170-223 brinnell; finish: raw natural finish. Openings in pattern must not exceed greater than 3/8-inch, in conformance with ADA Accessibility Guidelines. Each tree grate must have a single 9” lightport opening and corresponding metal lightport cover for access to the irrigation and aeration tube assembly that is to be located under the opening. Review exact location of trench drains that project through tree wells prior to ordering tree grates with light ports. Lightport must be located on longitudinal side of tree well opposite from trench drain, aligned to give access to the deep watering and aeration tube below and as per manufacturer’s lightport worksheet instructions.

Tree grate frames for “Chinook” tree grate must be Urban Accessories, 4-foot by 8-foot RCT Standard “S” tree grate frame made from steel with a raw finish and for direct embedment in new concrete.

20-5.05C(2)(b) Tree Guard

Where called for on the Plans, tree guard must be Urban Accessories, “Windsor” with flat tops, or approved equal; material: cast components must be of 100% recycled aluminum conforming to ASTM B261, fabricated components must be mild carbon steel, conforming to ASTM A36; color and finish: custom – to match color and finish of canopy on BRT platform. All visible welds must be ground smooth on outside edges. Castings must be squared and flat, free of burrs, slag, air pockets, blow holes, flashing, and grinding or welding on exposed surfaces. Excessive warping or shrinkage are not acceptable.

20-5.05C(3) Construction

Protect adjacent areas and improvements during delivery and storage. Protect all materials from damage caused by moisture, erosion and theft. Deliver materials in original containers with labels intact and exposed for inspection. Contractor is responsible for repair of salvaged tree grates sustained during Contractor’s salvage, transport, storage and reinstallation operations.

Prior to commencing installation, verify that adjacent work is complete and that conditions are acceptable for installation of tree grates and tree grate frames. Proceed with installation only after unsatisfactory conditions have been corrected.

Install grates, tree grate frames and tree guards in locations shown on the Drawings and per the manufacturer’s installation instructions and these specifications. Tree grate frames must be embedded in concrete such that all edges of tree grates are flush with adjacent paving surfaces. Unstable tree grate components and tree grates that pose a tripping hazard due to offsets between grate and adjacent concrete surfaces will be rejected by the Engineer. Reinstallation of rejected tree grates must be done with no additional cost to Owner. Tree grates must be attached to the tree grate frame using tamper-proof, anti-theft bolts.

Attach tree guard components to one another and to tree grate using tamperproof bolts and as per manufacturer’s installation instructions. If not specified by the manufacturer, use tamperproof bolts. Tie tree to tree guard as shown on the Plans.

20-5.05C(4) Payment

Not Used

Replace “Reserved” in section 20-5.05D of the RSS with:

20-5.05D Bicycle Racks
20-5.05D(1) General
20-5.05D(1)(a) Submittals

Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or shop Drawings indicating size, materials, finishes, color and quantities of furnishings being supplied.
20-5.05D(2) Materials
Bicycle racks must comply with Division 3.1 Section 12 93 00.

20-5.05D(3) Construction
Bicycle racks must be installed per Division 3.1 Section 12 93 00.

20-5.05D(4) Payment
Not Used

~~~~~~~~~~~~~~~~~~~~~~~~~~~

25 AGGREGATE SUBBASES

Add before 1st paragraph of section 25-1.03B:
At locations where the R-value of the existing subgrade is less than 10, the subgrade must be stabilized using a Class B1 Geotextile.

Class B1 Geotextile must comply with section 19-8 and 88-1.02B.

~~~~~~~~~~~~~~~~~~~~~~~~~~~

29 TREATED PERMEABLE BASES

Add to section 29-1.01:
Treated permeable base must be asphalt treated.

Add to section 29-1.02B:
The type of asphalt binder to be mixed with aggregate for ATPB must be Grade PG64-10 for Type A Hot Mix Asphalt and PG64-16 for Gap Graded Rubberized Hot Mix Asphalt.

~~~~~~~~~~~~~~~~~~~~~~~~~~~

DIVISION V SURFACINGS AND PAVEMENTS

39 HOT MIX ASPHALT

Replace section 39-1.03C(3) of the RSS for section 39 with:

39-1.03C(3) Prime Coat
Apply a slow-setting asphaltic emulsion as a prime coat to aggregate base areas designated by the Engineer. Apply prime coat at a spread rate of 0.15 to 0.40 gal/sq yd. Do not apply more prime coat than can be absorbed completely by the aggregate base in 24 hours.

If you request and the request is authorized, you may modify prime coat application rates.

Close areas receiving prime coat to traffic. Do not track prime coat onto pavement surfaces beyond the job site.
Replace the 2nd paragraph in section 39-2.01A of the RSS for section 39 with:
Produce Type A HMA using an authorized warm mix asphalt technology, except the water injection technology is not allowed.

Add to the table in the 1st paragraph of section 39-2.01D(2)(b) of the RSS for section 39:

| Requirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County. |

Fine durability index | AASHTO T 210 | 1 per 3,000 tons or 1 per paving day, whichever is greater |
Sodium sulfate soundness  | AASHTO T 104 | 1 per project |

Add the row for Los Angeles Rattler in the table in item 1 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39 with:

| Los Angeles Rattler (max, %) | AASHTO T 96 | 12 |
| Loss at 100 Rev. | 25 |
| Loss at 500 Rev. |

Add to the table in item 1 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39:

| Requirement applies if aggregate source is in Lassen, Modoc, Siskiyou, or Shasta County. |

Coarse durability index ($D_c$, min)  | AASHTO T 210 | 65 |
Fine durability index ($D_f$, min) | AASHTO T 210 | 50 |
Sodium sulfate soundness (max loss, %)  | AASHTO T 104 | 25 |

Delete the row for moisture susceptibility, dry strength, in the table in item 3 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39.

Replace the row for moisture susceptibility, wet strength, in the table in item 3 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39 with:

| Moisture susceptibility (min, tensile strength ratio) | AASHTO T 283 | 80 |

Add to the table in item 3 in the list in the paragraph of section 39-2.01D(5) of the RSS for section 39:

| Surface abrasion loss (max, g/cm²)  | California Test 360 | 0.4 |

If the project elevation is greater than 1500 feet

Replace "Reserved" in section 39-2.02C of the RSS for section 39 with:
The grade of asphalt binder for Type A HMA must be PG64-10.
Replace the paragraphs of section 39-2.03 of the RSS for section 39 with:

If the atmospheric temperature is below 60 degrees F, cover loads in trucks with tarps. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

Spread Type A HMA at the atmospheric and surface temperatures shown in the following table:

<table>
<thead>
<tr>
<th>Compacted layer thickness</th>
<th>Minimum Atmospheric and Surface Temperatures</th>
<th>Surface, °F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unmodified asphalt binder</td>
<td>Modified asphalt binder</td>
</tr>
<tr>
<td>&lt; 0.15</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>≥ 0.15</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

*a* Except asphalt rubber binder.

For method compaction, the maximum compacted layer thickness must be 0.25 foot.

For Type A HMA placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
   1.1 First coverage of breakdown compaction before the surface temperature drops below 240 degrees F
   1.2 Breakdown and intermediate compaction before the surface temperature drops below 190 degrees F
   1.3 Finish compaction before the surface temperature drops below 140 degrees F
2. Modified, complete:
   2.1 First coverage of breakdown compaction before the surface temperature drops below 230 degrees F
   2.2 Breakdown and intermediate compaction before the surface temperature drops below 170 degrees F
   2.3 Finish compaction before the surface temperature drops below 130 degrees F

If you request and the request is authorized, you may cool Type A HMA with water when rolling activities are complete. Apply water under section 17.

Replace the 2nd paragraph in section 39-3.01A of the RSS for section 39 with:

You must produce RHMA-G using an authorized warm mix asphalt technology, except the water injection technology is not allowed.

Add to section 39-3.02C(1) of the RSS for section 39:

The grade of asphalt binder for RHMA-G must be PG64-16.

Replace the paragraphs of section 39-3.03 of the RSS for section 39 with:

Use a material transfer vehicle when placing RHMA-G.

Do not use a pneumatic tired roller to compact RHMA-G.

Spread and compact RHMA-G at an atmospheric temperature of at least 50 degrees F and a surface temperature of at least 50 degrees F.
If the atmospheric temperature is below 60 degrees F, cover loads in trucks with tarps. If the time for HMA discharge to truck at the HMA plant until transfer to paver's hopper is 90 minutes or greater and if the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharging to the truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

For RHMA-G placed under method compaction:

1. Only spread and compact if the atmospheric temperature is at least 50 degrees F and the surface temperature is at least 50 degrees F
2. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 260 degrees F
3. Complete breakdown and intermediate compaction before the surface temperature drops below 230 degrees F
4. Complete finish compaction before the surface temperature drops below 180 degrees F

Spread sand at a rate between 1 and 2 lb/sq yd on new RHMA-G pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3). Keep traffic off the pavement until spreading sand is complete.

Add to section 39:

39-8 STAMPED ASPHALT

39-8.01 GENERAL

39-8.01A Summary

Section 39-8 includes specifications to stamping a pattern into the asphalt surface and applying a colored surface coating treatment. The pattern and color of the stamped asphalt must be specified by the Engineer.

39-8.01B Quality Assurance and Control

39-8.01B(1) Training

The Applicator shall be approved by the Engineer. The Applicator shall have lead personnel on the project that have been trained by manufacturer within the past 12 months of starting the project. At least one of these trained personnel shall be on site at all times during the application.

39-8.01B(2) Samples

Samples shall be provided to the Engineer for approval prior to tender closing.

Samples shall display the following:

1. Brick or stone Pattern
2. Brick or stone color
3. Variations as requested by the Engineer

Samples and mockups to be applied to and presented on:

1. 24” x 24” x ¼” hardboard panels unless otherwise requested.

Approved samples and mockups must be stored until project completion.

39-8.02 MATERIAL

39-8.02A Hot Mix Asphalt

Hot Mix Asphalt shall comply with Section 39.

39-8.02B Equipment

Templates must be flexible templates either 3/8 inch cable or 1/4 inch plastic.
Coatings shall be Pattern Paving Products’ STREETCOAT “Epoxy Modified Traffic Coating” or approved equal.

Coatings used with this surfacing system must meet the following minimum characteristic and performance properties:
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D2369 % Solids by weight</td>
<td>Greater than 76 percent</td>
</tr>
<tr>
<td>ASTM D26297 % Solids by volume</td>
<td>Greater than 55.5 percent</td>
</tr>
<tr>
<td>Weight per gallon</td>
<td>13.9 lbs/gal</td>
</tr>
<tr>
<td>% non-reactive fillers</td>
<td>Less than 40%</td>
</tr>
<tr>
<td>Boiling Range</td>
<td>147°F to 477°F</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>Heavier than air</td>
</tr>
<tr>
<td>Flashpoint ASTM D 3278</td>
<td>Greater than 201°F</td>
</tr>
<tr>
<td>Flashpoint ASTM D 3278</td>
<td>Greater than 201°F</td>
</tr>
<tr>
<td>Hazardous Ingredients</td>
<td>none</td>
</tr>
<tr>
<td>Mix Ratio (Coating : LiquidTint) gal/pint</td>
<td>5gallon:1pint</td>
</tr>
<tr>
<td>Dry mil thickness per coat</td>
<td>8 mils to 12 mils</td>
</tr>
<tr>
<td>Minimum number of coats</td>
<td>3</td>
</tr>
</tbody>
</table>
### Performance Requirements

<table>
<thead>
<tr>
<th>Test</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Time (to re-coat) @ 50°F (10°C)</td>
<td>120 minutes</td>
</tr>
<tr>
<td>Dry Time (to re-coat) @ 90°F (32°C)</td>
<td>30 minutes</td>
</tr>
<tr>
<td>85% Cure (to permit traffic) @ 50°F (10°C)</td>
<td>8 hours to 10 hours</td>
</tr>
<tr>
<td>85% Cure (to permit traffic) @ 90°F (32°C)</td>
<td>4 hours to 6 hours</td>
</tr>
<tr>
<td>Gloss: ASTM D523 (60° Gardner)</td>
<td>2.5</td>
</tr>
<tr>
<td>Hardness: ASTM D3363</td>
<td>3H pencil</td>
</tr>
<tr>
<td>ASTM 2486 Gasoline Scrub Resistance</td>
<td>To 50 percent of coating thickness (30 mils)</td>
</tr>
<tr>
<td>ASTM 2486 Motor Oil Scrub Resistance</td>
<td>To 50 percent of coating thickness (30 mils)</td>
</tr>
<tr>
<td>Temp. limits for service (of cured material)</td>
<td>-35°F to 145°F</td>
</tr>
<tr>
<td>ASTM G-155 Color Stability</td>
<td>Old Brick Color</td>
</tr>
<tr>
<td>QUV 2,000 hours (CIE units)</td>
<td>ΔE less than 0.5</td>
</tr>
<tr>
<td>Pedestrian Friction ASTM E303 British Pendulum</td>
<td>88 BPN Dry</td>
</tr>
<tr>
<td>Mandrel Bend Test ASTM D522</td>
<td>Greater than 3/16 inch Passing</td>
</tr>
<tr>
<td>Water Absorption ASTM D570 7day</td>
<td>Less than 9 percent</td>
</tr>
<tr>
<td>VOC Content ASTM D3960</td>
<td>Less than 19 grams per liter</td>
</tr>
<tr>
<td>Taber Abrasion Dry H-10 ASTM D4060 1day cure</td>
<td>.17 grams per 1000 cycles</td>
</tr>
<tr>
<td>Taber Abrasion Wet H-10 ASTM D4060 7day cure</td>
<td>.43 grams per 1000 cycles</td>
</tr>
<tr>
<td>Adhesion to Asphalt ASTM D4541</td>
<td>Asphalt Cohesive Failure</td>
</tr>
</tbody>
</table>

**Gloss: ASTM D523 (60° Gardner)**

### Additional Tests

<table>
<thead>
<tr>
<th>Test</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tem. limits for service (of cured material)</td>
<td>-35°F to 145°F</td>
</tr>
<tr>
<td>ASTM G-155 Color Stability</td>
<td>Old Brick Color</td>
</tr>
<tr>
<td>QUV 2,000 hours (CIE units)</td>
<td>ΔE less than 0.5</td>
</tr>
<tr>
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</tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Taber Abrasion Wet H-10 ASTM D4060 7day cure</td>
<td>.43 grams per 1000 cycles</td>
</tr>
<tr>
<td>Adhesion to Asphalt ASTM D4541</td>
<td>Asphalt Cohesive Failure</td>
</tr>
</tbody>
</table>

**Hardness: ASTM D3363**

3H pencil
39-8.02C(1) Color
Coloring system for Coating must be Pattern Paving Products' LiquidTint or approved equal.

Coloring system must consist of no less than 95 percent pure inorganic iron oxide pigments in a waterbase liquid carrier. Pigment particle size (fineness) must pass 95 percent minus 325 mesh. Coloring system must be alkali resistant, water insoluble, inert, light resistant, inorganic, and lime-proof.

39-8.03 CONSTRUCTION
39-8.03A Stamping Asphalt
Using flexible templates, stamp the pattern into the asphalt using a vibratory plate compactor. Stamping can be performed on a freshly placed asphalt surface when the asphalt is still pliable or into an existing asphalt surface. An existing asphalt surface must be heated using an infrared heating apparatus insuring not to heat the surface above 325ºF (163ºC)

Use slow cycled heat to ensure the surface does not burn. The surface must be heated to a depth of at least ¾ inch to ensure compaction below the stamping tool. Do not crush the aggregate when ensuring compaction below the stamping tool.

39-8.03B Coating Requirements
Coating surfacing products must be packed in standard closed containers. Each container of separately packaged component must be clearly and durably labeled to indicate the date of manufacture, manufacturer’s batch number, quantity, color, component identification and designated name or formula specification number together with special instructions.

Coating surfacing products must be delivered to the site in sealed containers that plainly show the designated name, batch number, color, date of manufacturer, and name of the manufacturer. Store the material on site in enclosures, out of direct sunlight in a warm, ventilated and dry area at room temperature; do not allow coating to freeze. Care must be taken in handling of coating containers to prevent puncture, inappropriate opening or other action, which may lead to product contamination. No materials that are past the coating manufacturer’s recommended shelf life must be used without the approval of the coating manufacturer.

39-8.03C Surface Preparation
39-8.03C(1) Cleaning
Broom using mechanical brooming device, or stiff bristle hand broom. Scrape and blow fine sand and debris off of surface. Pressure washing may be necessary to remove bonded debris. Use a non-solvent based degreaser to remove stains. Spray degreaser on stained area and let stand for 15 minutes. Using a stiff broom or brush, agitate the stained area to remove stain and rinse with water. Repeat this procedure on severe stains. Thoroughly rinse the area and let dry for 24 hours.

39-8.03C(2) Repair Damaged Asphalt
Damaged and cracked asphalt must be repaired by heating damaged area until the asphalt cement is in a liquid state ensuring asphalt does not exceed 325º F, turning over and mixing in new fresh asphalt if necessary to ensure repair is level with adjacent area. Infrared type heating mechanisms are the recommended tool for this procedure.

39-8.03C(3) Preparation of New Asphalt
New asphalt surfaces must be allowed to cool after final compaction roll to less than 140º F before applying coating.

39-8.03D Coating Application
39-8.03D(1) Surface Conditions
Surfaces should be dry for at least 24 hours prior to applying coatings. 50ºF is the recommended minimum air and surface temperature. The temperature of the concrete or asphalt surface must be at least 5ºF above the dew point temperature during and after applying coating. Coating application must be complete at least two hours before sunset to allow for proper cure.
**39-8.03D(2) Masking**

Mask all adjacent areas using paint-grade masking tape. Use duct taped on concrete and asphalt surfaces. Building paper extended a minimum of 48 inches beyond the edge of coated area is required to prevent over-spray of coatings onto adjacent areas.

**39-8.03D(3) Spray Equipment**

Spray texture gun must be Marshalltown® Sharpshooter I™ Hopper Gun, Graco “TexSpray”, Benron “EZ-TEX DX” sprayers, or approved equal.

Spray gun settings and alternative spray equipment must be approved by the Engineer.

**39-8.03D Coating Thickness**

The applied thickness of the coating must be determined according to the application as follows:

<table>
<thead>
<tr>
<th>Application</th>
<th>Film Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base coat</td>
<td>12 wet mils (8 dry mils)</td>
</tr>
<tr>
<td>Top coats per application</td>
<td>12 wet mils (8 dry mils)</td>
</tr>
</tbody>
</table>

**39-8.04 PAYMENT**

None.

Add between the 1st and 2nd paragraphs in section 40-1.01C(7) of the RSS for section 40:

As an alternative to the inertial profiler and operator certification by the Department, equivalent Texas Transportation Institute certification is accepted if the certification is dated before July 1, 2013 and is not more than 12 months old.

Replace section 40-1.01C(8) of the RSS for section 40 with:

**40-1.01C(8) Coefficient of Thermal Expansion**

Submit 4 test specimens fabricated from a single sample of concrete for coefficient of thermal expansion testing under AASHTO T 336.

Submit your coefficient of thermal expansion test data at:

http://169.237.179.13/cte/

Replace section 40-1.01D(7)(a)(v) of the RSS for section 40 with:

**40-1.01D(7)(a)(v) Coefficient of Thermal Expansion Testing**

Test for coefficient of thermal expansion under AASHTO T 336. Test at field qualification and at a frequency of 1 test for each 5,000 cu yd of paving but not less than 1 test for projects with less than 5,000 cu yd of concrete. This test is not used for acceptance.
40-6.01 GENERAL

40-6.01A Summary

Section 40-6 includes specifications for the construction of pervious concrete at the locations and to the dimensions shown on the plans as Architectural Precast Pavers and in accordance with these specifications and the manufacturer’s recommendations.

40-6.01B Definitions

pervious concrete: Pervious concrete contains little or no fines, creating an open matrix allowing water to pass through it. Properly installed and cured, pervious concrete is a strong and durable pavement or hardscape that can be used in any application in place of standard impervious concrete or asphalt.

40-6.01C Submittals

The following items must be submitted with the bid proposal:

1. Certificates of Qualifications for Pervious concrete Craftsman or Installers as discussed in Quality Control Section 40-6.01D(3).
2. Print out of NRMCA Certified Professional website database showing the Craftsman certificate holder as an employee of the qualifying company as discussed in Quality Control Section 40-6.01D(3).
3. List of 5 reference jobs as discussed in Quality Control Section 40-6.01D(3).

The following items must be submitted for approval no less than four (4) weeks before scheduled installation date:

1. Mix Design
   1.1 Batch weights of all constituents.
   1.2 Portland cement type and brand.
   1.3 Non-Portland cement pozzolan type and source.
   1.4 Macro-fiber brand and type, if used.
   1.5 Admixture type and brand.
   1.6 Aggregate source(s) and gradation(s).
   1.7 Fresh density of the pervious concrete.

40-6.01D Quality Assurance and Control

40-6.01D(1) General

Test and inspect concrete materials and operations as work progresses as described in Section 40-6.01D(4). Failure to detect defective work or material early will not prevent rejection if a defect is discovered later, nor must it constitute final acceptance.

40-6.01D(2) Referenced Standards

The pervious concrete must comply with the following standards:

1. American Society for Testing and Materials (ASTM) Standards, Material References:
   1.1 ASTM C 29 “Test for Unit Weight and Voids in Aggregate”
   1.2 ASTM C 150 “Specifications for Portland Cement” (Types I or II only).
   1.3 ASTM C 172 “Sampling fresh concrete”
   1.4 ASTM C 494 “Specification for Chemical Admixtures for Concrete”
   1.5 ASTM C 595 “Specifications for Blended Hydraulic Cements” (Types IP or IS only).
   1.6 ASTM C 1688 “Standard Test for Density and Voids Content of Freshly Mixed Pervious Concrete”
   1.7 ASTM C-1701 “Standard Test Method for Infiltration Rate of In Place Pervious Concrete”
   1.8 ASTM C 1028-07 “Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like- Surfaces by the Horizontal Dynamometer Pull-Meter Method”
   1.9 ASTM C 1692 “Clean Potable Water”
2. American Concrete Institute (ACI):
   2.1 ACI 306R “Cold Weather Concreting”
   2.2 ACI 305 “Hot Weather Concreting”
3. Bay Area Pervious Concrete, or approved equal (BPAC)
   3.1 Pervious Concrete Maintenance Manual, dated 2013 or newer.

40-6.01D(3) Contractor Qualification
Comply with the following requirements:

1. Employ no less than one National Ready Mixed Concrete Association (NRMCA) certified pervious concrete craftsman, who must be listed on the NRMCA pervious concrete database as an employee, who must oversee each placement crew during concrete placement, or the employ no less than four NRMCA certified Pervious Concrete Installers, who must be on site working as members of each placement crew during all concrete placement. Craftsmen consultants “for hire” are not permitted as qualifiers.

2. For all projects where the total pervious concrete pavement area exceeds 20,000 square feet, at least one (1) NRMCA certified Pervious Concrete Craftsman who is a full time employee of the installing company is required.

3. Provide documentation showing five or more successful pervious concrete projects in the last two years totaling more than 50,000 sq. ft. Documentation must include name and address of project, photographs and contact information for project owner, architect or engineer.

40-6.01D(4) Testing
40-6.01D(4)(a) Fresh Density Test
Obtain a minimum 1 cubic foot sample for acceptance tests in accordance with ASTM C172. Measure a minimum of one density test during each day’s placement with no less than one such test performed per day or when visual inspection indicates a change in the concrete in accordance with ASTM C1688. Fresh density must be between +/- 5 lb/cubic foot of the specified fresh density.

40-6.01D(4)(b) Hard Density Test
After seven days curing, a minimum 3 cores should be taken from the test panels, in accordance with ASTM C 42, and measured for thickness and density in accordance with ASTM C 1754. These test results should be recorded as a reference for subsequent quality assurance and acceptance testing. Cores taken from subsequent placements should also be tested in accordance with ASTM C 1754. The resulting measured density should be within plus or minus 5% of the average density of cores from the test panel.

40-6.01E(4)(c) Permeability Test
Permeability must be tested using ASTM C 1701. One test for every 10,000 square feet, minimum 3 tests, results should be averaged. Test locations should be at least 25 feet from each other.

Must be tested on clean, level pervious pavement upon completion of the curing period but before acceptance and opening the pavement to traffic.

Permeability must be at least 250 inches per hour on average as tested after curing period has ended.

If less than four (4) inches of open graded base rock is used under the pavement the permeability rate will not be valid and the permeability rate must not be used for criteria for acceptance of rejection of the pavement.

40-6.01D(4)(d) Compressive Strength Test
Compressive strength testing is not used for pervious concrete.

Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077. Agencies inspecting the Work must meet the requirements of ASTM E329. Testing agencies performing the testing must be accepted by Engineer before performing any Work.

Field tests of concrete required in Section 40-6.01D(4) must be performed by an individual certified as both an NRMCA Certified Pervious Concrete Technician and an ACI Concrete Field Testing Technician - Grade 1 or equivalent.

Approved Mix Design: Once accepted by the Engineer, the mix design meeting the criteria specified in Section 40-6.01C must become the approved mix design and must not be modified in any way unless re-
submitted and approved by the engineer. Modifications to the approved mix design not approved prior to being placed may be rejected. Admixture and water dosages may be modified as needed to maintain mix properties.

40-6.01D(5) Sample Panels

Place sample panels at a location on the project site identified by the Engineer, on a subgrade and base prepared as specified, using the material and construction requirements for pavement in this Specification. Notify the Engineer at least two (2) Working Days before installing pervious concrete reference panel.

The sample panel should be a minimum of 150 square feet at the same thickness as specified for the application, and should be installed using the same required tools and qualified personnel required for project installation as found in Section 40-6.01E(2). The fresh concrete used in the reference panel must be tested unit weight as per ASTM-C 1688. Construct additional sample panels at no additional cost until a sample panel has been accepted and approved by the Engineer.

Begin paving only after approval of a sample panel by the Engineer. The following criteria for the sample must be used:

1. The surface appearance of the sample must be approved for texture, finish and should have minimal surface sealing or raveling as described in acceptance section 40-6.01F. The finished product must a reasonable facsimile of the approved sample.
2. Permeability must be tested using ASTM C 1701 or approved equal.
   2.1 Permeability must be at least 250 inches per hour as tested after the initial curing period.
   2.2 If less than 4 inches of specified base rock is installed the ASTM C 1701 permeability test must not be criteria for acceptance.
3. Accepted sample panels, in like new condition, may be used in the contract work. Retain and maintain approved reference panels during construction in an undisturbed condition as a standard for judging completed portions of the final installations.
4. Rejected panels must be removed at the Contractor’s expense.

40-6.01E Acceptance

Acceptance of the reference panel will be based on the following criteria:

1. Appearance must comply with following:
   1.1 Each lot of finished pervious concrete will be inspected for appearance by the Engineer.
   1.2 The pervious concrete must have the following:
      1.2.1 A consistent surface texture
      1.2.2 No more than three (3) percent of the surface area within each panel (joint to joint) clogged/sealed with cement paste or raveled
      1.2.3 Free of ridges or other surface imperfections
      1.2.4 Joints that are in the specified location and are constructed per specification
      1.2.5 Free of cracks. Raveling is defined as: the contiguous dislodging of the surface layer(s) of aggregate.
2. Smoothness must comply with following:
   2.1. Pervious concrete pavement smoothness must be checked with a 10-foot straight edge.
      2.1.1 Vertical measurement must be taken between the pavement’s determined plane and straight edge discounting surface void and roughness irregularities.
      2.2. The surface of the finished pavement must be uniform to a degree such that no variations greater than 1/2-inch over ten (10) feet are present when tested with a 10-foot straight edge and checked in a direction perpendicular or parallel to the centerline and the pavement’s planed surface.
3. Grade must comply with following:
   3.1 Pervious concrete must be true to designed grades plus or minus 1/2 inch.
   3.2 Where abutting existing facilities such as sidewalks, walkways, curbs, driveways or other pavements, the pervious concrete must be within 1/4 inch of that surface.
4. Pervious concrete margins must be true to designed lines plus or minus 1/2 inch at any point.
5. The average of all three (3) infiltration tests must be greater than 250 inches per hour with no single
Pressure wash testing must comply with the following:

6.1. Before final acceptance the Engineer, may require a pressure wash test of the pervious concrete.

   6.1.1. Pressure washing must be provided and completed by using portable washer equipment working at a minimum of 3000 psi at 2.4 gpm.

   6.1.2. The nozzle must be a zero degree nozzle and be held a maximum of three (3) inches off the concrete surface.

6.2. Pressure test a minimum three (3) locations per lot or as determined by the Engineer.

   6.2.1. Any sections of pervious concrete that breaks up, ravels, or does not infiltrate must be removed and replaced with acceptable pervious concrete to the nearest joints.

   6.2.2. The Engineer may reject the concrete if the pressure washing dislodges more than a few individual aggregate particles in each panel.

6.3. Notify the Engineer after placing the pervious concrete, so that the Engineer can determine where to perform the quality assurance pressure wash testing for the acceptance.

40-6.02 MATERIAL

40-6.02A Fabric

Geotechnical fabric required for separation must be Mirafi 140n, or approved equal.

Geotechnical fabric required for strength must be Mirafi HP 370, or approved equal.

40-6.02B Base

Base must be composed of crushed rock maintaining a minimum of 35% void space.

For installations of more than 12 inches the upper 6 inches of base must be a nominal 3/4 inch open graded crushed rock, base rock beyond 6 inches must be minimum 1 1/2” crushed rock.

40-6.02C Forms

Form materials must be durable enough to resist deformation during edge compaction and maintain grade.

Forms must be clean and free of debris of any kind, rust, and hardened concrete.

40-6.02D Pervious Concrete

Comply with ASTM C94/C94M.

40-6.02D(1) Aggregates

Aggregate must have a minimum specific gravity of 2.60, a minimum rodded void content of 36% per ASTM C29, and a maximum absorption rate of 3%.

Size of aggregate to be determined by Engineer based on locally available materials but in no case must be larger than 1/2 inch nominal.

40-6.02D(2) Admixtures

Hydration stabilizers are required for use to extended set time.

Additional working time is determined by dosage rate.

Super absorbent polymers (SAP) are required to improve workability and curing and eliminate need for water reducers and viscosity modifiers.

Use Pervious Enhancer Pro or approved equal.

Other admixtures may be used and must comply with ASTM C 494 and approved by the design professional of record.
40-6.02D(3) Supplementary Cementitious Materials

SCMs such as fly ash, slag and silica fume are approved for use in pervious concrete. SCM mix proportions must be included in the mix design.

Supplementary cementitious material must be as specified herein:

1. Fly Ash: Fly ash must conform to the requirements of ASTM C618, Class F or C.
2. Slag Cement: Slag cement must meet the requirements of ASTM C989, Grade 100 or Grade 120.
3. Silica Fume: Silica fume must meet the requirements of ASTM C1240.

40-6.02D(4) Reinforcing Materials

The use of Macro-fibers in pervious concrete mixtures increases durability and is permitted when required. Micro-fibers have minimal effect.

No reinforcing bars, tie bars or dowels will be used in the installation of pervious concrete.

40-6.02D(5) Pigments

Use pigments or color complying with ASTM C979. Color will provided by the Engineer.

40-6.02D(6) Water

Clean potable water must be used per ASTM C 1692.

40-6.02E Cure Materials

40-6.02E(1) Moisture-Retaining Cover

A minimum of six mil polyethylene film ASTM C 171 must be used to cover the fresh pervious concrete.

40-6.02E(2) Evaporation Control

Surface stabilizers and ASTM C309 compliant curing agents are allowed prior to polyethylene cover as long as they are applied in mist form and do not dilute the surface paste.

40-6.03 CONSTRUCTION

40-6.03A Pre-Installation Meeting

A pre-installation meeting will be scheduled prior to the commencement of pervious concrete paving installation. The following individuals are required to attend:

1. General contractor representative
2. Pervious concrete installation representative
3. Site work contractor representative
4. Engineer

40-6.03B Field Conditions

40-6.03B(1) Protection of Existing Improvements

Prepare the site for work, including clearing area, protecting adjacent finished surfaces, materials and previously installed objects or furniture. Provide suitable protection where required before work commences and maintain protection throughout the course of the work. Notify the Engineer immediately of any site conditions that needs to be corrected before pervious pavement work can begin.

40-6.03B(2) Weather Limitations

Do not place pervious concrete pavement when the ambient temperature is below 45°F, is expected to fall below 32°F within 48 hours of placement, or is above 95°F, unless otherwise permitted in writing by the design professional of record. In the case of cold weather installation, surface efflorescence, as well as streaking, or tiger striping, which is a result of the curing membrane, may be significant.

Do not place pervious concrete pavement when the wind, heat or humidity does not allow enough time to place, properly joint, compact, edge, finish and cure before the surface dries to the point where it will result in raveling.
**40-6.03C  Subgrade Preparation**

Ensure the subgrade is prepared in accordance with Contract Documents.

Ensure that the required pavement thickness is obtained in all locations by verifying subgrade elevation.

Ensure that subgrade is not over-compact ed before installing the base rock material.

Keep all traffic off of the subgrade during construction to the maximum extent practical. Re-grade and re-compact subgrade disturbed by construction traffic, as needed. Compact the material added to obtain final subgrade elevation.

**40-6.03D  Base Installation**

Placement of all other elements of the design are to be reviewed prior to placing base.

Geotech fabric must extend at least four inches outside of base, or per the design documents, whichever is greater unless otherwise specified by Engineer.

Inspect the in-place open graded base aggregate:

1. Ensure compliance to the Drawings and specifications.
2. Verify the base rock is free-draining. If not, do not proceed.
3. Ensure that the required pavement thickness is obtained in all locations by verifying base elevation.
4. Base must extend at least three inches outside edge of slab.

**40-6.03E  Setting Formwork**

Set, align, and brace forms so that the hardened pavement meets the tolerances specified in 40-6.03F. Install forms to allow continuous progress of work and so that forms can remain in place at least 72 hours after concrete placement. Assemble formwork to permit easy stripping and dismantling without damage to concrete.

The vertical face of previously placed concrete may be used as a form ensuring that the pavement is protected from damage.

Forms may be wood or metal.

**40-6.03F  Tolerances**

Top of Forms must not be more than 3/8-inch variance in 5 feet.

Vertical Face on Longitudinal Axis must not be more than 3/8-inch in 5 feet.

**40-6.03G  Batching & Mixing**

Mix Proportions must comply with following:

1. Total cementitious material should be sufficient to result in a design void content of 17-23%.
2. The volume of aggregate, cement, water, and admixture per cubic yard calculated as a function of the unit weight as determined by ASTM C1688 Standard Test for Density and Voids Content of Freshly Mixed Pervious Concrete and must result in a yield of 27 cubic feet per cubic yard.
3. The measured unit weight per cubic yard of the concrete must be +5/-5 pounds of the design unit weight per ASTM C1688.

Batch and mix in compliance with ASTM C94/C94M.

Discharge must be completed as long as the mix is workable.

Hydration stabilizer can significantly increase working time. Installer should be well versed in the use of hydration stabilizer.

Water addition is permitted at the point of discharge. Water addition at site does not extend working time.
40-6.03H Delivery

Delivery of materials must be carefully scheduled to avoid trucks waiting on job. Pervious concrete that has been in the truck for excessive periods of time and is no longer workable should be rejected.

Concrete delivery trucks must comply with following:

1. Standard Ready Mix Concrete trucks can be used for pervious concrete mixes.
2. Volumetric trucks can be used for delivery and mixing of pervious concrete as well.

40-6.03I Pervious Concrete Placement

Before placing concrete, inspect and complete formwork installation.

Prior to placement of pervious concrete, moisten sub-base aggregate to provide a uniform dampered condition at the time concrete is placed. If initial application of water is quickly absorbed apply a second application of water just before installing pervious concrete.

Deposit concrete either directly from the transporting equipment onto the subgrade or sub-base, unless otherwise specified.

Do not place concrete on frozen subgrade or sub-base.

Finish the pavement to the elevations and thickness specified in Contract Documents and meet the requirements of 40-6.03F.

Edge top surface to a radius of not less than 1.5 times the nominal size of the aggregate.

40-6.03I(1) Finishing

Finishing must comply with the following:

1. Compact fresh concrete to stay within the requirement tolerances.
2. Compact pervious concrete to a dense, pervious surface.

40-6.03I(2) Tools

Tools must comply with the following:

1. Spinning “Roller” screed must be a spinning/motorized roller screed is the preferable method of strike off and initial compaction.
2. Hand Operated Straight Edge must be a hand operated straight edge may be used to place the pervious concrete where the spinning roller screed is not feasible.
3. Cross roller or float pan should be used to provides secondary compaction and improve surface flatness and texture.
4. Finishing Tools such as Hand floats and other tools typical to concrete finishing may be used but only if they do not seal the surface or reduce permeability below acceptable infiltration rates.
5. Asphalt rollers, truss screeds or plate compactors must not be used.

40-6.03J Jointing

Joint placement in pervious concrete is more restrictive than traditional concrete. Joint placement is at your discretion unless noted in the design documents, in which case the Engineer must be consulted with on joint location.

When joint placement is not indicated on the Project Drawings, submit drawings describing proposed jointing. Do not proceed with Work until the joint placement is accepted by the Engineer.

Spacing between contraction joints must not exceed 20 feet. The larger horizontal dimension of the slab panel, must not exceed 150% of the smaller dimension.

Tool contraction joints to the specified depth and width in fresh concrete immediately after the concrete is compacted.

Contraction joint depth must be a minimum of one fifth the pavement thickness.
Sawcut concrete joints may be placed after concrete has hardened sufficiently to prevent aggregate from being dislodged. If saw cuts are performed before the curing period has ended, the slabs must be kept sufficiently wet when it is uncovered and immediately recovered.

40-6.03K Concrete Curing

Proper moisture level is indicated by cement paste with a wet metallic sheen. Loss of surface moisture, as indicated by a loss of wet metallic sheen, results in raveling. Begin the curing as soon as possible after discharge of material and before excessive loss of surface moisture occurs.

Polyethylene Moisture-Retaining Cover:

1. Completely cover the pavement surface with a minimum 6 mil thick polyethylene sheet. Cut sheeting to a minimum of a full placement width plus 12 inches on both sides.
2. Cover all exposed edges of pavement with polyethylene sheet. Overlap sheet edges by at least 18 inches.
3. Secure curing cover material in such a manner as to ensure curing sheet will remain securely in place throughout the duration of the curing period.
4. Evaporation Control: Water, surface stabilizers and ASTM C309 compliant curing agents are allowed as long as they are applied in mist form and do not excessively dilute the surface paste.

Cure pavement for a minimum of 7 uninterrupted days, unless otherwise specified. Mixes with 20% or more SEMs must be cured a minimum of 10 days.

All curing times are based on temperatures at or above 55°F during the curing time. Each day temperatures are lower than 55°F does not count as a curing day. The added time required is to be determined by the design professional of record.

40-6.03L Concrete Protection

Inform all trades who use the pavement for staging, storage or other reasons and especially landscape contractors, not to dump materials such as dirt, debris, or bark directly on the pervious concrete.

Protect the pavement surface from abrasion, discoloration, or sediments until completion of any construction or landscaping activity that may expose the pavement to hazards.

Clean, repair and touchup, or replace when directed by the Engineer, pavement which has been soiled, discolored, or damaged by other trades outside the installer’s control prior to substantial completion.

40-6.03M Cleaning

Supply the owner with a copy of a Pervious Concrete Maintenance Manual.

Pressure washing or vacuuming or a combination of both may be used as required. Pressure washers are approved for use after 14 days.

The Contractor is responsible for all maintenance work until project acceptance.

40-6.03N Opening to Traffic

The pavement must cure for a minimum of seven (7) uninterrupted days before light vehicle traffic is permitted and 28 days for heavy vehicles. The Engineer must accept the pavement before it is opened up to traffic.

40-6.04 PAYMENT

None.

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DIVISION VI  STRUCTURES
56 SIGNS

Replace "Reserved" in section 56-4.01B with:

**ground-mounted**: Roadside sign or signs with a wide flange metal post.

**Add to section 56-4.02B:**

Mountings for ground-mounted signs must be wide flange metal posts fabricated from structural steel complying with ASTM A36/A36M. Nuts, bolts, and washers for breakaway connections of wide flange steel posts must comply with ASTM A325.

Ground wire must be secured to metal post in close proximity to the transmission lines, at the Engineer’s request.

**Add to section 56-4.04:**

Installation of ground-mounted signs is paid for as metal (roadside sign).

**Add to section 56-8**

**56-8 OFF-PLATFORM WAYFINDING SIGNAGE**

56-8.01 General
56-8.01A Summary

Off-platform wayfinding and directional signage for this project is modeled after the Metropolitan Transportation Commission’s Regional Hub Signage Program and its sign specifications. In addition, the project calls for the installation of station identification signs that include Braille and raised letters.

56-8.02 MATERIAL

Off-platform wayfinding signage must comply with Division 3.1, Section 10 14 00.

56-8.03 CONSTRUCTION

Construction of off-platform wayfinding signage must comply with Division 3.1, Section 10 14 00.

56-8.04 PAYMENT

Payment of off-platform wayfinding signage must comply with Division 3.1, Section 10 14 00.

DIVISION VII DRAINAGE

61 CULVERT AND DRAINAGE PIPE JOINTS

Replace the 11th paragraph of section 61-1.01D(2)(a)(i) with:

Perform final leakage testing of culverts and drainage pipes from 30 to 45 days after you install the pipe and complete backfilling unless a different time period is authorized.

**Replace the 1st sentence of item 2, paragraph 1 of section 61-1.01D(2)(a)(ii) with:**

Leakage must not be greater than 600 gallons per inch of nominal pipe diameter per mile of pipe per day with a minimum test pressure of 6 feet of water column above the pipe crown at the upper end of the pipe or above the active groundwater table, whichever is higher.
Leakage must not be greater than 200 gallons per inch of nominal pipe diameter per mile of pipe per day with a minimum test pressure of 6 feet of water column above the pipe crown at the upper end of the pipe or above the active groundwater table, whichever is higher.

64 PLASTIC PIPE

Replace item 1 of the 5th paragraph of section 64-1.03C with:

Install double gaskets on pipe spigots after the pipe is placed into the trench and ready for joint connection. Place the double gasket on the spigot end under the pipe manufacturer's installation instructions. The leading edge of the gasket must point in the direction of the spigot end. Both the spigot and bell ends must be free of debris before connection. Apply the pipe manufacturer's recommended lubricant to the inside of the bell and over the gasket. Insert the spigot end of the pipe into the bell end until the factory provided insertion line on the spigot end lines up with bell edge.

70 MISCELLANEOUS DRAINAGE FACILITIES

Add to section 70:

70-8 SIDEWALK TRENCH DRAIN

70-8.01 General
Section 70-8 includes specifications for constructing trench drains within sidewalk at locations shown on the plans.

Submit a certificate of compliance from the manufacturer.

70-8.02 Materials
Cast Iron Frame material must be galvanized, ASTM A36 steel. Frame must be load rated for H20 traffic. Typical horizontal gap between grate and grate must be 1/8". All visible welds to be ground smooth on outside edges. Frames will be true to square. Top of grate must be flushed with adjacent concrete slab finished grade. Trench drains must have rebar anchors standard to secure trench in its final location.

Grates must have the same manufacturer as the tree wells unless otherwise directed by the Engineer. Grate pattern must be "double wave" pattern. Grate must be anti-slip and vandal proof. 3/8" torx flat-head bolt must be used to bolt down grate onto frame unless otherwise directed by the Engineer. Grate material must be high quality 100% recycled grey iron, ASTM A48 class 35b or better. Finish will be natural patina of raw iron. Grate openings must not be greater than 1/4", in conformance with ADA Accessibility Guidelines.

70-8.03 Construction
Trench drains must be constructed within the sidewalk. The invert of the trench drain must be as shown on the plans. The opening width of the trench drain must be 4 inches wide. The trench drain must be laid on a straight grade with a minimum slope of 0.5 percent and terminate at the 6-inch curb face or connect to a drainage inlet, as shown on the plans or unless otherwise directed by the Engineer.

Replace existing roof drains in kind and connect to trench drain per the direction of the Engineer.

70-8.04 Payment
Not Used.
Add to section 70:
70-9 SIDEWALK UNDERDRAIN

70-9.01 General
Section 70-9 includes specifications for constructing underdrains within sidewalk at locations shown on the plans.

70-9.02 Materials
Cleanout frame and cover must be per City of Oakland Standard Detail.

70-9.03 Construction
Sidewalk underdrain must be constructed within the sidewalk. The invert of the sidewalk underdrain must be as shown on the plans. The opening width of the sidewalk underdrain must be 3 feet wide. Cleanout must be installed at all angles. Rebar and galvanized steel angle at each end must be as shown on the plans.

70-9.04 Payment
Not Used.

Add to section 70:
70-10 CATCH BASIN INSERTS

70-10.01 General
Catch basin inserts must be installed in proposed inlets and existing inlets at locations shown on the plans specified by the Engineer. Modify existing inlets to install catch basin insets.

Catch basin insert Stormtek brand, Model ST3 or equivalent as approved by the Engineer must be used for proposed and existing inlets as shown on the plans or as directed at the locations specified by the Engineer. At least 28 calendar days prior to start of construction in each construction zone, provide a request to the Engineer for the location of the catch basin inserts. At least 14 days prior to start of construction in each construction zone, provide the Engineer the inlet dimensions, including length and depth of all pipes of existing inlets or modified inlets that are to receive an insert, as measured in field. Catch basin inserts must not be ordered until the following:

1. The Engineer has provide the locations of the catch basin inserts
2. Existing inlet dimensions have been verified in field
3. New inlets have been constructed and the dimensions have been verified in field
4. The Engineer has approved inlet dimensions.
5. The Engineer has provided the height of catch basin insert.

Locations of catch basin inserts shown on the plans are for information only. Actual locations of catch basin inserts must be as specified by the Engineer.

70-10.02 Materials
Mounting frame must be made of coated or stainless steel. Frame members must be made from 2” flat bars with a minimum thickness of 3/16 inch. Insert screen must be made of heavy-gage sheet metal with 5 millimeter openings. Total openings constitute 50% of the screen surface. Top 4 inches of the screen is grated with bars spaced at 2 inches on center. Insert top cover must be made of heavy-gage sheet metal screen with 5 millimeter opening and 1” support frame. Structural support members for the screen and top cover are made of coated or stainless steel. Members are made from 1” flat bars with a minimum thickness of 1/8 inch. Height of insert must be verified with the Engineer for all existing inlets prior to installation.

70-10.03 Construction
Mounting frame members must be welded. Structural support frame members must be welded. Insert screens must be welded onto structural support frames. Mounting frames must be bolted onto the catch basin wall at the outlet opening. Mounting frames must be anchored at all four corners with HILTI expansion anchors or approved equivalent. Inserts must be installed vertically onto the mounting frame directly in front of the outlet opening. Inserts must be completely removable by lifting it off the mounting frame.

70-10.04 Payment
Not used.

Add to section 70:
70-11 CAST IRON PIPE

70-11.01 General
Cast iron pipe shall be constructed through landscape planter boxes and beneath the sidewalk to connect the sidewalk trench drains to curb outlets and drainage inlets as shown on the Plans or as directed by the Engineer.

70-11.02 Materials
Cast iron pipe and fittings shall comply with ASTM A 74. Unless otherwise specified, the internal surfaces of iron pipe and fittings shall be lined with a uniform thickness of cement mortar then sealed with a bituminous coating in accordance with AWWA C 104. The inside and outside surfaces of cast iron pipe and fittings for general use shall be coated with a bituminous coating 1 mil (0.0254mm) thick in accordance with ANSI A21.51. The pipe shall be suitably joined in accordance with the manufacturer's standard jointing system.

70-11.03 Construction
For outfall to curb face, the drain pipe shall have a minimum 2 inch (50 mm) clearance from top of curb and be laid on a straight grade with a minimum slope of 3/8 inch per foot (30 mm/m) and terminate 1 inch (25 mm) back of the curb face. For outfall to drainage inlets, the connection to the inlet shall have a minimum 18 inch clearance from top of pavement and be laid on a straight grade as shown on the plans or as directed by the Engineer.

70-11-04 Payment
Not Used.

DIVISION VIII MISCELLANEOUS CONSTRUCTION
73 CONCRETE CURBS AND SIDEWALKS

Add to section 73-1.02A:
Embankment materials must comply with section 19-6.02.

Add before the 1st paragraph in section 73-2.03A:
Before placing forms, place embankment to grading plane. Placing embankment must comply with section 19-6.03. Placing embankment must comply with section 19-6.03.

Add to section 73-2.03A:
Replace existing roof drains in kind per the direction of the Engineer.
Replace “Reserved” in section 73-2.04 with:

Payment for import borrow required for concrete curb is included in the payment for Minor Concrete (Curb).

Payment for import borrow required for concrete curb and gutter is included in the payment for Minor Concrete (Curb and Gutter).

Add to section 73-3.01C:

Within 2 business days of performing the surveys, submit preconstruction and post construction surveys signed and sealed by one of the following:

1. Land surveyor registered in the State
2. Civil engineer registered in the State

Add to section 73-3.01D:

For locations shown, perform a preconstruction survey to verify that forms and site constraints will allow the design dimensioning and slope requirements to be achieved. Upon completing construction of these facilities, perform a post construction survey and verify that design dimensioning and slope requirements were achieved. The post construction survey must include a minimum of 3 measurements for each dimension and slope requirement shown. Individual measurements must be equally distributed across the specified slope or dimensional surface.

Add before the 1st paragraph in section 73-3.03:

Before placing forms, place embankment to grading plane. Placing embankment must comply with section 19-6.03.

Replace existing roof drains in kind per the direction of the Engineer.

Before placing concrete, verify that forms and site constraints allow the required dimensioning and slopes shown. Immediately notify the Engineer if you encounter site conditions that will not accommodate the design details. Modifications ordered by the Engineer are change order work.

Add to section 73-3.03:

Replace existing roof drains in kind per the direction of the Engineer.

Utility boxes encroaching into the detectable warning surface must be relocated.

Replace “Reserved” in section 73-3.04 with:

Payment for import borrow required for concrete sidewalk and driveway is included in the payment for Minor Concrete (Sidewalk and Driveway)

Payment for import borrow required for concrete curb ramp is included in the payment for Minor Concrete (Curb Ramp).

Payment for import borrow required for concrete island paving is included in the payment for Minor Concrete (Island Paving).

Payment for import borrow required for concrete gutter is included in the payment for Minor Concrete (Gutter).

Add to section 73-4.01B:

Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or Shop Drawings indicating size, materials, finishes, color and quantities of items being supplied.
Evidence of qualifications must be submitted to and be subject to the approval of the Engineer.

Construct a 48-inch by 48 inch test panel for each texture, pattern and color combination of textured and colored concrete shown on the Drawings. Construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a specific treatment and pattern. Construct additional test panels at no additional cost until a test panel for each type of textured and colored concrete has been accepted and approved by the Engineer. Construction of textured may proceed once final approval by the Engineer of a successfully executed test panel for each type of textured and colored concrete or combination of adjacent treatments. Note that test panel of approved “Running Bond” and “Coquina Pattern”, or approved equal, must be coordinated with the test panel for “Precast Architectural Pavers” as described in section 73-7. All executed textured and colored concrete applications throughout the project must match their corresponding approved test panel.

Add to section 73-4.01C:
Provide conclusive proof of qualifications and provide proof of previously produced BOMANITE imprinting paving, or approved equal, over a period of no less than 20 years for workers and subconsultants performing the BOMANITE imprinted paving, or approved equal.

Proof must show three high quality installations, similar in scope, and located within a 50 mile radius of the City of project location.

Add to section 73-4.02 with:
The pattern for areas shown as stamped concrete on the Plans must be achieved using BOMANITE stamped concrete imprinting tools for the “Running Bond Pattern”, “Coquina Pattern”, and “Rock Pattern”, as manufactured by BOMANITE, or approved equal. Use BOMANITE installation tools, or approved equal, to achieve the specified patterns. Install all materials and use all stamping tools and patterns following the manufacturer’s instructions.

Aggregate base for textured and colored concrete must comply with requirements of Section 26-1.02B.

All coloring and curing compounds must be from the same manufacturer.

Color for textured concrete color must be ready-to-use, dry shake BOMANITE color hardener, or approved equal, and must use streak-free hard graded aggregate as manufactured by the BOMANITE, or approved equal. The colors must be BOMANITE “GRANOLA” or approved equal, BOMANITE “AUTUMN BROWN” or approved equal, and BOMANITE “SALMON” or approved equal.

Curing compound must comply with ASTM C 309 and must be used as a curing membrane that conforms with all applicable air pollution regulations. Curing compound must be “Clear-Cure” material, or approved equal.

Replace the 2nd sentence of section 73-4.03 with:
Reinforcement must be installed per the manufacturer’s instructions.

Add section 73-4.03 with:
Apply color hardener, curing compound, stamping tools and release agents in strict compliance with the manufacturer’s installation and other instructions.

The alignment of the “Running Bond Pattern”, or approved equal, must follow the pattern alignment details shown on the Plans.

Expansion joints and control joints must be located so as not to disrupt the pattern.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of colored concrete.

Screed concrete to the grade and cross section shown. Strike-off and compact until a layer of mortar is brought to the surface. Wood float to a uniform surface.
Replace section 73-5 with:

73-5 PARKING BUMPERS

73-5.01 GENERAL
Section 73-5 includes specifications for installing parking bumpers.

73-5.02 MATERIALS
Each parking bumper must be a commercially-available precast-concrete unit.

The parking bumper must be 48 inches long, nominally 8 inches wide and 6 inches high with both top longitudinal corners continuously chamfered, and anchor holes located 9 inches from each end. Minor variations in cross-sectional dimensions are acceptable.

Anchor dowels must be bar reinforcement steel, commercially available, 3/4 inch diameter, and 15 inches long.

73-5.03 CONSTRUCTION
Coordinate the arrangement of parking bumpers with the layout of parking stalls and traffic aisles, as shown.

Install dowels such that the tops of the bars are flush with the top of the parking bumper.

73-5.04 PAYMENT
Not used

Add to section 73:

73-6 TACTILE CONCRETE PAVING STRIP WITH ETCHED FINISH

73-6.01 GENERAL

73-6.01A Definition
Tactile concrete pavement strips with etched finish aid visually impaired transit passengers in identifying the entry points to EB-BRT curbside stations and locations of curb ramps that lead to median station entries. Tactile concrete pavement strips are integrally colored and treated with a heavy retarder finish as detailed on the Plans and approved mock ups.

73-6.01B Submittals
Submit for acceptance by the Engineer manufacturer’s product, installation, and maintenance information or Shop Drawings describing materials, finishes, color and quantities of items being supplied.

73-6.01B(1) Sample Panels
Prior to commencing this work, construct a minimum of three 48-inch by 48-inch test panels of tactile concrete pavement strips with etched finish at a location designated by the Engineer. Sample panels must demonstrate the contrast with standard concrete pavement used to construct adjacent sidewalk pavement and the desired tactile finish. The tactile quality is produced by the exposure of aggregate in the integral colored concrete through the retarder application process. The sample panels must be constructed using the same materials, methods, equipment and workers as will be used for the execution of the actual work. The submitted samples must be as follows:

1. Sample #1: Sample tactile finish through application of Grace Construction Products Top-Cast Grades 150, or approved equal.
2. Sample #2: Sample tactile finish through application of Grace Construction Products Top-Cast Grades 200, or approved equal.
3. Sample tactile finish through application of Grace Construction Products Top-Cast Grades 250, or approved equal.
Construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer and designated members of the disabled community representing blind persons and wheelchair users

Construct all sample panels such that they are accessible by wheelchair.

The approved sample panel must be maintained intact until the Engineer directs its removal.

Proceed with the construction of tactile concrete pavement strips with etched finish in locations shown on the plans after having received final approval by the Engineer and designated members of the disabled community representing blind persons and wheelchair users of a successfully executed test panel. All executed stamped concrete application throughout the project must match its corresponding approved test panel.

73-6.01C Quality Control and Assurance

The workers assigned to this work must be tooled and trained to perform the installation of integrally colored concrete and retarder etch finishes. Workers and subcontractors must be certified to work with specified retarder product, or approved equal, and must have a minimum of 10 years of experience in the installation of integrally colored concrete and retarder etch finishes and, at the preconstruction conference, must provide a list of the locations of past projects demonstrating the quality of his work and must provide a foreman capable of achieving work of the quality of the past projects.

73-6.02 Materials

Concrete must be as specified in section 90.

Aggregate base for tactile concrete pavement strips with etched finish must comply with requirements of Section 26-1.02B.

Admixture for integral color must be Chromix by L.M. Scofield Company, or approved equal. Color must be C-34 Dark Gray, or approved equal. Admixture must conform to the requirements of ACI 303.1, ASTM C979.

The color of the cement used for the decorative concrete pavement must be gray.

Retarder finish must be Top-Cast by Grace Construction Products, or approved equal. Degree of retarder application must be determined through the mock-up process described above.

73-6.03 Construction

Construct the tactile concrete paving in accordance with the project plans, the Standard Specifications, and these special provisions and as directed by the Engineer.

Adjacent paving, curbs, plantings, rock, mulch, and other surfaces that are not to receive retarded finish must be protected prior to application of retarders.

If tactile concrete pavement strips with etched finish are placed around new or remaining curb ramp, protect the grooved area and detectable warning surface of the curb ramp.

If tactile concrete pavement strips with etched finish are placed around or adjacent to miscellaneous structures (i.e., manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the tactile concrete pavement strips with etched finish is finished beyond the miscellaneous structure.

Leave forms in place for a minimum of 12 hours after surface finishing.

If the tactile concrete pavement strips with etched finish are constructed using extruded or slip form method, comply with section 73-1.03D.

Pour colored concrete, float and lightly trowel finish; no trowel, edger or jointer ridge marks. Apply retarders uniformly per manufacturer’s requirements. Do not delay the application of the surface retarder beyond the loss of the initial bleed water especially in warmer temperatures for best results, Refer to
manufacturer’s recommendations and requirements for additional information regarding application of retarders.

Retarder removal intervals depend on strength of mix, level of finish etching desired, climatic conditions, and desired washing techniques. Surface removal timing after application must follow manufacturer's directions. For removal, wash with water rinse/light broom or pressure wash with power equipment per manufacturer’s recommendation. Verify methods in test panels. Do not over-finish and/or delay application beyond the initial bleeding on the light finishes.

Run-off resulting from retarder removal must be controlled in accordance with local, state, and federal regulations.

Immediately following placement, concrete must be protected from premature drying, hot and cold temperatures, rain, flowing water and mechanical injury per manufacturer’s recommendations.

Standard, uncolored concrete pavement placed adjacent to tactile concrete pavement strips with etched finish must be placed as a separate pour to avoid staining of the plain concrete border with the color hardener and retarder.

Admixture: Do not add calcium chloride to mix as it causes mottling and surface discoloration and may interfere with chemical interaction of retarder. Supplemental admixtures must not be used unless approved by manufacturer. Do not add water to the mix in the field. Observe all manufacturers installation instructions regarding the use of the admixture.

Curing: Precautions must be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 Plastic Shrinkage Cracking published by the National Ready Mixed Concrete Association. Observe all manufacturers installation instructions regarding the use of the admixture.

Curing must be your sole responsibility and must be conducted in such a manner and using such materials so as to provide quality concrete and prevent the formation of cracks while not adversely effecting the finish or color of the concrete tactile paving.

Clean any discolored or etched concrete or other materials that are to remain adjacent to the area of construction of tactile concrete pavement strips with etched finish by abrasive blast cleaning or other method authorized by the Engineer. Repair or replace any damaged adjacent surfaces as directed by the Engineer. No additional payment must be made for cleaning and replacing of damaged adjacent materials.

73-6.04 Payment
Tactile concrete pavement strips must be measured by the square foot. No separate payment must be made for mock-up panels.

Add to section 73:
73-7–PRECAST ARCHITECTURAL PAVERS

73-7.01 GENERAL

73-7.01A Summary

Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement must govern.

American Society of Testing Materials (ASTM):

1. ASTM C 936-08, Standard Specification for Interlocking Concrete Paving Units (section 4.2 exempt)
2. ASTM C 140, Standard Test Methods of Sampling and Testing Concrete Masonry Units
3. ASTM C 136, Method for Sieve Analysis for Fine and Coarse Aggregate
4. ASTM C 33, Specification for Concrete Aggregates
5. ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction
73-7.01B Quality Control and Assurance

The workers assigned to this work must be tooled and trained to perform the installation of precast, permeable concrete unit pavers. At the preconstruction conference, must provide a list of the locations of past projects demonstrating the quality of his work and must provide a foreman capable of achieving work of the quality of the past projects.

73-7.01C Submittals

Submit manufacturer's product data for permeable concrete unit paver.

Test report of precast, permeable concrete unit must be submitted.

Testing must be done by an independent testing laboratory. Test procedures must conform to ASTM C 936 methods, where applicable.

Test report must indicate, as a minimum, the following:

1. Compressive strength, psi.
2. Absorption, 5 hour submersion in cold water.
3. Absorption, 24 hour submersion in cold water.
5. Initial rate of absorption (suction).
6. Abrasion index.

Pavers must be carefully packed and loaded for shipment and all necessary precautions taken against damage in transit and handling. Pavers damaged in any manner will be rejected and must be replaced with new materials at no additional cost to the Owner. Sand must be protected with waterproof covering to prevent exposure to rainfall or removal by wind. Secure the covering in place. Aggregate materials must be kept dry and free from soiling.

73-7.01C(1) Sample Panels

Prior to placing orders for the full quantities of precast, permeable concrete unit pavers specified below, construct an 8 foot by 8 foot minimum test panel adjacent to and in coordination with test panels for the approval of adjacent textured and colored concrete treatments in medians. This is intended to allow the Engineer to provide final confirmation of all material and color choices.

Construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer. Proceed with placing a final order for the approved type and color of precast, permeable concrete unit pavers and their installation after having received final approval by the Engineer of a successfully executed test panel. All executed precast, permeable concrete unit pavers installation throughout the project must match the approved test panel. The accepted panel must become the standard for the entire job and must remain undisturbed until completion of all precast, permeable concrete unit paving.

73-7.02 MATERIALS

73-7.02A Concrete Unit Pavers

Concrete Unit Pavers must be:

1. Permeable Paver: 6 inch by 9 inch x 2.375 inch thick, "Rustic Cobble Large" HYDRO-FLO”, color B10 Tahoe Granite (Charcoal) as manufactured by Pacific Interlock Pavestone, Inc., or approved equal.
2. Pavers must meet the requirements of ASTM C936-08.
3. Pavers must have an average compressive strength of 8,000 psi and minimal compressive strength of 7,200 psi per individual unit.
4. Permeable Pavers must allow in excess of 3 inches of water per hour to pass directly through the paver.
73-7.02B Crushed Stone Filler, Bedding Course and Base for Permeable Paver
Crushed stone with 90% fractured faces, LA Abrasion < 40 per ASTM C 131, minimum CBR of 80 percent per ASTM D 1883. Do not use rounded river gravel.

All stone materials must be washed with less than 1 percent passing the No. 200 sieve.

Joint/opening filler and bedding must conform to ASTM D 448 gradation as shown in Tables 1 and 2 below. No. 89 or finer gradation may be used to fill permeable pavers with narrow joints.

Table 1: Bedding Course and Joint/Opening Filler - ASTM No. 8 Grading Requirements

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.5 mm (1/2 in.)</td>
<td>100</td>
</tr>
<tr>
<td>9.5 mm (3/8 in.)</td>
<td>85 to 100</td>
</tr>
<tr>
<td>4.75 mm (No. 4)</td>
<td>10 to 30</td>
</tr>
<tr>
<td>2.36 mm (No. 8)</td>
<td>0 to 10</td>
</tr>
<tr>
<td>1.16 mm (No. 16)</td>
<td>0 to 5</td>
</tr>
</tbody>
</table>

Table 2: Permeable Aggregate Base - ASTM No. 57 Grading Requirements

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>% Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.5 mm (1 1/2 in.)</td>
<td>100</td>
</tr>
<tr>
<td>25 mm (1 in.)</td>
<td>95 to 100</td>
</tr>
<tr>
<td>12.5 mm (1/2 in.)</td>
<td>25 to 60</td>
</tr>
<tr>
<td>4.75 mm (No. 4)</td>
<td>0 to 10</td>
</tr>
<tr>
<td>2.36 mm (No. 8)</td>
<td>0 to 5</td>
</tr>
</tbody>
</table>

Color of crushed stone filler must be close match to the paver color, and must be approved by the Engineer.

Crushed stone filler must be supplied by a single source. Source of supply must not be changed during course of project without written permission of the Engineer.

73-7.02C Aluminum Edge Restraints
Aluminum edge restraints between planting areas and concrete unit pavers in medians must be “Curv-Rite”, 4000 Series Heavy Duty “L”-shaped aluminum edge restraint, 3-inch high by 3-inch base, with a natural aluminum finish, or approved equal. “L” shaped aluminum sections must conform to ASTM B308/B308M-10 for Aluminum-Alloy 6061-T6 Standard Structural Profiles. 3-inch aluminum splicers must be used to create an uninterrupted edging system that has a continuous support surface on both sides of the vertical wall. Edging base must have holes along its length for receiving 3/8-inch by 10-inch steel spikes. Install edge restraint system as per manufacturer’s recommendation.

73-7.02D Water
Water used for paver installation must be potable and must be free of injurious contaminants.

73-7.03 Construction
73-7.03A General
Do not install sand or pavers during heavy rain.

73-7.03B Concrete Unit Paver Installation
Place base as directed by the Engineer and per the manufacturer’s instructions.

73-7.03B(1) Acceptability Of Base
Verify that base is dry, uniform, even, free of any sediment (if open-graded), and ready to support bedding, pavers and imposed loads.
Verify gradients and elevations of base are correct. Verify location, type, installation and elevations of edge restraints around the perimeter area to be paved. Compact subgrade to 85 percent relative compaction. Do not overcompact. Evidence of inadequate compaction of subgrade, aggregate base or overall grades must be brought to the immediate attention of the Engineer.

Beginning of installation means acceptance of base and edge restraints.

73-7.03B(2) Setting Concrete Unit Pavers
Spread the leveling course aggregate evenly over the compacted, dense-graded base course and screed uniformly to 1-inch to 1 1/2-inch thickness. The screeded aggregate should not be disturbed. Place sufficient aggregate to stay ahead of the laid pavers.

Ensure that pavers are free from foreign materials before installation.

Where required, install aluminum edge restraints as per manufacturer’s recommendations.

Lay pavers in the pattern and alignment shown on the Plans and as established by the approved mock-up. Maintain straight pattern lines where applicable.

Joints between the pavers must be between 1/16 inch and 1/8 inch wide.

Fill gaps at the edges of the paved area with cut pavers or edge units.

Cut pavers to be placed along the edge with a double-bladed splitter or masonry saw.

Compact and seat the pavers into the screeded bedding using a low amplitude, 75-90Hz plate compactor capable of at least 5,000 pounds. centrifugal compaction force. A rubber or neoprene pad between the compactor and grids may be necessary to prevent cracking or chipping.

Vibrate and compact the pavers again, sweeping the small fraction of the No. 8 aggregate into the joints and openings until it is within 1/2 inch from the top surface. This will require at least two or three passes with the compactor. Do not compact within 3-feet of the unrestrained edges of the paving units.

73-7.03B(3) Joint Treatment
Joints between pavers must be hand tight and uniform in thickness. Joint thickness must not exceed 1/8 inch

73-7.03C Cleaning Of All Paved Surface
After completion of the concrete pavers, paved areas must be thoroughly swept clean and surface must be left unsoiled. Where required, surface must be cleaned with water or an approved cleaner.

73-7.04 PAYMENT
Not Used
Add to section 73:

73-8 INSTALLATION OF ARTISTICALLY ENHANCED HANDRAIL AND WINDSCREEN PANELS

73-8.01 GENERAL

Work under this item consists of the installation of separately procured artistically enhanced handrail panels and windscreens, including Work includes the secure transportation of handrail panels and windscreens from the location of their fabrication to a secure storage area, secure transportation to the jobsite based on a detailed installation schedule approved by the Engineer, and installation of the handrail panels and windscreens at station platforms as shown on the Drawings (A and AE drawing series), in accordance with these Specifications, and as directed by the Engineer. Fabrication of the artistically enhanced rail panels and windscreens as well as the installation hardware are procured under a separate contract and are not part of this contract.

Fabrication of the artistically enhanced rail panels and windscreens is procured by AC Transit under a separate contract with a Team of Artists and is not part of this contract. Along with the separately procured artistically enhanced handrail panels the Contractor will receive bolts, washers, and sleeves needed for the panels’ installation. All other installation hardware shown on the Architectural Plans (A Sheets) are the responsibility of the Contractor, including the following:

1. 2-inch by 2-inch back plates (four per artistically enhanced handrail panel) as shown on the Architect’s Plans.
2. 7 1/2-foot tall by 4 1/4-inch or 6-inch wide coverplates and metal filler strips at all posts that are to receive artistically enhanced windscreen panels as shown on the Architect’s Plans.
3. Stainless steel, self tapping screws, neoprene gaskets and other miscellaneous items needed for attachment of the artistically enhanced windscreen panels as shown on the Architect’s Plans.

Hardware shall comply with Division 3.1, Section 05 50 00.

The fabrication of artistically enhanced rail panels and windscreens and the procurement of hardware for their installation are not part of this contract. Artistically enhanced rail panels and windscreens and the required hardware will be provided as described in these Special Provisions.

73-8.01A Quality Control

Installer must meet the following minimum qualifications and provide Engineer with evidence of such qualifications.

Installs Qualifications:
1. Installer regularly engaged in the installation of artistically enhanced metal work and screens similar in type to those shown on the Drawings. Provide evidence of such experience by providing the Engineer with descriptions of work on past projects that involved the installation of artistically enhanced metal work and screens as well as references and their contact information.
2. Employ persons trained and tooled for installation of such artwork.

73-8.01B Submittals

Submit the following documents at least three months prior to installation of artistically enhanced handrail panels and windscreens for acceptance by the Engineer:

1. Submit proposed pick-up, storage and site delivery schedule: Schedule with dates for proposed pick-up and secure transportation of artistically enhanced handrail panels and windscreens from the location of fabrication to a secure storage area and secure transportation to the jobsite for installation.
2. Submit description of proposed secure short-term storage site for artistically enhanced handrails and windscreens between pick up and installation date. Security and environmental conditions at proposed storage site are based on requirements listed under 73-7.01C and subject to Engineer’s approval.
3. Submit Step-by-Step Installation Procedure: Submit for review and approval by the Engineer a step-by-step installation procedure that outlines how to ensure that artistically enhanced panels and windscreens remain undamaged after arrival at the jobsite and throughout the installation process.

73-8.01C Delivery, Storage and Handling
Pick up and transportation of artistically enhanced panels and windscreens from fabricator’s site of fabrication in Livermore, CA.

Deliver and load artistically enhanced panels and windscreens to secure storage site in artist’s original, unopened containers and packaging on palettes. Fabricator may assist in loading at Fabricator’s discretion and after coordination.

Protect Fabricator’s identification labels attached to Fabricator’s materials and for ensuring that labels remain attached to the materials they identify through handrail and windscreen panel ID numbers and platform names.

Transfer of ownership to Contractor occurs once materials have been transferred to Contractor’s truck at the time of pick-up. Secure storage once transfer of ownership has occurred.

Note that as an option, the Fabricator has agreed to make the artistically enhanced handrail panels, windscreens and hardware available on an as-needed basis. This option would require a separate agreement with Fabricator concerning costs and logistics associated with this option.

Handrail and windscreen panels will be stored by the Fabricator up to 1 year after fabrication. Secure and obtain an environmentally appropriate storage of handrail and windscreen panels beyond Fabricator’s storage period. Observe the following requirements for storage and handling of artistically handrail and windscreen panels:

1. Place of storage must be lockable and secured against theft of artistically enhanced handrail and windscreen panels. You are liable for all damage and theft of panels after transfer of materials from the Fabricator until final acceptance by the Engineer of the artistically enhanced handrail and windscreen panels.
2. Store materials in clean and dry indoor location, fenced and locked outdoor storage areas are not acceptable.
3. Store materials on flat, level surface, raised above floor, with adequate support to prevent sagging.
4. Handle materials in accordance with the step-by-step installation procedure approved by the Engineer.
5. Keep materials in original, unopened containers and packaging until installation.
6. Protect materials and finish during storage, handling, and installation to prevent damage at all times.
7. Take measures to protect panels after installation in accordance with the step-by-step procedure approved by the Engineer.

Cost of extending the storage at the Fabricator’s location for delays in the approved installation schedule that are under reasonable control must be at your own expense.

73-8.02 CONSTRUCTION
73-8.02A Preparation
Request review and approval of step-by-step installation and artwork protection procedure. Proceed with installation only after approval by the Engineer or after adjustments to the procedure have been made based on the Engineer’s review.

Examine areas to receive artistically enhanced handrail and windscreen panels. Verify surfaces to support panels are clean, dry, flat, plumb, level, square, stable, rigid, and capable of supporting the weight.

Notify Engineer of conditions that would adversely affect installation or subsequent use. Proceed only after unsatisfactory conditions have been corrected.

73-8.02B Installation.
Install artistically enhanced handrail and windscreen panels in accordance with the approved installation procedure.

Handrail Panels: Ensure the establishment of proper clearances between handrail posts by using the post spacing template shown on the Plans.
Handrail panels are fabricated to receive holes based on field-verified locations of connection points attached to handrail posts per the Architect’s Plans. Field verify hole locations for each panel and carefully drill holes in field verified hole locations to receive provided hardware and gaskets in field verified hole locations. Ensure complete protection of panel surfaces from damage during the drilling process. A Tnemec approved primer, or approved equal, should be applied to the newly drilled holes to protect against general and dielectric corrosion. Further alteration of the artistically enhanced handrail and windscreen panels is prohibited.

Install handrail and windscreen panels accurately aligned and to proper elevations and in locations indicated on the Plans.

Secure handrail and windscreen panels with tamper-proof fasteners and other hardware provided with the artistically enhanced handrail panels and windscreens. Coat all fasteners with Duroloc or approved equal to prevent dielectric corrosion.

Do not install bent, bowed, or otherwise damaged panels or posts. Remove damaged components from site to a location identified by the Engineer.

Attention is directed to tolerances shown on the Plans applicable to the vertical alignment of windscreen posts that are to receive artistically enhanced panels. A master windscreen panel template will be provided by the Engineer.

73-8.02C Adjusting and Cleaning.

Repair minor damages to finish in accordance with artist’s instructions and as approved by the Engineer.

At your own expense, remove and replace with newly fabricated handrail or windscreen panels or hardware, any damaged handrail and windscreen panels or hardware that cannot be successfully repaired, as determined by the Engineer. Replacement costs include design setup, fabrication, crating and shipping.

Clean all handrail and windscreen panels promptly after installation in accordance with instructions that will be provided with the panels. The use of harsh cleaning materials or methods that could damage the finish is prohibited.

Protect installed artistically enhanced handrail and windscreen panels until project completion and final acceptance by the Engineer as necessary to preclude damage, including vandalism, to panels.

73-8.03 PAYMENT
Not Used

Add to section 73:

73-9 UNCLASSIFIED SIDEWALK

73-9.01 GENERAL
73-9.01A Definition
Unclassified sidewalk consists reconstructing the existing concrete sidewalk pavement in-kind, which includes special design features such as colored and textured concrete.

73-9.01B Submittals
Analyze and document the structural section, materials, patterns and other treatments associated with each type of existing unclassified sidewalk found at the locations identified on the plans. Documentation must include sampling, pictures, City-provided specifications, or other necessary evidence of the existing conditions.

Provide completed documentation for each type of unclassified sidewalk for review and approval by the Engineer. Provide additional information and documentation at the request of the Engineer.

Provide to the Engineer for approval a plan set for construction of unclassified sidewalk that includes construction limits, transitions to existing unclassified sidewalk to remain, layout, construction details, and typical sections as well as specifications for materials, colors, patterns, manufactured products and other
required information to replace in kind each type of existing unclassified sidewalk at the locations identified on the plans and in Contractor’s approved documentation.

73-9.01B(1) Sample Panels
Construct a 48-by-48 inch test panel for each applicable type of texture, color, and material or texture/color/material combination of unclassified sidewalk identified in Contractor’s approved list of applications.

Construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a specific treatment. Construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer for each type of unclassified sidewalk identified in Contractor’s approved documentation.

Proceed with the construction of unclassified sidewalk areas after having received final approval by the Engineer of a successfully executed test panel for each type of unclassified sidewalk. Unclassified sidewalk constructed at the identified locations must match the approved sample.

73-9.01C Quality Control and Assurance
Workers assigned to this work must be tooled and trained to perform the installation of the types of sidewalk treatments identified in Contractor’s approved documentation. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.

73-9.02 Materials
Materials must be as per Contractor’s approved plans and specifications for the in-kind replacement of unclassified sidewalks and as directed by the Engineer.

73-9.03 Construction
Construct unclassified sidewalk in locations identified on the plans and as directed by the Engineer to a structural, durability and visual quality that matches conditions of the approved test panel.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of unclassified sidewalk.

If placing unclassified sidewalk around new or remaining curb ramp, do not texture or grout the grooved area and detectable warning surface of the curb ramp.

If placing unclassified sidewalk around or adjacent to miscellaneous structures (i.e. manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the unclassified sidewalk is finished beyond the miscellaneous structure.

Realign and adjust to grade all utility boxes and clean outs involved in construction of unclassified sidewalk.

Leave forms in place for a minimum of 12 hours after surface finishing. After stripping of form, backfill behind forms.

If unclassified sidewalk is constructed using extruded or slip form method, comply with section 73-1.03D.

Clean any discolored concrete or other surface material to remain adjacent to the area of construction of unclassified sidewalk at no additional cost by abrasive blast cleaning or other method authorized by the Engineer.

73-9.04 Payment
Unclassified sidewalk is measured for payment by the square foot and no additional payment must be made for depth of pavement section and type of materials or construction methods involved.
Add to section 73:

73-10 UNCLASSIFIED ISLAND PAVING

73-10.01 GENERAL

73-10.01A Definition
Unclassified island paving consists reconstructing the existing concrete island pavement in-kind, which includes special design features such as colored and textured concrete.

73-10.01B Submittals
Analyze and document the structural section, materials, patterns and other treatments associated with each type of existing unclassified island paving found at the locations identified on the plans. Documentation must include sampling, pictures, City-provided specifications, or other necessary evidence of the existing conditions.

Provide completed documentation for each type of unclassified island paving for review and approval by the Engineer. Provide additional information and documentation at the request of the Engineer.

Provide to the Engineer for approval a plan set for construction of unclassified island paving that includes construction limits, transitions to existing unclassified island paving to remain, layout, construction details, and typical sections as well as specifications for materials, colors, patterns, manufactured products and other required information to replace in kind each type of existing unclassified island paving at the locations identified on the plans and in Contractor's approved documentation.

73-10.01B(1) Sample Panels
Construct a 48-by-48 inch test panel for each applicable type of texture, color, and material or texture/color/material combination of unclassified island paving identified in Contractor's approved list of applications.

Construct larger test panels at no additional cost if the Engineer determines that a larger panel is required to demonstrate the proper execution of a specific treatment. Construct additional test panels at no additional cost until a test panel has been accepted and approved by the Engineer for each type of unclassified sidewalk identified in Contractor's approved documentation.

Proceed with the construction of unclassified island paving areas after having received final approval by the Engineer of a successfully executed test panel for each type of unclassified sidewalk. Unclassified island paving constructed at the identified locations must match the approved sample.

73-10.01C Quality Control and Assurance
Workers assigned to this work must be tooled and trained to perform the installation of the types of concrete treatments identified in Contractor’s approved documentation. Provide a list of the locations of past projects demonstrating the quality of past work and provide a foreman capable of achieving work of the quality of such past projects.

73-10.02 Materials
Materials must be as per Contractor’s approved plans and specifications for the in-kind replacement of unclassified island paving and as directed by the Engineer.

73-10.03 Construction
Construct unclassified island paving in locations identified on the plans and as directed by the Engineer to a structural, durability and visual quality that matches conditions of the approved test panel.

Protect surrounding exposed surfaces during the placement, finishing, and curing operations of unclassified island paving.

If placing unclassified island paving around new or remaining curb ramps, do not texture or grout the grooved area and detectable warning surface of the curb ramp.
If placing unclassified island paving around or adjacent to miscellaneous structures (i.e. manholes, pipe inlets, or other miscellaneous structures), do not finish the miscellaneous structures to final grade until the unclassified sidewalk is finished beyond the miscellaneous structure.

Realign and adjust grade all utility boxes involved in construction of unclassified island paving.

Leave forms in place for a minimum of 12 hours after surface finishing. After stripping of form, backfill behind forms.

If unclassified island paving is constructed using extruded or slip form method, comply with section 73-1.03D.

Clean any discolored concrete or other surface material to remain adjacent to the area of construction of unclassified island paving at no additional cost by abrasive blast cleaning or other method authorized by the Engineer.

**73-10.04 Payment**

Unclassified island paving is measured for payment by the square foot and no additional payment must be made for depth of pavement section and type of materials or construction methods involved.

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

**75 MISCELLANEOUS METAL**

Add to end of 2nd paragraph in section 75-1.02B:

Frame and cover in the City of Oakland must be in accordance with City of Oakland Standard Details or as directed by the Engineer. Frame and cover must be purchase from the City of Oakland. Maintain records of manhole cover and metal frames purchased (material, tax, and delivery cost), and submit them to the AC Transit for reimbursement. All new City of Oakland manhole covers and metal frames shall be ordered by the City of Oakland and furnished by the District. The Contractor shall submit to the Engineer for approval the proposed schedule for number and type of manhole covers and frames required at each location and dates the manhole covers and frames are needed for each location. The schedule shall reflect the following requirements:

1. City of Oakland shall not store any manhole frames and covers.
2. A manhole cover and frame can take 6 weeks to fabricate.

The schedule and quantity shall be confirmed each month and revised as necessary. Revised schedules must be approved by the Engineer. The Engineer will order the manhole covers and frames according to the approved schedule. The Contractor shall pick up the manhole covers and frames from the supplier as directed by the Engineer.

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

Replace “RESERVED” in section 79 with:

**79 SANITARY SEWER**

**79-1.01 General**

Section 79 includes specifications for furnishing and installation of sewer pipe, sewer pipe lateral, building sewer connections, sanitary sewer manholes, sanitary sewer cleanouts, and sanitary sewer appurtenance materials.

**79-1.02 Material**

Sewer pipes and sewer lateral pipes must comply with section 207 of Division 2.1 of these contract documents and section 207 of the 2009 Greenbook.
Sanitary sewer manholes, cleanouts and appurtenant materials must comply with section 201-8 of Division 2.1 of these contract documents and section 201-8 of 2009 Greenbook.

79-1.02 Construction
Installation of sewer pipes, sewer lateral pipe and building sewer connections must comply with section 306 of Division 2.1 of these contract documents and section 306 of 2009 Greenbook.

Installation of sanitary sewer manholes, cleanouts and appurtenant materials must comply section 303-9 of Division 2.1 of these contract documents.

79-1.02 Payment
Payment for sewer pipe, sewer lateral pipe and building sewer connections must comply with 306-1.6 of Division 2.1 of these contract documents.

Payment for sanitary sewer manholes, cleanouts, and appurtenant materials must comply section 303-9.3 of Division 2.1 of these contract documents.

ADD FENCES

80 FENCES

Add to section 80-1.04:
Ground wire must be secured to metal post in close proximity to the transmission lines, at the Engineer’s request.

Replace “Reserved” in section 80-4 with:

80-4 ARCHITECTURAL FENCE

80-4.01 GENERAL
Work under this item consists of fabricating, transporting and installing complete and in place architectural fence on curbside BRT platforms as shown on the plans and in accordance these Special Provisions.

80-4.02 MATERIALS
Materials for architectural fence must comply with Division 3.1, Section 05 52 00 – Metal Railings.

80-4.03 CONSTRUCTION
Construction of architectural fence must comply with Division 3.1, Section 05 52 00 – Metal Railings.

80-4.04 PAYMENT
Payment of architectural fence must comply with Division 3.1, Section 05 52 00 – Metal Railings.

MONUMENTS

81 MONUMENTS

81-1.04 PAYMENT
Payment for monuments is included in the payment for construction surveying.
84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

Add to section 84-2.02:

Use a durable, high skid and slip resistant, thermoplastic pavement marking material suitable for use as bike lane. The material must:

1. Be a resilient preformed thermoplastic product containing a minimum thirty percent (30%) intermix of anti-skid/anti-slip elements and where the top surface contains anti-skid/anti-slip elements. These anti-skid/anti-slip elements must have a minimum hardness of 8 (Mohs scale).
2. Be a resistant to the detrimental effects of motor fuels, antifreeze, lubricants, hydraulic fluids, and other automobile fluids.
3. Be a capable of being applied on bituminous pavement and portland cement concrete pavements by the use of a handheld heat torch, infrared heater, or a blue-flame radiant heater.
4. Be a capable of being applied to asphalt concrete and portland cement concrete surfaces without preheating the application surface to a specific temperature.
5. Be a capable of being affixed to green concrete (concrete that has set but not appreciably hardened). The material must not require the portland cement concrete application areas to be cured or dried out.
6. Be a capable of conforming to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures.
7. Be supplied in segments measuring 2 feet. x 3 feet.
8. Be capable of being applied in temperatures down to 45ºF without any special storage, preheating or treatment of the material before application.
9. Contain heating indicators evenly distributed on the surface that must act as visual cues during both the application process and post-application.
10. Be manufactured by an ISO 9001:2008 certified for design, development and manufacturing. Manufacture must provide proof of current certification. The scope of the certification must include the design, development and manufacture of preformed thermoplastic marking material.
11. Be composed of an ester-modified rosin impervious to degradation by motor fuels, lubricants, or other automobile fluid, in conjunction with aggregates, pigments, binders, and anti-skid/anti-slip elements uniformly distributed throughout the material.
12. Conform to AASHTO designation M249, with the exception of the relevant differences due to the material being supplied in a preformed state, being non-reflective, and being of a color different from white or yellow.

Green thermoplastic pavement marking use for bike lanes must have a color that is in accordance with FHWA Memorandum dated April 15, 2011: Interim Approval for Optional Use of Green Colored Pavement for Bike Lanes (IA-14). The pigment system must not contain heavy metals or any carcinogen, as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

The Daytime chromaticity coordinates for the color used for green thermoplastic pavement marking must be as follows:

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<tr>
<th>1</th>
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<th>4</th>
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<td>X</td>
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<td>Y</td>
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<tr>
<td>0.230</td>
<td>0.754</td>
<td>0.266</td>
<td>0.500</td>
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The Nighttime chromaticity coordinates for the color used for green thermoplastic pavement marking must be as follows:

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</tr>
<tr>
<td>0.230</td>
<td>0.754</td>
<td>0.336</td>
<td>0.540</td>
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</tbody>
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OCTOBER 2015
The top surface of the green thermoplastic pavement marking must have regularly spaced indents. The closing of these indents during application must act as a visual cue that the material has reached a molten state, allowing for satisfactory adhesion and proper embedment of the anti-skid/anti-slip elements, and a post-application visual cue that proper application procedures have been followed.

The surface of the preformed thermoplastic material must contain factory applied anti-skid elements with a minimum hardness of 8 (Mohs scale). Upon application the material must provide a minimum skid resistance value of 60 BPN when tested according to ASTM E 303.

The surface of the preformed thermoplastic material must contain factory applied anti-skid elements with a minimum hardness of 8 (Mohs scale). Upon application the material must provide a minimum static coefficient of friction of 0.6 when tested according to ASTM C 1028 (wet and dry), and a minimum static coefficient of friction of 0.6 when tested according to ASTM D 2047.

The thermoplastic material for green thermoplastic pavement marking must be supplied at a minimum thickness of 90 mil.

The thermoplastic material green thermoplastic pavement marking must be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

The preformed thermoplastic material for green thermoplastic pavement markings must be packaged in cardboard cartons. The cartons must not exceed 40 inches in length and 25 inches in width. The cartons must be labeled for ease of identification. The weight of the individual carton must not exceed 50 pounds. A protective film around the carton must be applied in order to protect the material from rain or premature aging.

Add to section 84-2.03A:

The thermoplastic material for green thermoplastic pavement markings must be capable of being applied using the propane torch method, and, or infrared or blue flame heater recommended by the manufacturer. The material must be capable of being applied at ambient and road temperatures down to 45°F without any preheating of the pavement to a specific temperature. A sealer specified by the manufacturer must be applied to the pavement surface prior to material application to ensure proper adhesion. A thermometer must not be required during the application process. The pavement must be clean, dry and free of debris. Supplier must enclose application instructions with each box/package.

Replace "Reserved" in the RSS for section 84-6 with:

84-6.01 GENERAL
84-6.01A Summary
Section 84-6 includes specifications for applying thermoplastic traffic stripes and pavement markings with enhanced wet-night visibility.

Thermoplastic must comply with section 84-2.

84-6.01B Submittals
Submit a certificate of compliance for the glass beads.

84-6.01C Quality Control and Assurance
Within 14 days of applying a thermoplastic traffic stripe or pavement marking with enhanced wet-night visibility, the retroreflectivity must be a minimum of 700 mcd/sq m/lx for white stripes and markings and 500 mcd/sq m/lx for yellow stripes and markings. Test the retroreflectivity using a reflectometer under ASTM E 1710.

84-6.02 MATERIALS
Thermoplastic traffic stripes and pavement markings with enhanced wet-night visibility must consist of a single uniform layer of thermoplastic and 2 layers of glass beads as follows:
1. The 1st layer of glass beads must be on the Authorized Material List under high-performance retroreflective glass beads for use in thermoplastic traffic stripes and pavement markings. The color of the glass beads must match the color of the stripe or marking to which they are being applied.

2. The 2nd layer of glass beads must comply with AASHTO M 247, Type 2.

Both types of glass beads must be surface treated for use with thermoplastic under the bead manufacturer's instructions.

84-6.03 CONSTRUCTION

Use a ribbon-extrusion or screed-type applicator to apply thermoplastic traffic stripe.

Operate the striping machine at a speed of 8 mph or slower during the application of thermoplastic traffic stripe and glass beads.

Apply thermoplastic traffic stripe at a rate of at least 0.38 lb/ft of 4-inch-wide solid stripe. The applied thermoplastic traffic stripe must be at least 0.090 inch thick.

Apply thermoplastic pavement marking at a rate of at least 1.06 lb/sq ft. The applied thermoplastic pavement marking must be at least 0.100 inch thick.

Apply thermoplastic traffic stripe and both types of glass beads in a single pass. First apply the thermoplastic, followed immediately by consecutive applications of high-performance glass beads and then AASHTO M 247, Type 2, glass beads. Use a separate applicator gun for each type of glass bead.

You may apply glass beads by hand on pavement markings.

Distribute glass beads uniformly on traffic stripes and pavement markings. Apply high-performance glass beads at a rate of at least 6 lb/100 sq ft of stripe or marking. Apply AASHTO M 247, Type 2, glass beads at a rate of at least 8 lb/100 sq ft of stripe or marking. The combined weight of the 2 types of glass beads must be greater than 14 lb/100 sq ft of stripe or marking.

84-6.04 PAYMENT

Not Used

86 ELECTRICAL SYSTEMS

Add to the end of the 1st paragraph of the RSS for section 86-1.01:

This work is shown on plan sheets labeled CT, SL, and SC. The work involved in each bid item is shown on a sheet with a title matching the bid item description except for the following bid items:

1. Maintaining the existing traffic management system during construction

Traffic signal work must be performed at the locations listed in the following table. Use the applicable standards for each intersection as indicated in the table and in the plans.
### Intersections with Traffic Signal Work in Segment A

<table>
<thead>
<tr>
<th>Intersection</th>
<th>Applicable Standard</th>
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<tbody>
<tr>
<td>International Blvd and 42nd Ave</td>
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<td>International Blvd and High St</td>
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<td>International Blvd and 45th Ave</td>
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<td>International Blvd and 64th Ave</td>
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<td>International Blvd and 66th / Havenscourt Blvd</td>
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<tr>
<td>E 14th St and Euclid Ave</td>
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<tr>
<td>E 14th St and Dutton Ave/Best Ave</td>
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<tr>
<td>E 14th St and Hays St/Chumalia St</td>
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<td>E 14th St and Callan Ave/Davis St</td>
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<tr>
<td>Davis St and Hays St</td>
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<tr>
<td>Davis St and San Leandro Blvd</td>
<td>Division 2.2 (State of California)</td>
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</table>
The positive location of traffic signal standards is anticipated to be on the critical path in the overall construction schedule. In order to minimize delay due to utility conflicts and field changes, adhere to the following order of work for selection of locations for traffic signal standards (poles):

1. **Utility Markings**
   a. Contact USA and have underground utilities marked.
   b. Coordinate with Engineer for the marking or identification of City and State utilities.

2. **Mark by construction staking locations of proposed curb ramps. Curb ramp layout shall match plans.**

3. **Mark by construction staking the location of proposed signal poles and foundations. Locations shall match project plans. If it appears that the signal pole and foundation location conflict with utilities or other existing or proposed appurtenances, work with the resident engineer to propose a new location.**

4. **Coordinate with the Engineer to obtain approval for the preliminary location of proposed ramps, signal poles, and signal pole foundations from agency with jurisdictional authority. Maintain a running list of status.**

5. **Once preliminary approval for locations has been obtained, confirm through utility potholing, Division 01 Section 01 71 25, the proposed signal pole foundation locations are clear of utility conflicts.**

6. **If utility conflicts are discovered, coordinate with the Engineer to propose new locations and proceed back to item 3.**

7. **Once a pole locations is preliminary approved by Engineer, and confirmed clear of utilities, it is considered final and shall be noted as such. Mark final pole location and any equipment changes on the project plans.**

8. **Traffic signal poles or pole equipment shall not be ordered until pole locations or any pole equipment changes have been finalized by the Engineer.**

Add to the list in the 5th paragraph of the RSS for section 86-1.03:

14. Fiber Optic Cable
15. Splice Closures
16. GPS Radio Units
17. Fiber Termination Panels
18. Multimode Phase Selector
19. Ethernet Switch

Replace the 3rd paragraph of section 86-1.06A with:

Traffic signal system shutdowns are limited to periods between the hours of 9 a.m. and 3 p.m.

Replace "Reserved" in section 86-1.06B with:

Traffic Management System (TMS) elements include, but are not limited to communication system, traffic monitoring stations, loop detection system, closed circuit television (CCTV) camera system, and fiber optic system.

Existing TMS elements, including detection systems, shown and located within the project limits must remain in place and be protected from damage. If the construction activities require existing TMS elements to be nonoperational or off line, and if temporary or portable TMS elements are not shown, the Contractor must provide for temporary or portable TMS elements. The Contractor must receive authorization on the type of temporary or portable TMS elements and installation method.

Before work is performed, the Engineer, the Contractor, and the Department's Traffic Operations Electrical representatives must jointly conduct a pre-construction operational status check of all existing TMS elements and each element's communication status with the Traffic Management Center (TMC), including existing TMS elements not shown and elements that may not be impacted by the Contractor's...
activities. The Department's Traffic Operations Electrical representatives will certify the TMS elements' location and status, and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components.

Obtain authorization at least 72 hours before interrupting existing TMS elements' communication with the TMC that will result in the elements being nonoperational or off line. The Contractor must notify the Engineer at least 72 hours before starting excavation activities.

Submit a traffic signal communications system shut down plan for review and approval prior to any traffic signals being taken off-line. The plan must include at a minimum, locations of traffic signals to be taken off-line, durations of planned downtime, and descriptions of how signal communications will be reestablished for each location, and whether interim signal interconnect or the new fiber optic cable will be connected.

All traffic signal controllers must be coordinated during construction. At any location at which communication to the Oakland TMC or Caltrans on-street master is interrupted or not available, a GPS clock must be installed. Locations for the GPS clocks must be approved by the Engineer prior to installation. At locations where temporary GPS clocks are installed, the contractor shall modify the controller to use the time synchronization from the GPS clocks rather than the master controller. Once permanent communication is established to the Oakland TMC or Caltrans on-street master controller via fiber optic cable, the GPS clocks must be removed and will remain the property of the contractor.

All traffic signal controllers must be coordinated during construction. At any location at which communication to the Oakland TMC or Caltrans on-street master is interrupted or not available, a GPS clock must be installed. Locations for the GPS clocks must be approved by the Engineer prior to installation. At locations where temporary GPS clocks are installed, the contractor shall modify the controller to use the time synchronization from the GPS clocks rather than the master controller. Once permanent communication is established to the Oakland TMC or Caltrans on-street master controller via fiber optic cable, the GPS clocks must be removed and will remain the property of the contractor.

The existing traffic signal communications system (signal interconnect and field masters) must be kept in effective operation for the benefit of the traveling public during the progress of the work, except when taking traffic signals off-line is permitted. Taking traffic signals off-line must be permitted only during the switch over from existing to interim controller operation or from existing/interim to new controller operation unless prior approval is obtained from the Engineer.

Traffic signals taken off-line must be limited to construction zones with work in progress. See Stage Construction sheets in the project Plans for construction zones. No more than eight (8) traffic signals must be off-line at any given time in any one construction zone.

Traffic signal communications downtime during switch over from the existing communications system to an interim communications system must be limited to not more than ten (10) working days.

Traffic signal communications downtime during switch over from the existing communications system to the ultimate communications system (fiber optic cable) must be limited to not more than twenty (20) consecutive working days.

The traffic signal communications system must not be taken off-line until a parallel system is in place. Relocation of existing traffic controllers and communications equipment to new controller cabinets may be required during construction. If a temporary traffic signal controller cabinet will be used during construction, the existing signal interconnect must be rerouted and reconnected to the temporary traffic signal controller and communications equipment.

Temporary taking a traffic signal off-line for reconnection of the existing signal interconnect system is permitted but must be limited to no more than seven (7) consecutive working days.

If existing ITS elements are damaged or fail due to the Contractor's activity, where the elements are not fully functional, the Engineer must be notified immediately. If the Contractor is notified by the Engineer that existing ITS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed ITS elements, excluding structure-related elements, must be repaired or replaced, at the Contractor's expense, within 24 hours. For structure-related elements, the Contractor must install temporary or portable TMS elements within 24 hours. For non-structure-related ITS elements, the Engineer may authorize temporary or portable TMS elements for use during the construction activities.
Traffic monitoring stations and their associated communication systems, which were verified to be operational during the pre-construction operational status check, must remain operational on freeway/highway mainline at all times, except:

1. For a duration of up to 15 days on any continuous segment of the freeway/highway longer than 3 miles
2. For a duration of up to 60 days on any continuous segment of the freeway/highway shorter than 3 miles

If the construction activities require existing detection systems to be nonoperational or off line for a longer time period or the spacing between traffic monitoring stations is more than the specified criteria above, and temporary or portable detection operations are not shown, the Contractor must provide provisions for temporary or portable detection operations. The Contractor must receive authorization on the type of detection and installation before installing the temporary or portable detection.

If existing TMS elements shown or identified during the pre-construction operational status check, except traffic monitoring stations, are damaged or fail due to the Contractor's activity, where the elements are not fully functional, the Engineer must be notified immediately. If the Contractor is notified by the Engineer that existing TMS elements have been damaged, have failed or are not fully functional due to the Contractor's activity, the damaged or failed TMS elements, excluding structure-related elements, must be repaired or replaced, at the Contractor's expense, within 24 hours. For a structure-related elements, the Contractor must install temporary or portable TMS elements within 24 hours. For nonstructure-related TMS elements, the Engineer may authorize temporary or portable TMS elements for use during the construction activities.

If fiber optic cables are damaged due to the Contractor's activities, the Contractor must install new fiber optic cables from an original splice point or termination to an original splice point or termination, unless otherwise authorized. Fiber optic cable must be spliced at the splice vaults if available. The amount of new fiber optic cable slack in splice vaults and the number of new fiber optic cable splices must be equivalent to the amount of slack and number of splices existing before the damage or as directed by the Engineer. Fusion splicing will be required.

If the pre-construction operational status check identified existing TMS elements, then the Contractor, the Engineer, and the Department's Traffic Operations Electrical representatives must jointly conduct a post construction operational status check of all existing TMS elements and each element's communication status with the TMC. The Department's Traffic Operations Electrical representatives will certify the TMS elements' status and provide a copy of the certified list of the existing TMS elements within the project limits to the Contractor. The status list will include the operational, defined as having full functionality, and the nonoperational components. TMS elements that cease to be functional between pre and post construction status checks must be repaired at the Contractor's expense.

The Engineer will authorize the schedule for final replacement, the replacement methods and the replacement elements, including element types and installation methods before repair or replacement work is performed. The final TMS elements must be new and of equal or better quality than the existing TMS elements.
If no electrical work exists on the project and no TMS elements are identified within the project limits, the pre-construction operational status check is change order work.

Furnishing and installing temporary or portable TMS elements that are not shown, but are required when an existing TMS element becomes nonoperational or off line due to construction activities, is change order work.

Furnishing and installing temporary or portable TMS elements and replacing TMS elements that are not shown nor identified during the pre-construction operational status check and were damaged by construction activities is change order work.

If the Contractor is required to submit provisions for the replacement of TMS elements that were not identified, submitting the provisions is change order work.

Add to section 86-1.06:

86-1.06C Traffic Signal Timing Services

86-1.06C(1) General

Provide all signal timing services required for the following items:

1. Construction staging coordination timing
2. Controller timing sheets

All signal timing must be prepared and certified by a registered Traffic Engineer, registered by the State of California. All signal timing must be approved by the relevant local operating agency (City of Oakland, Caltrans, City of San Leandro) prior to installation and operation.

Timing at all Segment A signals identified in Section 86-1.01 as having Caltrans applicable standards.

As each construction stage is finished, Caltrans will accept responsibility for the Segment A signals, as identified in Section 86-1.01 as having Caltrans applicable standards, involved in that construction stage, and will be responsible for signal timing after that event. The remaining signals in Segment A are operated by Oakland and may require additional support as outlined in Section 307-17.1.1.

The registered Traffic Engineer preparing the signal timing must possess the following experience:

1. Developed, implemented and fine-tuned traffic signal timings for Caltrans within the last three years
2. Worked directly with Caltrans Traffic Operations staff on traffic signal timing and coordination projects within the last three years
3. Developed, implemented and field fine-tuned traffic signal and TSP timings for Caltrans owned and operated traffic signals within the last three years
4. Prepared signal timing sheets including base controller settings and parameters, signal coordination plans, and TSP parameters (hardcopy) for Caltrans standard traffic controllers (Model 2070 controllers with TSCP firmware) within the last three years
5. Configured Caltrans standard controllers (hardware and firmware) including entire controller databases, base controller settings, clock updates, signal coordination timings, TSP timings and communications network parameters within the last three years
6. Worked with Caltrans Traffic Signal Communications System including the configuration, testing and implementation of the field network switches

The traffic signal timings for both Segment A and Segment B must be prepared and implemented by the same registered Traffic Engineer.

86-1.06C(2) Construction Staging Coordination Timing

86-1.06C(2)(i) Coordination Patterns
Prior to the beginning of construction on each stage, new coordinated traffic signal timing patterns must be developed for all the signals within the construction stage, for the periods when construction is active and lane closures are in place, in accordance with Section 1570. This will involve the following periods:

1. Business hours
2. AM and PM peak hours (for periods when lanes remain closed during the peak, e.g., to allow concrete curing).
3. Weekends (for periods when lanes remain closed during the peak, e.g., to allow concrete curing).

Timing plans must be developed using SYNCHRO, and illustrated on time-space diagrams. The plans must be approved by the relevant local operating agency (City of Oakland, Caltrans, City of San Leandro). The plans must then be installed by a suitably licensed traffic engineer in the controllers and fine-tuned to the satisfaction of the operating agency in the field once lane closures begin.

The coordination patterns must be operated according to a time-of-day (TOD) schedule that must be developed to accommodate the normal hours of operation of the construction activities. Variations to construction hours must be handled manually subject to the approval of the operating agency and relevant TMP coordination staff.

Enter the coordination patterns and TOD schedule into the ATMS.now database and, where communication is available, download to the local controllers. Where communication is not available, the patterns and schedule must be entered directly into the controller at the intersection.

**86-1.06C(2)(ii) Detectors and isolated operation**

Ensure all signal phases remain operational to serve all vehicle permitted movements when detectors are non-operational during the construction periods. During those periods, relevant phases will be placed on recall and phase maximum times adjusted to the satisfaction of the operating agency. All phase maxima must continue to accommodate all pedestrian walk and clearance times, as applicable. Where applicable, non-coordinated signal timing parameters must be modified to accommodate traffic control plans developed in accordance with Section 1570.

**86-1.06C(2)(iii) Payment**

Payment for construction staging coordination traffic signal coordination timing must be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).

**86-1.06C(3) Controller Timing Sheets**

Provide full and complete signal timing data sheets for each new controller prior to testing and installation. The timing sheets must provide all controller parameters that are needed to be established for normal isolated (non-coordinated) signal operation. The timing sheets must be provided electronically to the operating agency for approval prior to installation in each controller database. The timing sheets for initial controller installation will not include coordination pattern timing, nor TSP parameter timing.

Acceptance testing of each controller will be undertaken by the relevant local agency (Caltrans, City of Oakland or City of San Leandro). Support the testing agency to troubleshoot failures and refine the timing database until the testing agency accepts the timing data.

**86-1.06C(3)(i) Payment**

Payment for traffic signal controller timing sheets must be at the lump sum price in the Bid Traffic Signal Timing and Coordination (Additive Alternate 4).

### Add to section 86-2.03B:

Use sleeve nuts on Type 1-B standards. The bottom of the base plate must be flush with finished grade.

### Add to section 86-2.04A:

Where the side tenon detail at the end of the signal mast arm is shown, you may substitute the applicable tip tenon detail.

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The sign mounting hardware must be installed at the locations shown.

Set the Type 1 standards with the handhole on the downstream side of the pole in relation to traffic or as shown.

Add to section 86-2.05A:
Conduit installed underground must be Type 1.

Add to section 86-2.05B:
The conduit in a foundation and between a foundation and the nearest pull box must be Type 1.

Add to section 86-2.05C:
If a standard coupling cannot be used for joining Type 1 conduit, use a UL-listed threaded union coupling under section 86-2.05C, a concrete-tight split coupling, or a concrete-tight set screw coupling.

If Type 3 conduit is placed in a trench, not in the pavement or under concrete sidewalk, after the bedding material is placed and the conduit is installed, backfill the trench to not less than 4 inches above the conduit with minor concrete under section 90-2, except the concrete must contain not less than 421 pounds of cementitious material per cubic yard. Backfill the remaining trench to finished grade with backfill material.

After conductors have been installed, the ends of the conduits terminating in pull boxes, service equipment enclosures, and controller cabinets must be sealed with an authorized type of sealing compound.

At those locations where conduit is required to be installed under pavement and underground facilities designated as high priority subsurface installation under Govt Code § 4216 et seq. exist, conduit must be placed by the trenching in pavement method under section 86-2.05C.

At other locations where conduit is required to be installed under pavement and if a delay to vehicles will not exceed 5 minutes, conduit may be installed by the trenching in pavement method.

Replace the 3rd paragraph in section 86-2.06A(2) of the RSS for section 86-2.06 with:
In a ground or sidewalk area, embed the bottom of a pull box in crushed rock.

Replace "Reserved" in section 86-2.06B of the RSS for section 86-2.06 with:
86-2.06B(1) General
86-2.06B(1)(a) Summary
Section 86-2.06B includes specifications for installing non-traffic-rated pull boxes.

86-2.06B(1)(b) Submittals
Before shipping pull boxes to the job site, submit a list of materials used to fabricate the pull boxes to METS. Include:

1. Contract number
2. Manufacturer's name
3. Manufacturer's installation instructions
4. Your contact information

Submit reports for pull boxes from an NRTL-accredited laboratory.
Before installing a pull box and cover, submit the manufacturer's replacement warranty for them.

86-2.06B(1)(c) Quality Control and Assurance

86-2.06B(1)(c)(i) Functional Testing
The pull box and cover must be tested under ANSI/SCTE 77, "Specification for Underground Enclosure Integrity."

86-2.06B(1)(c)(ii) Warranty
Provide a 2-year manufacturer's replacement warranty for the pull box and cover. The warranty period starts on the date of Contract acceptance.

Deliver replacement parts within 5 business days after you receive notification of a failed pull box, cover, or both to the Department's Maintenance Electrical Shop at:

30 RICKARD STREET, SAN FRANCISCO, CA 94134  TEL. (415) 330-6500

86-2.06B(2) Materials
The pull box and cover must comply with ANSI/SCTE 77, "Specification for Underground Enclosure Integrity," for tier 22 load rating and must be gray or brown. All new pull boxes must be positively grounded with grounding rod in accordance with State Standard Plan ES8A.

Each pull box cover must have an electronic marker cast inside.

A pull box extension must be made of the same material as the pull box and attached to the box to maintain the minimum combined depths.

Include recesses for a hanger if a transformer or other device must be placed in a pull box.

The bolts, nuts, and washers must be a captive design.

The captive bolt must be capable of withstanding a torque from 55 to 60 ft-lb and a minimum pull-out strength of 750 lb. Perform the test with the cover in place and the bolts torqued. The pull box and cover must not be damaged while performing the test.

Hardware must be stainless steel with 18 percent chromium and 8 percent nickel content.

Galvanize ferrous metal parts under section 75-1.05.

The manufacturer's instructions must include:

1. Quantity and size of entries that can be made without degrading the strength of the pull box below the tier 22 load rating
2. Locations where side entries cannot be made
3. Acceptable method for creating the entry

The tier 22 load rating must be labeled or stenciled by the manufacturer on the inside and outside of the pull box and on the underside of the cover.

86-2.06B(3) Construction
Do not install a pull box in curb ramps or driveways.

A pull box for a post or a pole standard must be located within 5 feet of the standard. Place the pull box adjacent to the back of the curb or edge of the shoulder. If this is impractical, place the pull box in a suitable, protected, and accessible location.

Add to section 86-2.08A:

Wrap conductors around the projecting end of conduit in pull boxes as shown. Secure conductors and cables to the projecting end of the conduit in pull boxes.
Traffic signal cable must consist of 12, No. 14 AWG conductors. Conductors must be solid and conform to the requirements of ASTM Designation B3. The conductors must be individually insulated with polyethylene compound. Cable must comply with IMSA Specification 19-1. The insulation must be approved as Type TW Underwriters’ Laboratories, Inc.

Traffic signal conductor identification, numbering, and color coding must conform to City standard drawing E-34.

Mast arm traffic signal heads must be connected with 5-conductor, No. 14 AWG cable between head and terminal block inside traffic signal mounting adapter. The cable must comply with the above specifications for 12-conductor cable.

**Add to section 86-2.08:**

**86-2.08H FIBER OPTIC SYSTEM**

**86-2.08H(1) General**

All cable must be in accordance to these specifications and to the latest City of Oakland Telecommunications Standards. Submittals specified in the standard specifications and in the latest City of Oakland Telecommunications Standards must be submitted for approval following the submittal procedure set forth in these Special Provisions.

All fiber optic cable must be armored, loose tube, gel-free, single-mode fiber optic (SMFO) cable with a wavelength of 1,310/1,550nm and a maximum attenuation of 0.35/0.2dB/km.

All fiber optic cable must be manufactured by Corning, or approved equal. 12-strand SMFO cable must be used as the branch cable to connect the main trunk cable to the field devices as shown on the Plans.

**86-2.08H(2) SMFO Trunk Cable**

Each length of cable must be permanently identified by specifying the manufacturer and type of cable at intervals not greater than 6 feet along the outside of the outer jacket. Each length of cables must be permanently marked with length marking intervals not greater than 3 feet.

Submit certification from the manufacturer that the above requirements have been met by the cable supplied to the project. Documentation of factory results must be provided to the Project Engineer prior to shipping.

**86-2.08H(3) 12 SMFO Branch Cable**

Furnish and install 12 SMFO branch cable that has factory terminated Male SC-type connectors on all twelve fibers at one end of the cable. The end opposite the connectors must be left bare for fusion splicing in a fiber optic splice box. Branch cable must comply with or exceed the applicable provisions of the following documents:

1. CFR 1755.900, RUS Specification for Filled Fiber Optic Cables;
3. EIA-455-27A, Method of Measuring (Uncoated) Diameter of Optical Waveguide Fibers;
4. EIA-455-28B, Method for Measuring Tensile Failure Point of Optical Waveguide Fibers;
5. EIA-455-34, Interconnection Device Insertion Loss Test;
6. EIA/TIA-455-82A, Water Penetration Test;
7. EIA-455-95, Absolute Optical Power Test for Optical Fibers and Cables;
8. EIA-455-103, Buffered Fiber Bend Test; and

**86-2.08H(4) Fiber Optic Jumper Cable**

Furnish and install jumper cables that meet the following requirements:

1. 250 μm buffering of each fiber
2. 900 μm buffering of each fiber applied after the initial 250μm buffering
3. Maximum factory measured insertion loss of 0.5 dB per EIA/TIA 455-171
4. Less than 0.2 dB loss when subjected to EIA/TIA-455-1B, 300 cycles, 1.1 lbs.
5. Aramid yarn strength member
6. Rugged 0.12 inch (approximate) PVC sheathing
7. Minimum bend radius of 12.5" following installation, 25° during installation
8. Minimum tensile strength of 100 lbf
9. ST connectors as needed, factory terminated with strain relief
10. Comply with NEC requirements for indoor cable when used indoors
11. Rated by the manufacturer for use in outdoor field cabinets

Use either single fiber or duplex jumper cables. Provide permanent markings on duplex jumper cables that provide a visual distinction between the two fibers. Provide strain relief for jumper cables at both ends and elsewhere as needed. Adhere to manufacturer recommended installation and minimum bend radius requirements.

86-2.08H(5) Fiber Optic CAT 6 Patch Cable
Furnish and install Fiber Optic CAT 6 Patch cables that meet the following requirements:

1. Network Compatibility: 10 and 100 Base-T
2. RJ45 male to male connectors
3. Color blue
4. Model # P-A3L791 as manufactured by Belkin or equal

86-2.08H(6) Fiber Optic Pigtails
Fiber optic pigtails must comply with the requirements for jumper cable, except as amended by this subsection. Pigtails need not have a 0.12 inch PVC jacket. Use pigtails that have a factory installed male SC type connector on one end. Leave the other end of the pigtail bare for splicing to fiber.

86-2.08H(7) Underground Fiber Splice Closures
Underground fiber splice closures must be butt-end style, corrosion resistant, watertight, and meet the latest requirements of GR-771-CORE. Underground splice closures must seal, bond, anchor, and provide efficient routing, storage, organization, and protection for fiber optic cable and splices. The splice closure must provide an internal configuration and end cap with a minimum of two express ports for entry and exit of backbone cable and a minimum of three additional ports for distribution and branch cables. Splice closures must have a reliable dual seal design with both the cable jackets and core tubes sealed, without the use of water-blocking material. The splice closures must be capable of being opened and completely resealed without loss of performance.

The fiber splice closures must be equipped with splice trays that are designed specifically for housing single-mode fusion splices protected by heat-shrink sleeves, are easy to install and remove, and have provisions for a minimum number of splices accommodated by the splice closure. At a minimum, the splice closure must accommodate 48 splices. The splice closure maximum dimensions must not exceed 17"L x 9"W x 7.5"H.

86-2.08H(7) Fiber Termination Panel
The fiber termination panel must be REALM Distribution System (RDS) 1RU Patch and Splice Panel or approved equal. The panel must be of:

1. 1.75" in height and 17.5" in width
2. Allows for 3 adapter plates and up to 72 fibers using LC duplex adapters (Per rack unit)
3. Dual sliding tray system allows front panel slide out access without straining rear mounted cable
4. Mounts in 19” or 23” racks or cabinets
5. Can be pre-loaded with adapter plates, adapters, pigtails or splice cartridges
6. Custom or standard loading options available
7. Front door locking option available

The fiber splice cartridge must be of:

1. From 6 to 24 fiber configurations
2. Based on standard footprint of 118mm between mounting holes
3. Cartridge is available to include: laser safety smoked polycarbonate cover, bulkhead adapters, color coded pigtails, splice sleeve holder and splice sleeves
4. Pigtails can be 900um tight or loose buffered (900um loose buffer saves space & allows for easy splicing of 250um-250um fiber in loose tube cable
5. Pigtail end can be configured with ribbon fiber
6. Back side of cartridge has port ID chart for up to 24 terminations
7. Provision of optional MPO style connector/s at the rear port for quick plug & play applications
8. Heavy duty cable clamp and waterfalls included
10. Optional screw down metal cover

Replace the 1st paragraph of section 86-2.09E with:
Splices must be insulated by "Method B."

Delete the 6th and 7th paragraphs of section 86-2.09E.

Add to section 86-2.11A:
Continuous welding of exterior seams in service equipment enclosures is not required.

Circuits with Model 500 changeable message signs must have service equipment enclosures that have main busses and terminal lugs rated for 100 A, minimum, and a no. 2 bare copper ground wire.

Each service must be provided with up to 2 main circuit breakers that will disconnect ungrounded service entrance conductors. Where the "Main" circuit breaker consists of 2 circuit breakers as described, each of the circuit breakers must have a minimum interrupting capacity of 10,000 A, rms.

Add to section 86-2.16:

18. Signal and lighting equipment along the BRT corridor must be painted Boxwood Green or Traffic Signal Black, as noted on the applicable plan sheets. The Contractor must submit shop drawings submittals to the Engineer for each location to coordinate with the City of Oakland, City of San Leandro or Caltrans, as applicable to signals and lighting under each jurisdiction, and direct the appropriate colors to be used at each location along the corridor.

Replace section 86-2.18 with:

86-2.18 NUMBERING ELECTRICAL EQUIPMENT

Replace 1st paragraph of section 86-2.18 with:
Place numbers on the equipment as ordered.

Delete 2nd sentence of 3rd paragraph of section 86-2.18.

Add to section 86-2.

86-2.19 ETHERNET EDGE SWITCH
The Ethernet Edge Switch must be a Cisco IE-3000-8TC (Layer 2) or approved equal which has successfully been installed and operated in the City of Oakland for a period of one year as determined by the City of Oakland IT Division.

Cisco IE-3000-8TC must include the following items:

1. 1 Gigabit/s Single Mode Rugged SFP (2 fibers per port)
2. Field hardened power transformer
The Edge Switch must be environmentally hardened and intended for industrial applications and must comply with or exceed the NEMA TS2 2003 environmental requirements. The switch must comply with, at a minimum, the following requirements:

1. A minimum of two (2) 100BASE-FX ports (transmit and receive) capable of transmitting Ethernet data at 1 Gigabit/s over single mode fiber, full duplex (SFP ports)
2. A minimum of six (6) autosensing 100BASE-TX / 10BASE-T RJ45 ports capable of transmitting Ethernet data at 10 or 100 Mb/s, full duplex.
3. Switch must be capable of operating using an input voltage of 120VAC at 60Hz with a maximum power consumption of 20 watts, or must come equipped with power supplies capable of doing so.
4. Switch ports must comply with the following standards:
   4.1 IEEE 802.3 10Base-T
   4.2 IEEE 802.3u 100Base-TX
   4.3 IEEE 802.3u 100Base-FX
   4.4 IEEE 802.3ab 1000Base-T
   4.5 IEEE 802.3z 1000Base-SX and 1000Base-LX
   4.6 IEEE 802.1P priority queuing
   4.7 IEEE 802.3X flow control
5. Wire speed switching on all ports simultaneously, non-blocking
6. IEEE 802.1Q VLAN Tagging 4 port trunking groups with up to 2-4 ports per group with support for 256 VLANS
7. Meets Bellcore GR-63-CORE vibration and shock specifications for NEBS Level III compliance (optional)
8. Operating temperature = -34 to +74 degrees Celsius
9. Relative humidity = 10% - 90%, non-condensing
10. UL listed (UL1950), cUL, CE
11. Emissions meet FCC Part 15, Class A
12. Minimum MTBF of 8 years (Bellcore Method)
13. Packet Filtering and Port Security Destination MAC
14. MAC address learning with a minimum of 1028 MAC addresses and ≥ 1028 static MAC addresses
15. IEEE 802.1p QoS Classification based on: Port based priority VLAN Priority field in VLAN tagged frame DS/TOS field in IP packet UDP/TCP logical ports
15. IEEE 802.1w Rapid Spanning Tree Algorithm
16. IP Multicast Filtering through IGMP Snooping
17. Support Telnet, SNMP v1 & v2, RMON, Web Browser, Port Mirroring (RFC 1757, TFTP, FTP and CLI management tools
18. MIB statistics counters for all ports
19. Management and configuration must be able to be performed through an integrated web interface
20. Support remote reset and remote management
21. Support remote turn on/off of 10/100 Base-T ports

The switch must have a minimum MTBF of 60,000 hours. The MTBF must be calculated in accordance with the methods described in Mil-Std HDBK 217F for a temperature of 55ºC for naval sheltered.

86-2.20 HUB SWITCH
The hub switch must be Enterasys C5 (Model No. C5K125-48P2) or approved equivalent.

The hub switch must have:

1. (48) 10/100/1000 PoE (.af +.at) auto-sensing, auto negotiating MDI/MDI-X RJ45 ports
2. (2) Combo SFP ports
3. (2) SFP+ ports
4. (2) dedicated stacking ports
5. (1) DB9 console port
6. (1) RPS port

The hub switch must support fiber optic communications. The hub switch must have use Enterasys 1 Gb GBIC (Model No. MGBIC-LC09) or approved equivalent from same manufacturer.

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GBIC must have the following features:

1. 1000BASE-LX,
2. IEEE 802.3 SM,
3. 1310 nm Long Wave Length, 10 km,
4. LC SFP

Add to section 86-3.04:

Before shipping to the job site, submit each controller cabinet to METS for acceptance testing.

Each power distribution assembly must include the following equipment:

1. Two duplex NEMA 5-15R controller receptacle (rear mount)
2. One 30 A, 1-pole, 120 V(ac) main circuit breaker
3. Three 15 A, 1-pole, 120 V(ac) circuit breaker
4. One duplex GFCI NEMA 15 A, receptacle (front mount)

Furnish 3 shelves as shown. Each shelf must be attached to the tops of 2 supporting angles with 4 screws. Supporting angles must extend from the front to the back rails. The front of the shelf must abut the front member of the mounting cage. Arrange shelves as shown. The angles must be designed to support a minimum of 50 pounds each. The horizontal side of each angle must be a minimum of 3 inches. The angles must be vertically adjustable.

Furnish 3 terminal blocks as shown. Terminal blocks must comply with Chapter 6 of TEES, except the screw size must be 8-32.

Furnish a maintenance manual or a combined maintenance and operation manual for all controller units, auxiliary equipment, vehicle detector sensor units, control units, and amplifiers. Submit manual when the controllers are delivered for testing or, if ordered by the Engineer, before purchasing. The manual must include the following:

1. Specifications
2. Design characteristics
3. General operation theory
4. Function of all controls
5. Troubleshooting procedure (diagnostic routine)
6. Block circuit diagram
7. Geographical layout of components
8. Schematic diagrams
9. List of replaceable component parts with stock numbers

Replace section 86-4.01D(1)(c)(ii) with:

**86-4.01D(1)(c)(ii) Warranty**

The manufacturer must provide a written warranty against defects in materials and workmanship for LED signal modules for a minimum period of 48 months after installation of LED signal modules. Replacement LED signal modules must be provided within 15 days after receipt of failed LED modules at your expense. The Department pays for shipping the failed modules to you. All warranty documentation must be submitted to the Engineer before installation. Replacement LED signal modules must be delivered to State Maintenance Electrical Shop at 30 RICKARD STREET, SAN FRANCISCO, CA 94134 TEL. (415) 330-6500.

Add to section 86-4.01D(2)(a):

LED signal module must be manufactured for 12-inch circular, arrow, and Bus Rapid Transit sections.
Replace section 86-4.03H with:

86-4.03H LED Countdown Pedestrian Signal Face Modules

86-4.03H(1) General

86-4.03H(1)(a) Summary

Section 86-4.03H includes specifications for installing a LED countdown PSF module into a standard Type A pedestrian signal housing. Comply with TEES.

86-4.03H(1)(b) Definitions

Not Used

86-4.03H(1)(c) Submittals

Before shipping LED countdown PSF modules to the job site, submit all modules and the following items to METS:

1. Delivery form with Contract number and contact information
2. Installation manual and schematic wiring diagram
3. Product information, including manufacturer's name and month and year of manufacture
4. List of model, lot, and serial numbers

Submit documentation of the manufacturer's production QA, including test data showing the modules comply with the following requirements:

1. Luminous intensity as shown in the table titled “Luminance Values.”
2. Power factor after burn-in.
3. Test current flow measurements in amperes after burn-in. The measured values must comply with the design qualification figures. Record the measured ampere values with rated voltage on the product labels.

Submit the manufacturer’s warranty before installing LED countdown PSF modules.

86-4.03H(1)(d) Quality Control and Assurance

86-4.03H(1)(d)(i) General

The Engineer rejects a module if a visual inspection reveals any of the following defects:

1. Exterior physical damage
2. Assembly anomalies
3. Scratches
4. Abrasions
5. Cracks
6. Chips
7. Discoloration
8. Other surface defects

The Department tests LED countdown PSF modules under ANSI/ASQ Z1.4 and California Test 606. The module submitted for testing must be representative of typical production units.

Comply with testing requirements for electrical material and equipment under section 86-2.14.

86-4.03H(1)(d)(ii) Warranty

Provide a 5-year manufacturer's replacement warranty against defects or failures. The warranty period starts on the date of Contract acceptance. Furnish replacement parts within 15 days after notification of a failed module. The Department does not pay for replacement modules. Deliver replacement modules to the Department's Maintenance Electrical Shop at:

86-4.03H(2) Materials

A LED countdown PSF module must:
1. Use LED as the light source.
2. Be made of material complying with ASTM D 3935.
3. Be designed to mount behind or to replace face plates of a standard Type A housing as specified in the ITE publication *Equipment and Material Standards*, chapter 3, “Pedestrian Traffic Control Signal Indications,” and the *California MUTCD*.
4. Have a minimum power consumption of 10 W for the "Upraised Hand."
5. Have internal components supported such that they withstand mechanical shock and vibration from high winds and other sources.
6. Use the required color and be the ultra-bright type rated for 100,000 hours of continuous operation for a temperature range from -40 to +74 degrees C.
7. Have replaceable signal lamp optical units.
8. Fit into the housing of a pedestrian signal section without modification.
9. Be a single, self-contained device that does not require on-site assembly for installation.
10. Have the following information permanently marked on the back of the module:
   10.1. Manufacturer’s name
   10.2. Trademark
   10.3. Model number
   10.4. Serial number
   10.5. Lot number
   10.6. Month and year of manufacture
   10.7. Required operating characteristics, including:
       10.7.1. Rated voltage
       10.7.2. Power consumption
       10.7.3. Volt-ampere
       10.7.4. Power factor
11. Have prominent and permanent vertical markings for accurate indexing and orientation within the signal housing if a specific mounting orientation is required. Markings must be a minimum of 1 inch in height and include an up arrow and the word "up" or "top."

The circuit board and the power supply must be contained inside of the LED countdown PSF module. The circuit board must comply with TEES, chapter 1, section 6.

The enclosure containing the power supply or the electronic components of the module, except the lens, must be made of UL 94 V-0 flame-retardant material.

Each symbol must be at least 9 inches high and 5-1/4 inches wide. The lens’ signal output for the "Walking Person" and "Upraised Hand" symbols and the countdown display must not exceed a ratio of 5 to 1 for the highest and lowest luminance values. The symbols must comply with ITE publication *Equipment and Material Standards*, chapter 3, "Pedestrian Traffic Control Signal Indications," and the *California MUTCD*. The 2-digit countdown timer, "Upraised Hand," and "Walking Person" indications must be electronically isolated from each other. The 3 indications must not share a power supply or interconnect circuitry.

The module must maintain an average luminance value for at least 5 years of continuous signal operation for a temperature range from -40 to +74 degrees C.

The module must operate over the specified ambient temperature and voltage range and be readable both day and night at distances up to the full width of the area to be crossed. Upon initial testing at 25 degrees C, the module must have at least the luminance values shown in the following table:

<table>
<thead>
<tr>
<th>PSF module symbol</th>
<th>Luminance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Upraised Hand&quot; and 2-digit countdown timer</td>
<td>1,094 fL</td>
</tr>
<tr>
<td>&quot;Walking Person&quot;</td>
<td>1,547 fL</td>
</tr>
</tbody>
</table>

The color output of the module must comply with chromaticity requirements in section 5.3 of ITE publication *Equipment and Material Standards* chapter 3, "Pedestrian Traffic Control Signal Indications."
When operating over a temperature range from -40 to +74 degrees C, the measured chromaticity coordinates of the module must comply with the following requirements for 5 years after Contract acceptance:

### Chromaticity Standards (CIE Chart)

<table>
<thead>
<tr>
<th></th>
<th>X-axis Requirements</th>
<th>Y-axis Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Upraised Hand&quot;</td>
<td>0.600 ≤ X ≤ 0.659</td>
<td>Y: Not greater than 0.390 or less than 0.331 or less than 0.990 - X</td>
</tr>
<tr>
<td>2-digit countdown timer</td>
<td>&quot;Walking Person&quot; (lunar white)</td>
<td>X: Not less than 0.280 or greater than 0.400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Y: Not less than 0.0483 + 0.7917<em>X or greater than 0.0983 + 0.7917</em>X</td>
</tr>
</tbody>
</table>

The module must not exceed the power consumption requirements shown in the following table:

### Maximum Power Consumption Requirements

<table>
<thead>
<tr>
<th>PSF module display</th>
<th>At 24 ºC</th>
<th>At 74 ºC</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;Upraised Hand&quot;</td>
<td>10.0 W</td>
<td>12.0 W</td>
</tr>
<tr>
<td>2-digit countdown timer</td>
<td>6.0 W</td>
<td>8.0 W</td>
</tr>
<tr>
<td>&quot;Walking Person&quot;</td>
<td>9.0 W</td>
<td>12.0 W</td>
</tr>
</tbody>
</table>

The wiring and terminal block must comply with section 13.02 of ITE publication *Equipment and Material Standards*, chapter 2, "Vehicle Traffic Control Signal Heads." The PSF module must have spade lugs and 3 secured, jacketed copper wires that comply with NEC and are:

1. Color coded
2. 3 feet long
3. 600 V(ac)
4. 20 AWG minimum stranded
5. Rated for service at +105 degrees C

The module must operate:

1. At a frequency of 60 ± 3 Hz over a voltage range from 95 to 135 V(ac) without flicker perceptible to the unaided eye. Fluctuations of the line voltage must have no visible effect on the luminous intensity of the indications. The rated voltage for measurements must be 120 V(ac).
2. With currently-used Department controller assemblies, including solid-state load switches, flashers, and conflict monitors. Comply with TEES, chapters 3 and 6. If an alternating current of 20 mA or less is applied to the unit, the voltage read across the 2 leads must not exceed 15 V(ac).
3. With a smart control and regulation mode that exhibits countdown displays automatically adjusted to the traffic controller's programmed intervals.

The countdown PSF module must operate during the pedestrian change interval. The module must begin counting down when the flashing "Upraised Hand" interval turns on, counting down to 0 and turning off when the steady "Upraised Hand" interval turns on.

The module's on-board circuitry must:

1. Include voltage surge protection to withstand high-repetition noise transients. The voltage surge protection must comply with NEMA Standard TS, section 2.1.6.
2. Comply with Class A emission limits for electronic noise under 47 CFR 15, subpart B.

The module must provide a power factor of 0.90 or greater.

The total harmonic distortion from a current and voltage induced in an alternating-current power line by a PSF module must not exceed 20 percent at an operating temperature of 25 degrees C.

The module's circuitry must prevent light emission perceptible to the unaided eye when a voltage of 50 V(ac) or less is applied to the unit.

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When power is applied to the module, light emission must occur within 90 ms.

**86-4.03H(3) Construction**

Use LED countdown PSF modules from the same manufacturer.

Install the module in a standard Type A pedestrian signal housing. Special tools must not be required for installing the modules.

The installation of the module into the pedestrian signal face must require only the removal of the lens, reflector, and existing LED module.

**86-4.03H(4) Payment**

Not Used

Add to section 86-4.03I(1)(b):

Submit warranty documentation as an informational submittal before installing LED PSF modules.

Replace section 86-4.03I(1)(c)(ii) with:

**86-4.03I(1)(c)(ii) Warranty**

Submit a 5-year manufacturer's warranty against defects in materials and workmanship for LED PSF modules. The 5-year warranty period starts on the date of Contract acceptance. Furnish replacement modules within 15 days after receiving the failed modules. The Department does not pay for replacement modules. Deliver replacement modules to the Department's Maintenance Electrical Shop at:

Add to the 6th paragraph in section 86-4.03I(2):

Installation of the LED PSF module into the pedestrian signal face only requires the removal of lenses, reflectors, and existing LED modules.

Add to section 86-5.01A(1):

Loop wire must be Type 2.

Loop detector lead-in cable must be Type B.

Slots must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

You may use a Type E loop where a Type A or a Type B loop is shown.

For Type E detector loops, sides of the slot must be vertical and the minimum radius of the slot entering and leaving the circular part of the loop must be 1-1/2 inches. Slot width must be a maximum of 5/8 inch. Loop wire for circular loops must be Type 2. Slots of circular loops must be filled with elastomeric sealant or hot-melt rubberized asphalt sealant.

Replace the 1st sentence of the 1st paragraph of the RSS for section 86-5.02 with:

The housing for a push button assembly must be made of (1) die-cast aluminum, (2) permanent mold-cast aluminum, or (3) UV-stabilized, self-extinguishing structural plastic. The plastic housing must have a color throughout that matches color no. 17038, 27038, or 37038 of FED-STD-595.

The housing for a push button assembly must be made of UV-stabilized, self-extinguishing structural plastic. The plastic housing must have a color throughout that matches color no. 17038, 27038, or 37038 of FED-STD-595.
Replace "Reserved" in section 86-5.03 of the RSS with:

86-5.03A General

86-5.03A(1) Summary
Section 86-5.03 includes specifications for installing accessible pedestrian signals (APS). Comply with TEES.

Push Button Assemblies must be ADA compliant pedestrian push button. Pedestrian push button must have audible and vibrotactile features which have successfully operated in the City of Oakland for a period of one year. The audible function must have a custom message approved by the City of Oakland’s Transportation Services, see Attachment 10. The Contractor must prepare the text of each audible message and submit to the Engineer for approval by the City of Oakland, City of San Leandro or Caltrans, as applicable to signals under each jurisdiction, prior to installation at each traffic signal.

APS Push Button Assemblies must be in accordance with State Standard Specifications 86-5.02, California Manual on Uniform Traffic Control Devices (California MUTCD), Americans with Disabilities Act (ADA) and Institute of Transportation Engineers.

Furnish metal type housing pedestrian push button (PPB) including sign with appropriate arrow indication and high visibility banding. Sign must be in accordance with California MUTCD Sign R10-4b. The sign must fit completely within the assembly frame. Braille must not be provided. The sign must be fabricated from aluminum with Type III High Intensity sheeting.

Pedestrian Push Button must be in accordance with State Standard Specifications Section 86-5.02, “Pedestrian Push Button Assemblies,” and these special provisions. Unless otherwise noted on the plans, pedestrian push buttons shall be located within 5 feet of the side of the curb ramp, measured from the edge farthest from the center of the intersection, and between 1.5 and 6 feet from the edge of the curb.

At each pole on which a pedestrian push button is located at a signalized intersection (new or existing) within the project limits, install reflective tape as specified in the California Building Code Section 1178.5.9. The reflective tape must consist of a textured horizontal yellow band, 2-inches in width, encircling the pole, and a 1-inch wide black border band above and below the yellow band. Reflective tape must be placed on the pole, at the height of the button. Button must be installed over the tape. Reflective tape must be made of reflective sheeting, 3M Engineer Grade, or approved equivalent.

86-5.03A(2) Definitions

accessible pedestrian signal: Accessible pedestrian signal as defined in the California MUTCD.
accessible walk indication: Activated audible and vibrotactile action during the walk interval.
ambient sound level: Background sound level in dB at a given location.
ambient sound sensing microphone: Microphone that measures the ambient sound level in dB and automatically adjusts the APS speaker's volume.
APS assembly: Assembly that includes a pushbutton to actuate the APS components.
audible speech walk message: Audible prerecorded message that communicates to pedestrians which street has the walk interval.
programming mechanism: Device to program the APS’ operation.
pushbutton information message: Pushbutton information message as defined in the California MUTCD.
pushbutton locator tone: Pushbutton locator tone as defined in the California MUTCD.
vibrotactile pedestrian device: Vibrotactile pedestrian device as defined in the California MUTCD.

86-5.03A(3) Submittals
Before shipping the APS units to the job site, submit the units with the following to METS:
1. Delivery form including Contract number and your contact information
2. Manufacturer’s name
3. Model, lot, and serial numbers
4. Month and year of manufacture
5. Wiring diagram
6. Product data
7. Programming mechanism if not integral to the APS

Submit 2 APS user and operator manuals for each signalized location as informational submittals. Each manual must have a master item index that includes:

1. Descriptions of the APS and its associated equipment and cables
2. Illustrative block diagrams
3. Manufacturer’s contact information
4. Technical data specifications
5. Parts list, descriptions, and settings
6. Fault diagnostic and repair procedures
7. Preventative maintenance procedures for maintaining APS performance parameters

Submit the manufacturer’s warranty documentation as an informational submittal before installing the APS.

Submit a record of completed field tests, the APS’ final configuration, audible sound level and threshold, and a list of all parameter settings.

86-5.03A(4) Quality Control and Assurance

86-5.03A(4)(a) General
The APS must be compatible with the Department-furnished Model 170E/2070L controller assembly.

The power to the APS must be connected to the pedestrian signal’s terminal blocks.

86-5.03A(4)(b) Functional Testing
Perform 2 field tests on the APS: (1) when traffic is noisy during peak traffic hours and (2) when traffic is quiet during off-peak hours. Notify the Engineer 15 days before testing the APS.

86-5.03A(4)(c) Warranty
The APS must have a 2-year manufacturer’s warranty against any defects or failures. The 2-year warranty period starts at Contract acceptance. Deliver a replacement within 10 days after you receive notification of a failed APS. The Department does not pay for the replacement. Deliver the replacement to the Department's Maintenance Electrical Shop at:

30 RICKARD STREET, SAN FRANCISCO, CA 94134 TEL. (415) 330-6500

86-5.03A(4)(d) Training
Provide a minimum of 2 hours of training by a certified manufacturer's representative for up to 6 Department employees selected by the Engineer. The training must include instruction in installing, programming, adjusting, calibrating, and maintaining the APS.

Furnish materials and equipment for the training.

86-5.03B Materials
The housing for the APS assembly must be made of corrosion-resistant material. Theft proof bolts used for mounting the APS housing to the standard must be stainless steel with a chromium content of 17 percent and a nickel content of 8 percent.

The color of metallic housing must match color no. 33538 of FED-STD-595.

The color of plastic housing must match color no. 17038, 27038, or 37038 of FED-STD-595.
The APS assembly must be rainproof and shockproof in any weather condition.

The APS assembly must include:

1. Pushbutton actuator with a minimum diameter of 2 inches. If a mechanical switch is used, it must have:
   1.1. Operating force of 3.5 lb.
   1.2. Maximum pretravel of 5/64 inch
   1.3. Minimum overtravel of 1/32 inch
   1.4. Differential travel from 0.002 to 0.04 inch
2. Vibrotactile device on the pushbutton or on the arrow.
3. Enclosure with an ambient-sound-level-sensing microphone and weatherproof speaker. The enclosure must:
   3.1. Weigh less than 7 lb.
   3.2. Measure less than 16 by 6 by 5 inches.
   3.3. Fit the traffic signal standard.
   3.4. Have a wiring hole with a diameter not exceeding 1-1/8 inches.
   3.5. Be attached to the pole with 2 screws with a diameter from 1/4 to 3/8 inch suitable for use in tapped holes. The clear space between any 2 holes in the post must be at least twice the diameter of the larger hole.
4. Pushbutton sign.

The APS speakers and electronic equipment must be installed inside the APS assembly’s enclosure. The speaker grills must be located on the surface of the enclosure.

Speakers must not interfere with the housing or its mounting hardware.

The conductor cable between the APS assembly and the pedestrian signal head must be a no. 9, 20-conductor cable complying with MIL-W-16878D. The wiring must comply with section 13.02 of ITE publication *Equipment and Material Standards* chapter 2, "Vehicle Traffic Control Signal Heads," and be NEC rated for service at +105 degrees C.

The APS must:

1. Include a mechanism for enabling and disabling its operation.
2. Have electronic switches, a potentiometer, or a handheld device for controlling and programming the volume level and messaging. Deliver any handheld programming device to the Engineer.
2. Provide information using:
   2.1. Audible speech message that plays when the pushbutton is actuated. The message must include the name of the street to be crossed. The APS must have at least 5 audible message options. The Engineer selects the message. The message must have a percussive tone consisting of multiple frequencies with a dominant component of 880 Hz. If the tone is selected as the message, it must repeat 8 to 10 ticks per second.
   2.2. Pushbutton locator tone that clicks or beeps. The pushbutton must produce the locator tone at an interval of 1 tone per second. Each tone must have a maximum duration of 0.15 second. The tone volume must adjust in response to the ambient sound level and be audible up to 12 feet from the pushbutton or to the building line, whichever is less.
3. Have a pushbutton that remains functional during an APS failure.

For signalized intersections, the APS must:

1. Have a pushbutton that when actuated activates the pedestrian walk signal's timing during an APS failure.
2. Provide information using:
   2.1. Audible speech walk message. The message must be activated from the beginning of the walk interval and repeated for its duration. An example of the message is "Peachtree. Walk sign is on to cross Peachtree."
   2.2. Pushbutton information message that provides the name of the street to be crossed. The message must play when the pushbutton is actuated. An example of the message is "Wait to
cross Howard at Grand. Wait."

3. Have a functional pushbutton that activates the pedestrian walk signal whenever actuated, even if the audible speech walk message, the pushbutton information message, the pushbutton locator tone, and the vibrating surface features are disabled.

### 86-5.03C Construction

Arrange to have a manufacturer’s representative at the job site when the APS is installed, modified, connected, or reconnected. The APS must not interfere with the Department-furnished controller assembly, the signal installation on signal standards, the pedestrian signal heads, or the terminal compartment blocks. The APS electronic control equipment must reside inside the APS assembly and the standard pedestrian signal head.

You are responsible for the compatibility of the components and for making the necessary calibration adjustments to deliver the performance specified. Furnish the equipment and hardware, and then set up, calibrate, and verify the performance of the APS.

Point arrows on the pushbutton signs in the same direction as the corresponding crosswalk. Attach the sign to the APS assembly.

Do not install an APS on a standard smaller than Type 1.

### 86-5.03D Payment

Not Used

Add to section 86-5:

#### 86-5.04 EMERGENCY VEHICLE PREEMPTION (EVP)/TRANSIT SIGNAL PRIORITY (TSP) SYSTEM

##### 86-5.04A General

Furnish and install, where shown on the Plans, an Opticom emergency vehicle preemption and transit signal priority system manufactured by GTT and approved by the City of Oakland Electrical Services Division, functional with existing City systems, and conforming to the Alameda County Transportation Commission SMART Corridors and AC Transit Rapid Bus Program. The EVP/TSP equipment must conform to the equipment installed by the AC Transit Line 51 project. The devices to be furnished and installed must be functional with the existing on-board equipment that is currently used by the City of Oakland emergency vehicles.

The EVP/TSP equipment must be compatible with the Central Management System, with Advanced Schedule Management functionality, that will be deployed by AC Transit and City of Oakland for this project.

The EVP (Optical) and TSP (GPS Radio) must operate as a single system. The equipment for EVP and TSP must be from a single manufacturer. The system must share a phase selector card. The equipment as referred to in these Special Provisions must include, but not be limited to, the following:

1. Optical Detection Unit and Mounting (Model No. 721)
2. TSP Intersection Equipment (GPS Radio Unit - Model No. 3100, GPS installation cable – Model No. 1070)
3. Discriminator Module (Model No. 764)
4. System Chassis
5. Card Rack – as needed by location
6. Green Sense Harness (Model No. 768)
7. Detector Cable (Model No. 138)
8. All associated power cables, accessories, and components recommended by the manufacturer and necessary to accomplish a fully functional EVP and TSP installation.

##### 86-5.04B Functional Capabilities

OCTOBER 2015
The EVP/TSP equipment will provide traffic signal priority preemption to emergency vehicles and Class 1 (Transit) detection by altering the phasing of the traffic signals depending on the phase selection criteria. Each modulated light signal detection system must consist of an optical emitter assembly or assemblies located on the appropriate vehicle and an optical detector/discriminator assembly or assemblies located at the traffic signal. Emitter assemblies are not required for this project except units for testing purposes to demonstrate that the systems perform as specified. Conduct the test in the presence of the Engineer as described below under “System Operation” during the signal test period. Notify the Engineer a minimum of two working days’ notice prior to performing the tests.

Each system must permit detection of authorized vehicles. Class II (emergency) vehicles and Class 1 (transit) vehicles and must be capable of being detected at any range up to 1800’ (550 m) from the optical detector. Detection must be both optical detection and GPS/radio detection.

Each optical system must permit detection of authorized vehicles. Class II (emergency) vehicles and Class 1 (transit) vehicles and must be capable of being detected at any range up to 1800’ (550 m) from the optical detector.

The optical modulation frequency for Class II signal emitters must be 14.035 Hz ±0.250 Hz.

The optical modulation frequency for Class 1 signal emitters must be 10Hz ±0.250 Hz.

Each TSP GPS wireless system must permit detection of Class 1 vehicles at any range up to 2300’ (700m) from the TSP GPS wireless antenna.

A system must conform to the requirements in Section 25352, of the California Vehicle Code.

**86-5.04C Optical Detection**

Each optical detection assembly must consist of one or more optical detectors, and connecting cable. Each such assembly, when used with standard emitters, must have a range of at least 300 m for Class I signals and 1800’ (550 m) for Class II signals. Standard emitters for both classes of signals must be available from the manufacturer of the system.

**86-5.04C(1) Optical Detector (Model No. 721)**

Each optical detector must be a waterproof unit capable of receiving optical energy from two separately aimable directions. The horizontal angle between the two directions must be variable from 180 degrees to 5 degrees. The reception angle for each photocell assembly must be a maximum of 8 degrees in all directions about the aiming axis of the assembly. Measurements, of reception angle will be taken at a range of 1000’ (300 m) for a Type I emitter and at a range of 1800’ (550 m) for a Type II emitter.

All internal circuitry must be solid state.

Each optical detector assembly must be contained in a housing, which must include two rotatable photocell assemblies, an electronic assembly, and a base. The base must have an opening to permit its mounting on a mast arm or a vertical pipe nipple, or suspension from a span wire. The mounting opening must have female threads for Size 21 conduit. A cable entrance must be provided which must have male threads and gasketing to permit a waterproof cable connection. Each detector must have mass of less than 2.4 lb. (1.1 kg) and must present a maximum wind load area of 35.6 in2 (230 cm2). The housing must be provided with weep holes to permit drainage of condensed moisture.

Each optical detector must be installed, wired and aimed as specified by the manufacturer.

**86-5.04C(2) Cable (Model No. 138)**

Optical detector cable (EV-DLC) must meet the requirements of IPCEA S 61-402\NEMA WC 5, Section 7.4, 600-V control cable, 170°F (75°C), Type B, and the following:

1. The cable must contain 3 conductors, each of which must be No. 20 (7 x 28) stranded, tinned copper with low-density polyethylene insulation. Minimum average insulation thickness must be 0.025” (0.63 mm). Insulation of individual conductors must be color coded: 1 yellow, 1 blue, 1 orange.

2. The shield must be either tinned copper braid or aluminized polyester film with a nominal 20 percent overlap. Where the film is used, a No. 20 (7 x 28) stranded, tinned, bare drain wire must be placed between the insulated conductors and the shield and in contact with the conductive surface of the shield.
3. The jacket must be black polyvinyl chloride with minimum ratings of 600 V and 175°F (80°C) and a minimum average thickness of 0.04" (1.1 mm): The jacket must be marked as required by IPCEA\NEMA.

4. The finished outside diameter of the cable must not exceed 0.35" (8.9 mm).

5. The capacitance, as measured between any conductor and the other conductors and the shield, must not exceed 157 pf per meter at 1000 Hz.

6. The cable run between each detector and the controller cabinet must be continuous without splices or must be spliced only as directed by the detector manufacturer.

86-5.04D TSP System Intersection Equipment

The Traffic Signal Priority system and the Emergency Vehicle Preemption must be manufactured by a single manufacturer and the equipment must share a single phase selector card. The TSP must provide transit priority based on a user-defined headway based system and provide a user defined schedule based option.

The TSP system must maintain a complete history log of the following events, with bus emitter ID and unique time stamps for each event.

1. Time approaching bus detected, identified by direction
2. Time bus departs the intersection, identified by direction
3. Start of priority request sent to controller, identifying bus direction and calculated headway from preceding bus
4. End of priority request sent to controller, identifying bus direction.

The system must include a GPS radio unit containing a GPS receiver with antenna and 2.4 GHz spread spectrum transceiver with antenna, multimode phase selector, auxiliary interface panel, GPS card rack and GPS installation cable. This installation must be provided for every traffic signal identified as being modified or added in Segment A.

The TSP system intersection equipment must be weather resistant, RF-energy-emitting GPS radio unit containing a GPS receiver with antenna and a 2.4 GHz spread spectrum transceiver with antenna. The radio unit must be connected to a multimode phase selector by means of an 11-conductor radio/GPS cable.

86-5.04E Discriminator Module (Model No. 764)

Each discriminator module must be designed to be compatible and usable with a Model 2070E controller unit and to be mounted in the input file of a Model 332 or Model 336 controller cabinet, and must conform to the requirements of Chapter I of the State of California, Department of Transportation “Traffic Signal Control Equipment Specifications”. The equipment must be capable of providing multi-mode phase selector with Optical and GPS/Radio capabilities including four channel multiple-priority. The multi-modal device must be able to be installed into a standard card rack within the controller cabinet. The unit must be capable of using existing infrared or Radio/GPS system card racks. Additional card racks must be provided if needed for installation.

86-5.04E(1) Minimum Requirements

Each discriminator module must meet the following minimum requirements:

1. Four channels of detection
2. Radio range of 2,500 – feet.
3. User-settable range setting by estimated time of arrival and or distance
4. Call bridging
5. Precise preemption output pulse
6. Optically isolated outputs
7. Variable outputs
8. High and low priority and probe frequency discrimination
9. First come, first serve priority within each priority level.
10. 10/100 Mb Ethernet and USB 2.0 communication capability.
11. RS232 communications front port, rear backplane and Auxiliary Interface Panel.
12. History log of most recent GPS system activities (10,000 count)
13. Multivehicle agency/class/vehicle code combinations capability
14. Customizable ID code validation
15. Two character display, LED and keypad
16. Programmable option for priority control parameters
17. Capable of data export directly into Type 33X input files.
18. Compatible with Model 2070 E traffic signal controller
19. Meets NEMA environmental and electrical test specifications

86-5.04E(2) Operation

Each discriminator module must be capable of operating four channels, each of which must provide an independent output for each separate input.

Each discriminator module, when used with its associated detectors, must be capable of:

1. Receiving Class I signals at a range of up to 2300 feet (700m) from the TSP GPS wireless antenna and Class I and Class II signals at a range of up to 1800 feet (550 m) from the optical detector.
2. Decoding the signals, on the basis of frequency, at 9.639 Hz ±0.119 Hz for Class I signals and 14.035 Hz ±0.255 Hz for Class II signals.
3. Establishing the validity of received signals on the basis of frequency and length of time received. A signal must be considered valid only when received for more than 0.50 second. No combination of Class I signals must be recognized as a Class II signal regardless of the number of signals being received, up to a maximum of ten signals. Once a valid signal has been recognized its effect must be held by the module in the event of temporary loss of the signal for a period adjustable from 4.5 seconds to 11 seconds in at least 2 steps at 5 seconds ±0.5 second and 10 seconds ±0.5 second.
4. Providing an output for each channel that will result in a "low" or grounded condition of the appropriate input of a Model 2070E controller unit. For Class I signals, the output must be a 6.25 Hz ±0.1 percent, rectangular waveform with a 50 percent duty cycle. For Class II signals the output must be steady.

Each discriminator module must receive electric power from the controller cabinet at either 24 VDC or 120 VAC. Multimode Phase Selector must operate between 89 to 135 VAC, 60Hz as up to 500mA or 24 VDC at up to 1 Amp. The phase selector must have a safe operation range between -24 degrees F to 165 degrees F. It must be capable of operating within a humidity range of 5% to 95%.

Each channel together with its associated detectors must draw not more than 100 mA at 24 VDC or more than 100 mA at 120 VAC. Electric power, one detector input for each channel and one output for each channel, must terminate at the printed circuit board edge connector pins listed below:
### Board Edge Connector Pin Assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Assignment</th>
<th>Pin</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DC ground</td>
<td>P</td>
<td>(NC)</td>
</tr>
<tr>
<td>B</td>
<td>+24 VDC</td>
<td>R</td>
<td>(NC)</td>
</tr>
<tr>
<td>C</td>
<td>(NC)</td>
<td>S</td>
<td>(NC)</td>
</tr>
<tr>
<td>D</td>
<td>Detector input, Channel A</td>
<td>T</td>
<td>(NC)</td>
</tr>
<tr>
<td>E</td>
<td>+24VDC to detectors</td>
<td>U</td>
<td>(NC)</td>
</tr>
<tr>
<td>F</td>
<td>Channel A output (C)</td>
<td>V</td>
<td>(NC)</td>
</tr>
<tr>
<td>H</td>
<td>Channel A output (E)</td>
<td>W</td>
<td>Channel B Output (C)</td>
</tr>
<tr>
<td>J</td>
<td>Detector input, Channel B</td>
<td>X</td>
<td>Channel B Output (E)</td>
</tr>
<tr>
<td>K</td>
<td>DC Ground to detectors</td>
<td>Y</td>
<td>(NC)</td>
</tr>
<tr>
<td>L</td>
<td>Chassis ground</td>
<td>Z</td>
<td>(NC)</td>
</tr>
<tr>
<td>M</td>
<td>AC-</td>
<td>(C) Collector, Slotted for Keying</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>AC+</td>
<td>(E) Emitter, Slotted for Keying</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(NC) Not connected, cannot be used by manufacturer for any purpose.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 86-5.04E(3) Channel Input/Output

Two auxiliary inputs for each channel must enter each module through the front panel connector. Pin assignment for the connector must be as follows:

1. Auxiliary detector 1 input, Channel A
2. Auxiliary detector 2 input, Channel A
3. Auxiliary detector 1 input, Channel B
4. Auxiliary detector 2 input, Channel B

Each channel output must be an optically isolated NPN open collector transistor capable of sinking 50 mA at 30 V and must be compatible with the Model 2070E controller unit inputs.

Each discriminator module must be provided with means of preventing transients received by the detector from affecting the Model 2070E controller assembly.

### 86-5.04E(4) Front Panel

Each discriminator module must have a single connector board and must occupy one slot width of the input file. The front panel of each module must have a handle to facilitate withdrawal and the following controls and indicators for each channel:

1. Three separate range adjustments each for both Class I and Class II signals.
2. A 3-position, center-off, momentary contact switch, one position (down) labeled for test operation of Class I signals, and one position (up) labeled for test operation of Class II signals.
3. A "signal" indication and a "call" indication each for Class I and for Class II signals. The "signal" indication denotes that a signal above the threshold level has been received. A "call" indication denotes that a steady, validly coded signal has been received. These two indications may be accomplished with a single indication lamp; "signal" being denoted by a flashing indication and "call" with a steady indication.

### 86-5.04E(5) Front Panel Connections

The front panel must be provided with a single circular, bayonet-captured, multi-pin connector for two auxiliary detector inputs for each channel. Connector must be a mechanical configuration equivalent to a MIL C-26482 with 10 4 insert arrangement, such as Burndy Trim Trio Bantamate Series, consisting of:

1. Wall mounting receptacle, G0B10-4PNE with SM20M-1S6 gold plated pins.
2. Plug, G6L10-4SNE with SC20M-1S6 gold plated sockets, cable clamp and strain relief that must provide for a right angle turn within 2.56” (65 mm) maximum from the front panel surface of the discriminator module.

86-5.04F Cabinet Wiring

The Model 332 cabinet has provisions for connections between the optical detectors, the discriminator module and the Model 2070E controller unit.

Wiring for a Model 332 cabinet must conform to the following:

1. Slots 12 and 13 of input file “J” have each been wired to accept a 2 channel module.
2. Field wiring for the primary detectors, except 24-VDC power, must terminate on either terminal board TB in the controller cabinet or on the rear of input file “J”, depending on cabinet configuration. Where TB 9 is used position assignments must be as follows:

<table>
<thead>
<tr>
<th>Position</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Channel A detector input, 1st module (Slot J-12)</td>
</tr>
<tr>
<td>5</td>
<td>Channel B detector input, 1st module Slot J-12</td>
</tr>
<tr>
<td>7</td>
<td>Channel A detector input, 2nd module (Slot J-13)</td>
</tr>
<tr>
<td>8</td>
<td>Channel B detector input, 2nd module (Slot J-13)</td>
</tr>
</tbody>
</table>

The 24 VDC cabinet power will be available at Position 1 of terminal board TB 1 in the controller cabinet.

All field wiring for the auxiliary detectors must terminate on terminal board TB 0 in the controller cabinet. Position assignments are as follows:

<table>
<thead>
<tr>
<th>Position</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+24VDC from (J-12E)</td>
</tr>
<tr>
<td>2</td>
<td>Detector ground From (J-12K)</td>
</tr>
<tr>
<td>3</td>
<td>Channel A auxiliary detector input 1</td>
</tr>
<tr>
<td>4</td>
<td>Channel A auxiliary detector input 2</td>
</tr>
<tr>
<td>5</td>
<td>Channel B auxiliary detector input 1</td>
</tr>
<tr>
<td>6</td>
<td>Channel B auxiliary detector input 2</td>
</tr>
<tr>
<td>7</td>
<td>+24VDC from (J-13E)</td>
</tr>
<tr>
<td>8</td>
<td>Detector ground from (J-13K)</td>
</tr>
<tr>
<td>9</td>
<td>Channel A auxiliary detector input 1</td>
</tr>
<tr>
<td>10</td>
<td>Channel A auxiliary detector input 2</td>
</tr>
<tr>
<td>11</td>
<td>Channel B auxiliary detector input 1</td>
</tr>
<tr>
<td>12</td>
<td>Channel B auxiliary detector input 2</td>
</tr>
</tbody>
</table>

86-5.04G Installation

Install the detector unit(s), GPS/radio equipment, mounting hardware, cabling, discriminator unit(s), system chassis, card rack(s), and green sense harness and must coordinate with manufacturer’s representative for programming and calibration of the detector and discriminator units. Follow step-by-step instructions provided by the equipment manufacturer and supplier to provide a fully functional installation. Confirm location of each TSP wireless access point provides suitable line of sight prior to installation. Each location must be approved by the Engineer prior to installation. Adjustments to TSP wireless access points for line of sight incidental to other work must be approved by Engineer prior to installation.

86-5.04H System Operation

A TSP system must be provided that fully complies with all requirements set out in the TSP System Requirements document, and with all compatibility requirements contained elsewhere in these specifications, see Attachment 9.

The TSP system must be able to activate exclusive transit phases, grant early green or extended green. TSP must not truncate pedestrian walk and flashing don’t walk time period.

Demonstrate that all of the components of each system are compatible and will perform satisfactorily as a system. Satisfactory performance must be determined using the following test procedure during the
Functional test period:

1. Each system to be used for testing must consist of an optical emitter assembly, an optical detector, optical detector cable, GPS/radio equipment and cabling, and a discriminator module.
2. The discriminator modules must be installed in the proper input file slot of the Model 2070E controller assembly.
3. Two tests must be conducted; one using a Class I signal emitter and a distance of 1000’ (300 m) between the emitter and the detector, the other using a Class II signal emitter and a distance of 1800’ (550 m) between the emitter and the detector. All range adjustments on the module must be set to "Maximum" for each test.
4. Each above test must be conducted for a period of one hour, during which the emitter must be operated for 30 cycles, each consisting of a one minute "on" interval and a one minute "off" interval. During the total test period (1) the emitter signal must cause the proper response from the Model 2070E controller unit during each "on" interval and (2) there must be no improper operation of either the Model 2070E controller unit or the monitor during each "off" interval.

86-5.04I Software Interface and Central Management System

Opticom Central Management System software must be provided, installed and configured to permit an operator to remotely access all parameters in all TSP modules installed in local intersection cabinets. The software must include the Advanced Schedule Management (ASM) module and provide headway-based and schedule-based functionality. The software must operate on a standard MS Windows-based PC situated at the City of Oakland TMC that communicates directly with all TSP modules in each local intersection cabinet along the BRT route. The operator must interface with the software from remote workstations at AC Transit, City of Oakland, City of San Leandro and Caltrans. The software must maintain a historical log of all events at the TSP modules in all local intersection cabinets.

The software must produce reports that satisfy all reporting requirements listed in the TSP System Requirements document at the operators command.

86-5.04I(1) Central Management System Server

Provide and configure a server for the Central Management System to be installed at the City of Oakland TMC.

86-5.04I(1)(i) Server Hardware

The server must meet the following minimum hardware requirements:
1. 2X AMD Opteron 6134 2.3GHz, 8C, 4M L2/12M L3, 1333Mhz
2. 32 GB 1333 LV RDIMMs for 2 processors
3. 2 TB (RAID 5 or other)
4. 1GB Ethernet connection
5. Data backup methodology in place
6. DVD Drive

86-5.04I(1)(ii) Server Software

The server must include software meeting the following requirements:
2. SQL Database: SQL Server 2008 R2, Service Pack 2 (Standard) or SQL Server 2005, Service Pack 4 (Standard)

86-5.04J System Demonstration

Prior to installation of any TSP equipment, demonstrate to the satisfaction of the Engineer full ability of the TSP system to provide signal priority in accordance with the TSP System Requirements set out in Attachment 9, in both headway adherence mode and schedule adherence mode. This may be achieved by demonstrating and documenting successful in-service operation at another location, or by setting up a pilot demonstration in a laboratory, or by temporarily setting appropriate equipment on AC Transit District...
buses and at traffic signals operated by an agency within AC Transit Districts service area. Obtain all necessary and appropriate approvals from all public agencies involved in or affected by the demonstration. The method of demonstration must be approved by the Engineer before the demonstration proceeds.

Prior to conducting the demonstration, submit a detailed TSP System Demonstration Plan that explains how each requirement set out in the TSP System Requirements in Attachment 9 will be verified, and describes in detail each applicable test procedure, the manner in which the test results will be recorded, the basis for determining compliance with each requirement, and the actions to be taken whenever a test fails to prove the system satisfies a requirement. All demonstration verification tests must be witnessed by the Engineer or authorized representative, and must be documented to the satisfaction of the engineer before permanent installation of any TSP equipment.

86-5.04K System Verification

Submit a TSP System Verification Plan to the satisfaction of the Engineer prior to installation of any permanent TSP equipment. The plan must explain how each requirement set out in the TSP System Requirements in Attachment 9 will be verified, and describes in detail each applicable test procedure, the manner in which the test results will be recorded, the basis for determining compliance with each requirement, and the actions to be taken whenever a test fails to prove the system satisfies a requirement. The plan must be used to determine final verification that the fully installed system complies with all TSP System Requirements set out in Attachment 9. Acceptance of the TSP System must require completion of all verification tests with test results satisfactory to the Engineer.

86-5.04L Payment

Payment for the EVP/TSP system must be included in other items bid for the traffic signal installation and includes furnishing and installation of the system, testing, and includes the labor, equipment, materials for the system and no additional compensation must be provided therefor.

Full payment for the TSP System Demonstration Plan, conducting the demonstration and producing required documentation, the TSP System Verification Plan, conducting all verification tests and producing required documentation, including all incidental equipment required to render the TSP system fully functional and testable, must be included in other items bid for the traffic signal installation, and no additional compensation must be provided therefor.

Replace section 86-6.02 with:

86-6.02 LED LUMINAIRES
86-6.02A General
86-6.02A(1) Summary
Section 86-6.02 includes specifications for installing LED luminaires.

86-6.02A(2) Definitions
CALIPER: Commercially Available LED Product Evaluation and Reporting. A U.S. DOE program that individually tests and provides unbiased information on the performance of commercially-available LED luminaires and lights.

correlated color temperature: Absolute temperature in kelvin of a blackbody whose chromaticity most nearly resembles that of the light source.

house side lumens: Lumens from a luminaire directed to light up areas between the fixture and the pole, such as sidewalks at intersection or areas off the shoulders on freeways.


junction temperature: Temperature of the electronic junction of the LED device. The junction temperature is critical in determining photometric performance, estimating operational life, and preventing catastrophic failure of the LED.
L70: Extrapolated life in hours of the luminaire when the luminous output depreciates 30 percent from initial values.

LM-79: Test method from the Illumination Engineering Society of North America specifying test conditions, measurements, and report format for testing solid state lighting devices, including LED luminaires.

LM-80: Test method from the Illumination Engineering Society of North America specifying test conditions, measurements, and report format for testing and estimating the long-term performance of LEDs for general lighting purposes.

National Voluntary Laboratory Accreditation Program (NVLAP): U.S. DOE program that accredits independent testing laboratories.

Power factor: Ratio of the real power component to the complex power component.

Street side lumens: Lumens from a luminaire directed to light up areas between the fixture and the roadway, such as traveled ways and freeway lanes.

Surge protection device (SPD): Subsystem or component that protects the unit against short-duration voltage and current surges.

Total harmonic distortion: Ratio of the rms value of the sum of the squared individual harmonic amplitudes to the rms value of the fundamental frequency of a complex waveform.

86-6.02A(3) Submittals
Submit a sample luminaire to METS for testing after the manufacturer's testing is completed. Include the manufacturer's test data.

Product submittals must include:

1. LED luminaire checklist.
2. Product specification sheets, including:
   2.1. Maximum power in watts.
   2.2. Maximum designed junction temperature.
   2.3. Heat sink area in square inches.
   2.4. Designed junction to ambient thermal resistance calculation with thermal resistance components clearly defined.
   2.5. L70 in hours when extrapolated for the average nighttime operating temperature.
3. LM-79 and LM-80 compliant test reports from a CALiPER-qualified or NVLAP-approved testing laboratory for the specific model submitted.
5. Initial and depreciated isofootcandle diagrams showing the specified minimum illuminance for the particular application. The diagrams must be calibrated to feet and show a 40 by 40 foot grid. The diagrams must be calibrated to the mounting height specified for that particular application. The depreciated isofootcandle diagrams must be calculated at the minimum operational life.
7. Test report showing mechanical vibration test results as tested under California Test 611 or equal.
8. Data sheets from the LED manufacturer that include information on life expectancy based on junction temperature.
9. Data sheets from the power supply manufacturer that include life expectancy information.

Submit documentation of a production QA performed by the luminaire manufacturer that:

1. Ensures the minimum specified performance level
2. Includes a documented process for resolving problems

Submit the QA documentation as an informational submittal.

Submit the manufacturer's warranty documentation as an informational submittal before installing LED luminaires.
86-6.02A(4) Quality Control and Assurance

86-6.02A(4)(a) General

The Department may test random samples of the luminaires under section 86-2.14A. The Department tests luminaires under California Test 678 and may test any parameters specified in section 86-6.01.

Fit 1 sample luminaire with a thermistor or thermocouple temperature sensor. A temperature sensor must be mounted on the:

1. LED solder pad as close to the LED as possible
2. Power supply case
3. Light bar or modular system as close to the center of the module as possible

Other configurations must have at least 5 sensors per luminaire. The Engineer provides advice on sensor location. Thermocouples must be either Type K or C. Thermistors must be a negative-temperature-coefficient type with a nominal resistance of 20 kΩ. Use the appropriate thermocouple wire. The leads must be a minimum of 6 feet. Submit documentation with the test unit describing the type of sensor used.

Before performing any testing, energize the sample luminaires for a minimum of 24 hours at 100 percent on-time duty cycle and a temperature of +70 degrees F.

Depreciate the luminaire lighting's performance for the minimum operating life by using the LED manufacturer's data or the data from the LM-80 test report, whichever results in a higher lumen depreciation.

Failure of the luminaire that renders the unit noncompliant with section 86-6.02 specifications is cause for rejection.

86-6.02A(4)(b) Warranty

Provide a 7-year manufacturer's warranty against any defects or failures. The warranty period begins on the date of Contract acceptance. Furnish a replacement luminaire within 10 days after receipt of the failed luminaire. The Department does not pay for the replacement. Deliver replacement luminaires to the Department's Maintenance Electrical Shop at:

30 RICKARD STREET, SAN FRANCISCO, CA 94134 TEL. (415) 330-6500

86-6.02B Materials

86-6.02B(1) General

The luminaire must include an assembly that uses LEDs as the light source. The assembly must include a housing, an LED array, and an electronic driver. The luminaire must:

1. Be UL listed under UL 1598 for luminaires in wet locations or an equivalent standard from a recognized testing laboratory
2. Have a minimum operational life of 63,000 hours
3. Operate at an average operating time of 11.5 hours per night
4. Be designed to operate at an average nighttime operating temperature of 70 degrees F
5. Have an operating temperature range from -40 to +130 degrees F
6. Be defined by the following applications:

<table>
<thead>
<tr>
<th>Application</th>
<th>Replaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway 1</td>
<td>200 W high-pressure sodium luminaire mounted at 34 ft</td>
</tr>
<tr>
<td>Roadway 2</td>
<td>310 W high-pressure sodium luminaire mounted at 40 ft</td>
</tr>
<tr>
<td>Roadway 3</td>
<td>310 W high-pressure sodium luminaire mounted at 40 ft with back side control</td>
</tr>
<tr>
<td>Roadway 4</td>
<td>400 W high-pressure sodium luminaire mounted at 40 ft</td>
</tr>
</tbody>
</table>

The individual LEDs must be connected such that a catastrophic loss or a failure of 1 LED does not result in the loss of more than 20 percent of the luminous output of the luminaire.
86-6.02B(2) Luminaire Identification

Each luminaire must have the following identification permanently marked inside the unit and outside of its packaging box:

1. Manufacturer’s name
2. Trademark
3. Model number
4. Serial number
5. Month and year of manufacture
6. Lot number
7. Contract number
8. Rated voltage
9. Rated wattage
10. Rated power in VA

86-6.02B(3) Electrical Requirements

The luminaire must operate from a 60 ± 3 Hz AC power source. The fluctuations of line voltage must have no visible effect on the luminous output. The operating voltage may range from 120 to 480 V(ac). The luminaire must operate over the entire voltage range or the voltage range must be selected from either of the following options:

1. Luminaire must operate over a voltage range of 95 to 277 V(ac). The operating voltages for this option are 120 V(ac) and 240 V(ac).
2. Luminaire must operate over a voltage range of 347 to 480 V(ac). The operating voltage for this option is 480 V(ac).

The power factor of the luminaire must be 0.90 or greater. The total harmonic distortion, current, and voltage induced into an AC power line by a luminaire must not exceed 20 percent. The maximum power consumption allowed for the luminaire must be as shown in the following table:

<table>
<thead>
<tr>
<th>Application</th>
<th>Maximum consumption (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway 1</td>
<td>165</td>
</tr>
<tr>
<td>Roadway 2</td>
<td>235</td>
</tr>
<tr>
<td>Roadway 3</td>
<td>235</td>
</tr>
<tr>
<td>Roadway 4</td>
<td>300</td>
</tr>
</tbody>
</table>

86-6.02B(4) Surge Suppression and Electromagnetic Interference

The luminaire's on-board circuitry must include an SPD to withstand high repetition noise transients caused by utility line switching, nearby lightning strikes, and other interferences. The SPD must protect the luminaire from damage and failure due to transient voltages and currents as defined in Tables 1 and 4 of ANSI/IEEE C64.41.2 for location category C-High. The SPD must comply with UL 1449. The SPD must be tested under ANSI/IEEE C62.45 based on ANSI/IEEE C62.41.2 definitions for standard and optional waveforms for location category C-High.
The luminaires and associated on-board circuitry must comply with the Class A emission limits under 47 CFR 15, subpart B, for the emission of electronic noise.

86.02B(5) Compatibility
The luminaire must be operationally compatible with currently-used lighting control systems and photoelectric controls.

86.02B(6) Photometric Requirements
The luminaire must maintain a minimum illuminance level throughout the minimum operating life. The L70 of the luminaire must be the minimum operating life or greater. The measurements must be calibrated to standard photopic calibrations. The minimum maintained illuminance values measured at a point must be as shown in the following table:

<table>
<thead>
<tr>
<th>Application</th>
<th>Mounting height</th>
<th>Minimum maintained illuminance</th>
<th>Light pattern figure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(ft)</td>
<td>(fc)</td>
<td>(isofootcandle curve)</td>
</tr>
<tr>
<td>Roadway 1</td>
<td>34</td>
<td>0.15</td>
<td>Pattern defined by an ellipse with the equation:</td>
</tr>
</tbody>
</table>
|             |                 |                                | \[
\frac{x^2}{(82)^2} + \frac{(y-20)^2}{(52)^2} = 1
\]
|             |                 |                                | where: 
|             |                 |                                | \(x\) = direction longitudinal to the roadway 
|             |                 |                                | \(y\) = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern. |
| Roadway 2   | 40              | 0.2                            | Pattern defined by an ellipse with the equation: |
|             |                 |                                | \[
\frac{x^2}{(82)^2} + \frac{(y-20)^2}{(52)^2} = 1
\]
|             |                 |                                | where: 
|             |                 |                                | \(x\) = direction longitudinal to the roadway 
|             |                 |                                | \(y\) = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern. |
| Roadway 3   | 40              | 0.2                            | Pattern defined by an ellipse with the equation: |
|             |                 |                                | \[
\frac{x^2}{(82)^2} + \frac{(y-20)^2}{(52)^2} = 1
\]
|             |                 |                                | for \(y \geq 0\) (street side) 
|             |                 |                                | where: 
|             |                 |                                | \(x\) = direction longitudinal to the roadway 
|             |                 |                                | \(y\) = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 20 feet to the house side of the pattern. |
Pattern defined by an ellipse with the equation:

\[
\frac{x^2}{(92)^2} + \frac{(y - 23)^2}{(55)^2} = 1
\]

where:
\(x\) = direction longitudinal to the roadway
\(y\) = direction transverse to the roadway and the luminaire is offset from the center of the pattern by 23 feet to the house side of the pattern.

The luminaire must have a correlated color temperature range from 3,500 to 6,500 K. The color rendering index must be 65 or greater.

The luminaire must not allow more than:

1. 10 percent of the rated lumens to project above 80 degrees from vertical
2. 2.5 percent of the rated lumens to project above 90 degrees from vertical

**86-6.02B(7) Thermal Management**

The passive thermal management of the heat generated by the LEDs must have enough capacity to ensure proper operation of the luminaire over the minimum operation life. The LED maximum junction temperature for the minimum operation life must not exceed 221 degrees F.

The junction-to-ambient thermal resistance must be 95 degrees F per watt or less. The use of fans or other mechanical devices is not allowed. The heat sink material must be aluminum or other material of equal or lower thermal resistance.

The luminaire must contain circuitry that automatically reduces the power to the LEDs so the maximum junction temperature is not exceeded when the ambient outside temperature is 100 degrees F or greater.

**86-6.02B(8) Physical and Mechanical Requirements**

The luminaire must:

1. Be a single, self-contained device not requiring job-site assembly for installation
2. Have an integral power supply
3. Weigh no more than 35 lb
4. Have a maximum-effective projected area of 1.4 sq ft when viewed from either side or end
5. Have a housing color that matches color number from 26152 to 26440, from 36231 to 36375, or 36440 of FED-STD-595.

The housing must be fabricated from materials designed to withstand a 3,000-hour salt spray test under ASTM B 117. All aluminum used in housings and brackets must be made of a marine-grade alloy with less than 0.2 percent copper. All exposed aluminum must be anodized.

Each refractor or lens must be made from UV-inhibited high-impact plastic such as acrylic or polycarbonate or heat- and impact-resistant glass and be resistant to scratching. Polymeric materials except lenses of enclosures containing either the power supply or electronic components of the luminaire must be made of UL94VO flame retardant materials. The housing's paint must comply with section 86-2.16. A chromate conversion undercoating must be used underneath a thermoplastic polyester powder coat.

Provide each housing with a slip fitter capable of mounting on a 2-inch pipe tenon. This slip fitter must fit on mast arms with outside diameters from 1-5/8 to 2-3/8 inches. The slip fitter must be capable of being adjusted a minimum of ±5 degrees from the axis of the tenon in a minimum of 5 steps: +5, +2.5, 0, -2.5, -5. The clamping brackets of the slip fitter must not bottom out on the housing bosses when adjusted within the designed angular range. No part of the slip fitter's mounting brackets must develop a permanent set in excess of 1/32 inch when the bracket's two or four 3/8-inch-diameter cap screws are tightened to 10 ft-lb. Two sets of cap screws may be furnished to allow the slip fitter to be mounted on the
pipe tenon in the acceptable range without the cap screws bottoming out in the threaded holes. The cap screws and the clamping brackets must be made of corrosion-resistant materials or treated to prevent galvanic reactions and be compatible with the luminaire housing and the mast arm.

The LED luminaire must be assembled and manufactured such that its internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources. When tested under California Test 611, the luminaire to be mounted horizontally on the mast arm must be capable of withstanding the following cyclic loading for a minimum of 2 million cycles without failure of any luminaire part:

<table>
<thead>
<tr>
<th>Plane</th>
<th>Power supply</th>
<th>Minimum peak acceleration level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical</td>
<td>Installed</td>
<td>3.0 g peak-to-peak sinusoidal loading (same as 1.5 g peak)</td>
</tr>
<tr>
<td>Horizontal</td>
<td>Installed</td>
<td>1.5 g peak-to-peak sinusoidal loading (same as 0.75 g peak)</td>
</tr>
</tbody>
</table>

*Perpendicular to the direction of the mast arm

The housing must be designed to prevent the buildup of water on top of the housing. Exposed heat sink fins must be oriented to allow water to freely run off of the luminaire and carry dust and other accumulated debris away from the unit. The optical assembly of the luminaire must be protected against dust and moisture intrusion to at least an ANSI/IEC rating of IP66. The power supply enclosure must be protected to at least an ANSI/IEC rating of IP43.

Furnish each mounted luminaire with an ANSI C136.10-compliant, locking-type photocontrol receptacle and a raintight shorting cap. The receptacle must comply with section 86-6.11A.

Furnish each mounted luminaire with an ANSI C136.41-compliant, locking-type photocontrol receptacle with dimming connections and a raintight shorting cap. The receptacle must comply with section 86-6.11A.

When the components are mounted on a down-opening door, the door must be hinged and secured to the luminaire housing separately from the refractor or flat lens frame. The door must be secured to the housing such that accidental opening is prevented. A safety cable must mechanically connect the door to the housing.

Field wires connected to the luminaire must terminate on a barrier-type terminal block secured to the housing. The terminal screws must be captive and equipped with wire grips for conductors up to no. 6. Each terminal position must be clearly identified.

The power supply must be rated for outdoor operation and have at least an ANSI/IEC rating of IP65.

The power supply must be rated for a minimum operational life equal to the minimum operational life of the luminaire or greater.

The power supply case temperature must have a self rise of 77 degrees F or less above ambient temperature in free air with no additional heat sinks.

The power supply must have 2 leads to accept standard 0-10 V(dc). The dimming control must be compatible with IEC 60929. If the control leads are open or the analog control signal is lost, the circuit must default to 100-percent power.

Conductors and terminals must be identified.

86-6.02C Construction
Not Used

86-6.02D Payment
Not Used
Replace “Reserved” in section 86-6.06C with:

86-6.06C(1) General
The Contractor must furnish and install in-roadway warning lights (IRWLs) under section 86-1.02, the details shown, and the special provisions.

IRWL systems must consist of the following:

1. LED light sources
2. Service equipment enclosures
3. IRWL equipment enclosures
4. Service
5. Pedestrian activation equipment

IRWL systems must be rated at 120 V(ac), 60 Hz, from 12 V(dc) to 24 V(dc), with a maximum rating of 10 W.

IRWL units must be designed for mounting onto a base plate assembly installed in the pavement or a base can assembly mounted on the pavement. IRWLs must be moisture and corrosion resistant.

Submit a certificate of compliance for IRWLs.

86-6.06C(2) Light Emitting Diode Light Source
LED light sources must consist of a housing, base plate, refractor and lens. LED light sources must utilize aluminum indium gallium phosphate (AlInGaP) technology and must be the ultra-bright type rated for 100,000 hours of continuous operation from -40 to +74 degrees C. The LED color must be yellow with a peak wavelength from 590 nanometers to 600 nanometers. LEDs must have a 30-degree viewing angle.

Luminance of each IRWL must be a minimum of 650-foot lamberts measured under California Test 606.

86-6.06C(3) Service Equipment Enclosure
Service equipment enclosures must comply with section 86-2.11. Service equipment enclosures must be designed for outdoor use and have a dead front panel and hasp for padlocking the cover. Painting of service equipment enclosures must comply with section 86-2.16.

86-6.06C(4) In-Roadway Warning Light Equipment Enclosure
IRWL equipment enclosures must be NEMA 3R controller cabinets, and must comply with section 86-2.11. The IRWL equipment enclosure must be designed for outdoor use and have a dead front panel and hasp for padlocking of the cover. Painting of IRWL equipment enclosures must comply with section 86-2.16.

IRWL equipment enclosures must contain a power supply, controller unit compatible with IRWL operation, flasher unit, circuit breakers, terminal blocks, wiring, and electrical components for operation of the IRWL system.

Flasher units for IRWLs must be installed in IRWL equipment enclosures. Flasher units must indicate when the IRWL is activated. The flash rate must be between 50 and 60 flashes per minute. The flash rate and period for the IRWL must comply with Chapter 4L of the California MUTCD. The flash rate must comply with Section 8.3.3 of the National Electrical Manufacturers Association Standards Publications No. TS-1 “Traffic Control System.” The minimum pedestrian crossing time must be based on a walking speed of 4 feet per second.

86-6.06C(5) Service
86-6.06C(5)(a) AC Power
Electrical service installation must comply with the requirements of the serving utility and section 86-2.11.

Barrier type terminal blocks must be rated at 10 A, 600 V, be molded from phenolic or nylon material, and have plated brass screw terminals and integral type marking strips. Each terminal position must have a permanent printed or engraved label. Labels must comply with the designations on the IRWL equipment enclosure wiring diagram provided by the manufacturer. Equipment installed inside IRWL equipment enclosures must be labeled. Terminal blocks, circuit breakers, and a power supply must be UL approved.
IRWL systems must operate from a nominal-supplied voltage, 120 V(ac) ± 5 percent, 60 Hz inputs. Branch circuit breakers must be 10 A and a minimum of 5 branch circuit breakers must be installed inside the IRWL equipment enclosure to control AC power entering the enclosure.

86-6.06C(5) Service
86-6.06C(5)(a) Photovoltaic Power
The Contractor must furnish a photovoltaic system to energize the IRWL system consisting of solar module arrays, batteries, a voltage controller, and associated components. The photovoltaic system must be designed to operate from 12 V(dc) to 24 V(dc). The IRWL system must be capable of operating for 8 days in low light conditions.

Photovoltaic systems must be mounted on a 10-foot or 20-foot pole. Poles must comply with section 86-2.04. The solar module mounting angle setting must comply with the manufacturer's instruction. Photovoltaic systems must be designed to withstand winds of 80 mph.

86-6.06C(5)(b) Submittals
Submittals for photovoltaic systems must comply with section 86-1.04. Submittals must be delivered to the Engineer 15 days after approval of the Contract. The Engineer must be allowed 15 days to review the submittals.

Submittals for photovoltaic systems must include:

1. UL certification.
2. Certificate of compliance.
3. Calculations for determining the battery and solar panel sizing under the formula established by Sandia National Laboratory, including a minimum solar array to load ratio of 1.2:1. Insulation for photovoltaic systems must be based on National Renewable Energy Lab (NREL) Solar Radiation Data Manual.
4. Certified test reports from an independent laboratory of the photovoltaic system prepared under NREL/TP-520-27031 for an array to load ratio below 2.5:1.
5. System description of the IRWL and photovoltaic system.
6. Block diagram for the IRWL and photovoltaic system.
7. Theory of operation for the IRWL.

86-6.06C(5)(c) Documents
Parts lists and instructions for operating, maintaining, and servicing the photovoltaic system must be delivered to the Engineer.

86-6.06C(5)(d) Batteries
Batteries must be 12 V type, 65 A-h maximum, and must be easily replaced and commercially available. As a minimum, batteries must be maintenance free, sealed, gel cell or Absorbed Glass Matt, deep cycle, and heavy duty. Batteries must be 100 percent recyclable. Batteries must be certified by the manufacturer to operate over an ambient temperature range from -25 to +75 degrees C. Batteries must be provided with interconnected wiring, connection harness and corrosion-resistant mounting trays and brackets appropriate for the cabinet into which they will be installed. Battery terminals must be covered and insulated to prevent accidental shorting.

86-6.06C(5)(e) Controllers
Controllers must be designed specifically for solar applications. The controller must regulate the batteries from being over-charged and disconnect the battery in the event of a voltage drop below 10 V. Controllers must be rated from 6 A to 30 A for either 12 V(dc) or 24 V(dc).

86-6.06C(6) Pedestrian Activation System
Pedestrian activation systems must be either manual or automatic. Manual systems must consist of a standard pedestrian push button (PPB) assembly, post, and push button. PPB assemblies must comply with section 86-5.02.
Automatic pedestrian activated devices must be actuated through an automatic activation infrared beam interruption detection device or equal. Automatic systems must be installed at each side of the crosswalk entrance zone. Optical beam sensors must automatically activate the system upon interruption by a pedestrian entering the crosswalk within the detection beam. Automatic activation systems must not reactivate the system when a pedestrian exits the crosswalk. The Contractor must furnish and install an override feature (such as a button for the pedestrian to push) to bypass the system in case the automatic detection device fails. The Contractor must furnish and install automatic activation system devices under the manufacturer's specifications. Automatic systems must be capable of activating the IRWL for every pedestrian using the crosswalk and be functional 24 hours a day, 7 days a week.

Pedestrian activated pads must be actuated through a metal sensitive pad installed by the Contractor, at the crosswalk, as shown, and as recommended by the manufacturer. Automatic systems must be installed at each side of the crosswalk entrance zone. Pedestrian pad sensors must automatically activate the system upon interruption by a pedestrian entering the crosswalk between the detection devices. Automatic activation systems must not reactivate the system when the last pedestrian exits the crosswalk. The Contractor must furnish and install the automatic activation system devices of approximate length to fit the detection area of the sidewalk at the crossing, as shown, and without interfering with curb ramps or the access to the curb ramps. Automatic systems must be capable of activating the IRWL for every pedestrian using the crosswalk and be functional 24 hours a day, 7 days a week.

86-6.06C(7) Installation

Unless otherwise shown, the IRWL unit must not extend more than 3/4 inch above the pavement surface. The trenching method must comply with section 86-2.05C. IRWLs must be installed under the manufacturer's specifications.

Conduit must be installed under section 86-2.05C.

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DIVISION X MATERIALS

90 CONCRETE

Add to section 90-2.02B:
You may use rice hull ash as an SCM. Rice hull ash must comply with AASHTO M 321 and the chemical and physical requirements shown in the following tables:

<table>
<thead>
<tr>
<th>Chemical property</th>
<th>Requirement (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silicon dioxide (SiO$_2$)$^b$</td>
<td>90 min</td>
</tr>
<tr>
<td>Loss on ignition</td>
<td>5.0 max</td>
</tr>
<tr>
<td>Total alkalies as Na$_2$O equivalent</td>
<td>3.0 max</td>
</tr>
<tr>
<td>Physical property</td>
<td>Requirement</td>
</tr>
<tr>
<td>-----------------------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Particle size distribution</td>
<td></td>
</tr>
<tr>
<td>Less than 45 microns</td>
<td>95 percent</td>
</tr>
<tr>
<td>Less than 10 microns</td>
<td>50 percent</td>
</tr>
<tr>
<td>Strength activity index with portland cement(^a)</td>
<td></td>
</tr>
<tr>
<td>7 days</td>
<td>95 percent (min percent of control)</td>
</tr>
<tr>
<td>28 days</td>
<td>110 percent (min percent of control)</td>
</tr>
<tr>
<td>Expansion at 16 days when testing project materials under ASTM C 1567(^c)</td>
<td>0.10 percent max</td>
</tr>
<tr>
<td>Surface area when testing by nitrogen adsorption under ASTM D 5604</td>
<td>40.0 m(^2)/g min</td>
</tr>
</tbody>
</table>

\(^a\)SiO\(_2\) in crystalline form must not exceed 1.0 percent.

\(^b\)When tested under AASHTO M 307 for strength activity testing of silica fume.

\(^c\)In the test mix, Type II or V portland cement must be replaced with at least 12 percent rice hull ash by weight.

For the purpose of calculating the equations for the cementitious material specifications, consider rice hull ash to be represented by the variable UF.
DIVISION 2.2.1 - REVISED STANDARD SPECIFICATIONS

DATED

5-15-15

ORGANIZATION

Revised standard specifications are under headings that correspond with the main-section headings of the Standard Specifications. A main-section heading is a heading shown in the table of contents of the Standard Specifications. A date under a main-section heading is the date of the latest revision to the section.

Each revision to the Standard Specifications begins with a revision clause that describes or introduces a revision to the Standard Specifications. For a revision clause that describes a revision, the date on the right above the clause is the publication date of the revision. For a revision clause that introduces a revision, the date on the right above a revised term, phrase, clause, paragraph, or section is the publication date of the revised term, phrase, clause, paragraph, or section. For a multiple-paragraph or multiple-section revision, the date on the right above a paragraph or section is the publication date of the paragraphs or sections that follow.

Any paragraph added or deleted by a revision clause does not change the paragraph numbering of the Standard Specifications for any other reference to a paragraph of the Standard Specifications.

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ORGANIZATIONAL REVISIONS

07-19-13

Transfer section 36 from division IV to division V.

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DIVISION 1  GENERAL PROVISIONS

1  GENERAL

02-27-15

Replace "current" in the 2nd paragraph of section 1-1.05 with:

most recent
Add to the 4th paragraph of section 1-1.05:

Any reference directly to a revised standard specification section is for convenience only. Lack of a direct reference to a revised standard specification section does not indicate a revised standard specification for the section does not exist.

Add to the 1st table in section 1-1.06:

<table>
<thead>
<tr>
<th>LCS</th>
<th>Department's lane closure system</th>
</tr>
</thead>
<tbody>
<tr>
<td>POC</td>
<td>pedestrian overcrossing</td>
</tr>
<tr>
<td>QSD</td>
<td>qualified SWPPP developer</td>
</tr>
<tr>
<td>QSP</td>
<td>qualified SWPPP practitioner</td>
</tr>
<tr>
<td>SDS</td>
<td>safety data sheet</td>
</tr>
<tr>
<td>TRO</td>
<td>time-related overhead</td>
</tr>
<tr>
<td>WPC</td>
<td>water pollution control</td>
</tr>
</tbody>
</table>

Add to the notes of the 1st table in section 1-1.06:

Interpret a reference to MSDS as a reference to SDS under 29 CFR 1910.1200.

Delete the abbreviation and its meaning for UDBE in the 1st table of section 1-1.06.

Delete "Contract completion date" and its definition in section 1-1.07B.

Delete "critical delay" and its definition in section 1-1.07B.

Replace "day" and its definition in section 1-1.07B with:

**day**: 24 consecutive hours running from midnight to midnight; calendar day.

1. **business day**: Day on the calendar except a Saturday and a holiday.
2. **working day**: Time measure unit for work progress. A working day is any 24-consecutive-hour period except:
   2.1. Saturday and holiday.
   2.2. Day during which you cannot perform work on the controlling activity for at least 50 percent of the scheduled work shift with at least 50 percent of the scheduled labor and equipment due to any of the following:
      2.2.1. Adverse weather-related conditions.
      2.2.2. Maintaining traffic under the Contract.
      2.2.3. Suspension of a controlling activity that you and the Engineer agree benefits both parties.
      2.2.4. Unanticipated event not caused by either party such as:
         2.2.4.1. Act of God.
         2.2.4.2. Act of a public enemy.
         2.2.4.3. Epidemic.
         2.2.4.4. Fire.
         2.2.4.5. Flood.
         2.2.4.6. Governor-declared state of emergency.
2.2.4.7. Landslide.
2.2.4.8. Quarantine restriction.

2.2.5. Issue involving a third party, including:
- 2.2.5.1. Industry or area-wide labor strike.
- 2.2.5.2. Material shortage.
- 2.2.5.3. Freight embargo.
- 2.2.5.4. Jurisdictional requirement of a law enforcement agency.
- 2.2.5.5. Workforce labor dispute of a utility or nonhighway facility owner resulting in a nonhighway facility rearrangement not described and not solely for the Contractor's convenience. Rearrangement of a nonhighway facility includes installation, relocation, alteration, or removal of the facility.

2.3. Day during a concurrent delay.

3. **original working days:**
   - 3.1. Working days to complete the work shown on the Notice to Bidders for a non–cost plus time based bid.
   - 3.2. Working days bid to complete the work for a cost plus time based bid.

Where working days is specified without the modifier "original" in the context of the number of working days to complete the work, interpret the number as the number of original working days as adjusted by any time adjustment.

**Replace "Contract" in the definition of "early completion time" in section 1-1.07B with:**

**Replace "excusable delay" and its definition in section 1-1.07B with:**

**delay:** Event that extends the completion of an activity.

1. **excusable delay:** Delay caused by the Department and not reasonably foreseeable when the work began such as:
   - 1.1. Change in the work
   - 1.2. Department action that is not part of the Contract
   - 1.3. Presence of an underground utility main not described in the Contract or in a location substantially different from that specified
   - 1.4. Described facility rearrangement not rearranged as described, by the utility owner by the date specified, unless the rearrangement is solely for the Contractor's convenience
   - 1.5. Department's failure to obtain timely access to the right-of-way
   - 1.6. Department's failure to review a submittal or provide notification in the time specified

2. **critical delay:** Excusable delay that extends the scheduled completion date

3. **concurrent delay:** Occurrence of at least 2 of the following events in the same period of time, either partially or entirely:
   - 3.1. Critical delay
   - 3.2. Delay to a controlling activity caused by you
   - 3.3. Non–working day

Replace "project" in the definition of "scheduled completion date" in section 1-1.07B with:
Add to section 1-1.07B:

Contract time: Number of original working days as adjusted by any time adjustment.


Replace "PO BOX 911" in the District 3 mailing address in the table in section 1-1.08 with:

703 B ST

Replace the Web site for the Department of General Services, Office of Small Business and DVBE Services in the table in section 1-1.11 with:

http://www.dgs.ca.gov/dgs/ProgramsServices/BusServices.aspx

Replace "--" for the telephone number for the Office Engineer in the table in section 1-1.11 with:

(916) 227-6299

2 BIDDING

04-10-15

Replace the headings and paragraphs in section 2 with:

2-1.01 GENERAL
Section 2 includes specifications related to bid eligibility and the bidding process.

The electronic bid specifications in section 2 apply if Electronic Bidding Contract is shown on the cover of the Notice to Bidders and Special Provisions.

2-1.02 BID INELIGIBILITY
A firm that has provided architectural or engineering services to the Department for this contract before bid submittal for this contract is prohibited from any of the following:

1. Submitting a bid
2. Subcontracting for a part of the work
3. Supplying materials

2-1.03 RESERVED

2-1.04 CONTRACTOR REGISTRATION
No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].
2-1.05 RESERVED

2-1.06 BID DOCUMENTS

2-1.06A General
The Bid book includes bid forms and certifications. For an electronic bid, the Bid book includes forms not available through the electronic bidding service. The Notice to Bidders and Special Provisions includes the Notice to Bidders, revised standard specifications, and special provisions. The Bid book, including Bid book forms not available through the electronic bidding service, Notice to Bidders and Special Provisions, project plans, and any addenda to these documents may be accessed at the Bidders' Exchange website. The Standard Specifications and Standard Plans may be viewed at the Bidders' Exchange website and may be purchased at the Publication Distribution Unit.

2-1.06B Supplemental Project Information
The Department makes supplemental information available as specified in the special provisions.

Logs of test borings are supplemental project information.

If an Information Handout or cross sections are available, you may view them at the Contract Plans and Special Provisions link at the Bidders' Exchange website.

If rock cores are available, you may view them by sending a request to Coreroom@dot.ca.gov.

If other supplemental project information is available for inspection, you may view it by phoning in a request.

Make your request at least 7 days before viewing. Include in your request:

1. District-County-Route
2. Contract number
3. Viewing date
4. Contact information, including telephone number

For rock cores, also include the bridge number in your request.

If as-built drawings are available:

1. For a project in District 1 through 6 or 10, you may request them from the Office of Structure Maintenance and Investigations, fax (916) 227-8357
2. For a project in District 7, 8, 9, 11, or 12, you may request them from the Office of Structure Maintenance and Investigations, fax (916) 227-8357, and they are available at the Office of Structure Maintenance and Investigations, Los Angeles, CA, telephone (213) 897-0877

As-built drawings may not show existing dimensions and conditions. Where new construction dimensions are dependent on existing bridge dimensions, verify the field dimensions and adjust dimensions of the work to fit existing conditions.

2-1.06C–2-1.06D Reserved

2-1.07 JOB SITE AND DOCUMENT EXAMINATION
Examine the job site and bid documents. Notify the Department of apparent errors and patent ambiguities in the plans, specifications, and Bid Item List. Failure to do so may result in rejection of a bid or rescission of an award.

Bid submission is your acknowledgment that you have examined the job site and bid documents and are satisfied with:
1. General and local conditions to be encountered
2. Character, quality, and scope of work to be performed
3. Quantities of materials to be furnished
4. Character, quality, and quantity of surface and subsurface materials or obstacles
5. Requirements of the contract

2-1.08 RESERVED

2-1.09 BID ITEM LIST
Submit a bid based on the bid item quantities the Department shows on the Bid Item List.

2-1.10 SUBCONTRACTOR LIST
On the Subcontractor List form, list each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid or $10,000, whichever is greater (Pub Cont Code § 4100 et seq.). For each subcontractor listed, the Subcontractor List form must show:
1. Business name and the location of its place of business.
2. California contractor license number for a non-federal-aid contract.
3. Public works contractor registration number
4. Portion of work it will perform. Show the portion of the work by:
   4.1. Bid item numbers for the subcontracted work
   4.2. Percentage of the subcontracted work for each bid item listed
   4.3. Description of the subcontracted work if the percentage of the bid item listed is less than 100 percent

2-1.11 RESERVED

2-1.12 DISADVANTAGED BUSINESS ENTERPRISES
2-1.12A General
Section 2-1.12 applies to a federal-aid contract.
Under 49 CFR 26.13(b):

The contractor, sub recipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:

(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

Include this assurance in each subcontract you sign with a subcontractor.

2-1.12B Disadvantaged Business Enterprise Goal
2-1.12B(1) General
Section 2-1.12B applies if a DBE goal is shown on the Notice to Bidders.
The Department shows a goal for DBEs to comply with the DBE program objectives provided in 49 CFR 26.1.
Make work available to DBEs and select work parts consistent with available DBEs, including subcontractors, suppliers, service providers, and truckers.
Meet the DBE goal shown on the Notice to Bidders or demonstrate that you made adequate good faith efforts to meet this goal.
You are responsible to verify at bid opening the DBE firm is certified as a DBE by the California Unified Certification Program and possess the work codes applicable to the type of work the firm will perform on the Contract.

Determine that selected DBEs perform a commercially useful function for the type of work the DBE will perform on the Contract as provided in 49 CFR 26.55(c)(1)–(4). Under 49 CFR 26.55(c)(1)–(4), the DBE must be responsible for the execution of a distinct element of work and must carry out its responsibility by actually performing, managing, and supervising the work.

All DBE participation will count toward the Department's federally-mandated statewide overall DBE goal.

Credit for materials or supplies you purchase from DBEs will be evaluated on a contract-by-contract basis and counts toward the goal in the following manner:

1. 100 percent if the materials or supplies are obtained from a DBE manufacturer.
2. 60 percent if the materials or supplies are obtained from a DBE regular dealer.
3. Only fees, commissions, and charges for assistance in the procurement and delivery of materials or supplies, if they are obtained from a DBE that is neither a manufacturer nor regular dealer. 49 CFR 26.55 defines "manufacturer" and "regular dealer."

You receive credit toward the goal if you employ a DBE trucking company that is performing a commercially useful function. The Department uses the following factors in determining whether a DBE trucking company is performing a commercially useful function:

- The DBE must be responsible for the management and supervision of the entire trucking operation for which it is responsible on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting DBE goals.
- The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
- The DBE receives credit for the total value of the transportation services it provides on the Contract using trucks it owns, insures, and operates using drivers it employs.
- The DBE may lease trucks from another DBE firm, including an owner-operator who is certified as a DBE. The DBE who leases trucks from another DBE receives credit for the total value of the transportation services the lessee DBE provides on the Contract.
- The DBE may lease trucks without drivers from a non-DBE truck leasing company. If the DBE leases trucks from a non-DBE truck leasing company and uses its own employees as drivers, it is entitled to credit for the total value of these hauling services.
- A lease must indicate that the DBE has exclusive use of and control over the truck. This does not preclude the leased truck from working for others during the term of the lease with the consent of the DBE, so long as the lease gives the DBE absolute priority for use of the leased truck. Leased trucks must display the name and identification number of the DBE.

[49 Fed Reg 59595 (10/2/14) (to be codified at 49 CFR 26.55(d)]

2-1.12B(2) DBE Commitment Submittal
Submit DBE information under section 2-1.33.

Submit a copy of the quote from each DBE shown on the DBE Commitment form that describes the type and dollar amount of work shown on the form. Submit a DBE Confirmation form for each DBE shown on the DBE Commitment form to establish that it will be participating in the Contract in the type and dollar amount of work shown on the form. If a DBE is participating as a joint venture partner, submit a copy of the joint venture agreement.

2-1.12B(3) DBE Good Faith Efforts Submittal
You can meet the DBE requirements by either documenting commitments to DBEs to meet the Contract goal or by documenting adequate good faith efforts to meet the Contract goal. An adequate good faith effort means that the bidder must show that it took all necessary and reasonable steps to achieve a DBE goal.
goal that, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to meet the DBE goal.

If you have not met the DBE goal, complete and submit the DBE Good Faith Efforts Documentation form under section 2-1.33 showing that you made adequate good faith efforts to meet the goal. Only good faith efforts directed toward obtaining participation by DBEs are considered.

Submit good faith efforts documentation within the specified time to protect your eligibility for award of the contract in the event the Department finds that the DBE goal has not been met.

Refer to 49 CFR 26 app A for guidance regarding evaluation of good faith efforts to meet the DBE goal.

The Department considers DBE commitments of other bidders in determining whether the low bidder made good faith efforts to meet the DBE goal.

2-1.13–2-1.14 RESERVED

2-1.15 DISABLED VETERAN BUSINESS ENTERPRISES

2-1.15A General

Section 2-1.15 applies to a non-federal-aid contract.

Take necessary and reasonable steps to ensure that DVBEs have opportunity to participate in the Contract.

Comply with Mil & Vet Code § 999 et seq.

2-1.15B Projects $5 Million or Less

Section 2-1.15B applies to a project with an estimated cost of $5 million or less.

Make work available to DVBEs and select work parts consistent with available DVBE subcontractors and suppliers.

Meet the goal shown on the Notice to Bidders.

Complete and submit the Certified DVBE Summary form under section 2-1.33. List all DVBE participation on this form.

If a DVBE joint venture is used, submit the joint venture agreement with the Certified DVBE Summary form.

List each 1st-tier DVBE subcontractor on the Subcontractor List form regardless of percentage of the total bid.

2-1.15C Projects More Than $5 Million

2-1.15C(1) General

Section 2-1.15C applies to a project with an estimated cost of more than $5 million.

The Department encourages bidders to obtain DVBE participation to ensure the Department achieves its State-mandated overall DVBE goal.

If you obtain DVBE participation:

1. Complete and submit the Certified DVBE Summary form under section 2-1.33. List all DVBE participation on this form.
2. List each 1st tier DVBE subcontractor in the Subcontractor List form regardless of percentage of the total bid.

If a DVBE joint venture is used, submit the joint venture agreement with the Certified DVBE Summary form.
2-1.15C(2) DVBE Incentive

The Department grants a DVBE incentive to each bidder who achieves a DVBE participation of 1 percent or greater (Mil & Vet Code 999.5 and Code of Regs § 1896.98 et seq.).

To receive this incentive, submit the Certified DVBE Summary form under section 2-1.33.

Bidders other than the apparent low bidder, the 2nd low bidder, and the 3rd low bidder may be required to submit the Certified DVBE Summary form if the bid ranking changes. If the Department requests a Certified DVBE Summary form from you, submit the completed form within 4 business days of the request.

2-1.15C(3) Incentive Evaluation

The Department applies the small business and non–small business preference during bid verification and proceeds with the evaluation specified below for DVBE incentive.

The DVBE incentive is a reduction, for bid comparison only, in the total bid submitted by the lesser of the following amounts:

1. Percentage of DVBE achievement rounded to 2 decimal places of the verified total bid of the low bidder
2. 5 percent of the verified total bid of the low bidder
3. $250,000

The Department applies DVBE incentive and determines whether bid ranking changes.

A non–small business bidder cannot displace a small business bidder. However, a small business bidder with higher DVBE achievement can displace another small business bidder.

The Department proceeds with awarding the contract to the new low bidder and posts the new verified bid results at the Department's Web site.

2-1.16–2-1.17 RESERVED

2-1.18 SMALL BUSINESS AND NON–SMALL BUSINESS SUBCONTRACTOR PREFERENCES

2-1.18A General

Section 2-1.18 applies to a non-federal-aid contract.

The Department applies small business preferences and non–small business preferences under Govt Code § 14835 et seq. and 2 CA Code of Regs § 1896 et seq.

Any contractor, subcontractor, supplier, or service provider who qualifies as a small business is encouraged to apply for certification as a small business by submitting its application to the Department of General Services, Office of Small Business and DVBE Services.

Contract award is based on the total bid, not the reduced bid.

2-1.18B Small Business Preference

The Department allows a bidder certified as a small business by the Department of General Services, Office of Small Business and DVBE Services, a preference if:

2. Low bidder did not request the preference or is not certified as a small business

The bidder’s signature on the Request for Small Business Preference or Non–Small Business Preference form certifies that the bidder is certified as a small business at the date and time of bid or has submitted a complete application to the Department of General Services. The complete application and any required substantiating documentation must be received by the Department of General Services by 5:00 p.m. on the bid opening date.
The Department of General Services determines whether a bidder was certified on the bid opening date. The Department of Transportation confirms the bidder's status as a small business before applying the small business preference.

The small business preference is a reduction for bid comparison in the total bid submitted by the small business contractor by the lesser of the following amounts:

1. 5 percent of the verified total bid of the low bidder
2. $50,000

If the Department determines that a certified small business bidder is the low bidder after the application of the small business preference, the Department does not consider a request for non–small business preference.

2-1.18C Non–Small Business Subcontractor Preference

The Department allows a bidder not certified as a small business by the Department of General Services, Office of Small Business and DVBE Services, a preference if:

2. Certified Small Business Listing for the Non–Small Business Preference form shows that you are subcontracting at least 25 percent to certified small businesses

Each listed subcontractor and supplier must be certified as a small business at the date and time of bid or must have submitted a complete application to the Department of General Services. The complete application and any required substantiating documentation must be received by the Department of General Services by 5:00 p.m. on the bid opening date.

The non–small business subcontractor preference is a reduction for bid comparison in the total bid submitted by the non–small business contractor requesting the preference by the lesser of the following amounts:

1. 5 percent of the verified total bid of the low bidder
2. $50,000

2-1.19–2-1.26 RESERVED

2-1.27 CALIFORNIA COMPANIES

Section 2-1.27 applies to a non-federal-aid contract.

Under Pub Cont Code § 6107, the Department gives preference to a "California company," as defined, for bid comparison purposes over a nonresident contractor from any state that gives or requires a preference to be given to contractors from that state on its public entity construction contracts.

Complete a California Company Preference form.

The California company reciprocal preference amount is equal to the preference amount applied by the state of the nonresident contractor with the lowest responsive bid unless the California company is eligible for a small business preference or a non–small business subcontractor preference, in which case the preference amount is the greater of the two, but not both.

If the low bidder is not a California company and a California company's bid with reciprocal preference is equal to or less than the lowest bid, the Department awards the contract to the California company on the basis of its total bid.

2-1.28 RESERVED

2-1.29 OPT OUT OF PAYMENT ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

You may opt out of the payment adjustments for price index fluctuations specified in section 9-1.07. To opt out, submit a completed Opt Out of Payment Adjustments for Price Index Fluctuations form under section 2-1.33.
2-1.33 BID DOCUMENT COMPLETION AND SUBMITTAL

2-1.33A General

Complete the forms in the Bid book.

Use the forms provided by the Department except as otherwise specified for a bidder's bond.

Do not fax forms except for the copies of forms with the public works contractor registration number submitted after the time of bid. Fax these copies to (916) 227-6282.

Submit the forms and copies of the forms to the Office Engineer.

Failure to submit the forms and information as specified may result in a nonresponsive bid.

If an agent other than the authorized corporate officer or a partnership member signs the bid, file a Power of Attorney with the Department either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

2-1.33B Electronic Bids

Section 2-1.33B applies to electronic bids.

For an electronic bid, complete and submit the electronic portion of the Bid book under the Electronic Bidding Guide at the Bidders' Exchange website and submit the paper forms as specified for a paper bid.

Your authorized digital signature is your confirmation of and agreement to all certifications and statements contained in the Bid book.

On forms and certifications that you submit through the electronic bidding service, you agree that each form and certification where a signature is required is deemed as having your signature.

2-1.33C Paper Bids

Section 2-1.33C applies to paper bids.

Submit your bid and any Bid book forms after you submit your bid:

1. Under sealed cover
2. Marked as a bid
3. Identifying the contract number and the bid opening date

2-1.33D Bid Form Submittal Schedules

2-1.33D(1) General

The Bid book includes forms specific to the contract. The deadlines for the submittal of the forms vary depending on the requirements of each contract. Determine the requirements of the contract and submit the forms based on the applicable schedule specified in section 2-1.33D.

Bid forms and information on the form that are due after the time of bid may be submitted at the time of bid.

2-1.33D(2) Federal-Aid Contracts

2-1.33D(2)(a) General

Section 2-1.33D(2) applies to a federal-aid contract.

2-1.33D(2)(b) Contracts with a DBE Goal

Section 2-1.33D(2)(b) applies if a DBE goal is shown on the Notice to Bidders.

Submit the bid forms according to the schedule shown in the following table:
Bid Form Submittal Schedule for a Federal-Aid Contract with a DBE Goal

<table>
<thead>
<tr>
<th>Form</th>
<th>Submittal deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid to the Department of Transportation</td>
<td>Time of bid except for the public works contractor</td>
</tr>
<tr>
<td></td>
<td>registration number</td>
</tr>
<tr>
<td>Copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number</td>
<td>10 days after bid opening</td>
</tr>
<tr>
<td>Subcontractor List</td>
<td>Time of bid except for the public works contractor</td>
</tr>
<tr>
<td></td>
<td>registration number</td>
</tr>
<tr>
<td>Copy of the Subcontractor List as submitted at the time of bid with the public works contractor registration number</td>
<td>10 days after bid opening</td>
</tr>
<tr>
<td>Small Business Status</td>
<td>Time of bid</td>
</tr>
<tr>
<td>Opt Out of Payment Adjustments for Price Index Fluctuations(^a)</td>
<td>Time of bid</td>
</tr>
<tr>
<td>DBE Commitment</td>
<td>No later than 4 p.m. on the 4th business day after bid opening</td>
</tr>
<tr>
<td>DBE Confirmation</td>
<td>No later than 4 p.m. on the 4th business day after bid opening</td>
</tr>
<tr>
<td>DBE Good Faith Efforts Documentation</td>
<td>No later than 4 p.m. on the 4th business day after bid opening</td>
</tr>
</tbody>
</table>

\(^a\)Submit only if you choose the option.

2-1.33D(2)(c) Contracts without a DBE Goal
Reserved

2-1.33D(2)(d)–2-1.33D(2)(h) Reserved

2-1.33D(3) Non-Federal-Aid Contracts

2-1.33D(3)(a) General
Section 2-1.33D(3) applies to non-federal-aid contracts.

2-1.33D(3)(b) Contracts with a DVBE Goal
Section 2-1.33D(3)(b) applies if a DVBE goal is shown on the Notice to Bidders.
Submit the bid forms according to the schedule shown in the following table:

### Bid Form Submittal Schedule for a Non-Federal-Aid Contract with a DVBE Goal

<table>
<thead>
<tr>
<th>Form</th>
<th>Submittal deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bid to the Department of Transportation</td>
<td>Time of bid except for the public works contractor registration number for a joint-venture contract</td>
</tr>
<tr>
<td>For a joint-venture contract, copy of the Bid to the Department of Transportation as submitted at the time of bid with the public works contractor registration number</td>
<td>10 days after bid opening</td>
</tr>
<tr>
<td>Subcontractor List</td>
<td>Time of bid</td>
</tr>
<tr>
<td>Opt Out of Payment Adjustments for Price Index Fluctuations&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Time of bid</td>
</tr>
<tr>
<td>Certified DVBE Summary</td>
<td>No later than 4 p.m. on the 4th business day after bid opening</td>
</tr>
<tr>
<td>California Company Preference</td>
<td>Time of bid</td>
</tr>
<tr>
<td>Request for Small Business Preference or Non–Small Business Preference&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Time of bid</td>
</tr>
<tr>
<td>Certified Small Business Listing for the Non–Small Business Preference&lt;sup&gt;a&lt;/sup&gt;</td>
<td>No later than 4 p.m. on the 2nd business day after bid opening</td>
</tr>
</tbody>
</table>

<sup>a</sup>Submit only if you choose the option or preference.

### 2-1.33D(3)(c) Contracts without a DVBE Goal

Reserved

### 2-1.33D(3)(d)–2-1.33D(3)(h) Reserved

### 2-1.33D(4)–2-1.33D(9) Reserved

### 2-1.34 BIDDER'S SECURITY

Submit one of the following forms of bidder’s security equal to at least 10 percent of the bid:

1. Cash
2. Cashier’s check
3. Certified check
4. Signed bidder’s bond by an admitted surety insurer
5. For an electronic bid, electronic bidder’s bond by an admitted surety insurer submitted using an electronic registry service approved by the Department.

Submit cash, cashier’s check, certified check, or bidder’s bond to the Department at the Bidders Exchange before the bid opening time.

Submit electronic bidder’s bond with the electronic bid.

If using a bidder's bond, you may use the form in the Bid book. If you do not use the form in the Bid book, use a form containing the same information.

### 2-1.35–2-1.39 RESERVED

### 2-1.40 BID WITHDRAWAL

For a paper bid:

1. An authorized agent may withdraw a bid before the bid opening date and time by submitting a written bid withdrawal request at the location where the bid was submitted. Withdrawing a bid does not prevent you from submitting a new bid.
2. After the bid opening time, you cannot withdraw a bid.

For an electronic bid:
1. Bids are not filed with the Department until the date and time of bid opening.
2. A bidder may withdraw or revise a bid after it has been submitted to the electronic bidding service if this is done before the bid opening date and time.

2-1.43 BID OPENING
The Department publicly opens and reads bids at the time and place shown on the Notice to Bidders.

2-1.44–2-1.45 RESERVED

2-1.46 DEPARTMENT'S DECISION ON BID
The Department's decision on the bid amount is final.

The Department may reject:
1. All bids
2. A nonresponsive bid

2-1.47 BID RELIEF
The Department may grant bid relief under Pub Cont Code § 5100 et seq. Submit any request for bid relief to the Office Engineer. The Relief of Bid Request form is available at the Department's website.

2-1.48 RESERVED

2-1.49 SUBMITTAL FAILURE HISTORY
The Department considers a bidder's past failure to submit documents required after bid opening in determining a bidder's responsibility.

2-1.50 BID RIGGING
Section 2-1.50 applies to a federal-aid contract.

The U.S. Department of Transportation (DOT) provides a toll-free hotline to report bid rigging activities. Use the hotline to report bid rigging, bidder collusion, and other fraudulent activities. The hotline number is (800) 424-9071. The service is available 24 hours 7 days a week and is confidential and anonymous. The hotline is part of the DOT's effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General.

3 CONTRACT AWARD AND EXECUTION

3-1.02 CONSIDERATION OF BIDS
Replace section 3-1.02 with:

3-1.02A General
For a lump sum based bid, the Department compares bids based on the total price.

For a unit price based bid, the Department compares bids based on the sum of the item totals.

For a cost plus time based bid, the Department compares bids based on the sum of the item totals and the total bid for time.

3-1.02B Tied Bids
The Department breaks a tied bid with a coin toss except:
1. If a small business bidder and a non–small business bidder request preferences and the reductions result in a tied bid, the Department awards the contract to the small business bidder.
2. If a DVBE small business bidder and a non-DVBE small business bidder request preferences and the reduction results in a tied bid, the Department awards the contract to the DVBE small business bidder.

Replace section 3-1.03 with:

3-1.03 CONTRACTOR REGISTRATION
No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

Add to the end of section 3-1.04:

You may request to extend the award period by faxing a request to (916) 227-6282 before 4:00 p.m. on the last day of the award period. If you do not make this request, after the specified award period:
1. Your bid becomes invalid
2. You are not eligible for the award of the contract

Replace the paragraph in section 3-1.11 with:

Complete and deliver to the Office Engineer a Payee Data Record when requested by the Department.

Replace section 3-1.12 with:

3-1.12 RESERVED

Replace section 3-1.13 with:

3-1.13 FORM FHWA-1273
For a federal-aid contract, form FHWA-1273 is included with the Contract form in the documents sent to the successful bidder for execution. Comply with its provisions. Interpret the training and promotion section as specified in section 7-1.11A.

Add to item 1 in the list in the 2nd paragraph of section 3-1.18:
, including the attached form FHWA-1273

Delete item 4 of the 2nd paragraph of section 3-1.18.

Delete items 4 and 6 of the 2nd paragraph of section 3-1.18.

Delete the 3rd paragraph of section 3-1.18.
Replace "For all other contracts, the" in the 4th paragraph of section 3-1.18 with:

02-27-15

The

Replace "at least 2 representatives" in the 5th paragraph of section 5-1.09C with:

field supervisory personnel

10-19-12

Replace the 8th paragraph of section 5-1.13A with:

04-24-15

Each subcontractor must have an active and valid:
1. State contractor license with a classification appropriate for the work to be performed (Bus & Prof Code § 7000 et seq.)
2. Public works contractor registration number with the Department of Industrial Relations

Replace section 5-1.13B with:

01-23-15

5-1.13B Disadvantaged Business Enterprises
5-1.13B(1) General
Section 5-1.13B applies to a federal-aid contract.
Use each DBE as listed on the DBE Commitment form unless you receive authorization for a substitution. Ensure that all subcontracts and agreements with DBEs to supply labor or materials are performed under 49 CFR 26.

Maintain records, including:

1. Name and business address of each 1st-tier subcontractor
2. Name and business address of each DBE subcontractor, DBE vendor, and DBE trucking company, regardless of tier
3. Date of payment and total amount paid to each business

If you are a DBE contractor, include the date of work performed by your own forces and the corresponding value of the work.

Before the 15th day of each month for the previous month's work, submit:
1. Monthly DBE Trucking Verification form
2. Monthly DBE Payment form

If a DBE is decertified before completing its work, the DBE must notify you in writing of the decertification date. If a business becomes a certified DBE before completing its work, the business must notify you in writing of the certification date. Submit the notifications. Upon work completion, complete a Disadvantaged Business Enterprises (DBE) Certification Status Change form. Submit the form within 30 days of Contract acceptance.

Upon work completion, complete a Final Report – Utilization of Disadvantaged Business Enterprises (DBE), First-Tier Subcontractors form. Submit it within 30 days of Contract acceptance. The Department withholds $10,000 until the form is submitted. The Department releases the withhold upon submission of the completed form.

5-1.13B(2) Performance of Disadvantaged Business Enterprises
Section 5-1.13(B)(2) applies if a DBE goal is shown on the Notice to Bidders.

DBEs must perform work or supply materials as listed on the DBE Commitment form.

Do not terminate or substitute a listed DBE for convenience and perform the work with your own forces or those of an affiliate, a non-DBE firm, or another DBE firm or obtain materials from other sources without authorization from the Department.

The Department authorizes a request to use other forces or sources of materials if it shows any of the following justifications:

1. Listed DBE fails or refuses to execute a written contract based on the plans and specifications for the project.
2. You stipulated that a bond is a condition of executing the subcontract and the listed DBE fails to meet your bond requirements.
3. Work requires a contractor license and the listed DBE does not have a valid license under the Contractors License Law.
4. Listed DBE fails or refuses to perform the work or furnish the listed materials.
5. Listed DBE’s work is unsatisfactory and not in compliance with the Contract.
6. Listed DBE is ineligible to work on the project because of suspension or debarment.
7. Listed DBE becomes bankrupt or insolvent.
8. Listed DBE voluntarily withdraws with written notice from the Contract.
9. Listed DBE is ineligible to receive credit for the type of work required.
10. Listed DBE owner dies or becomes disabled resulting in the inability to perform the work on the Contract.

Notify the original DBE of your intent to use other forces or material sources and provide the reasons. Provide the DBE with 5 business days to respond to your notice and advise you and the Department of
the reasons why the use of other forces or sources of materials should not occur. Your request to use other forces or material sources must include:

1. 1 or more of the reasons listed in the preceding paragraph
2. Notices from you to the DBE regarding the request
3. Notices from the DBE to you regarding the request

If the Department authorizes the termination or substitution of a listed DBE, make good faith efforts to find another DBE. The substitute DBE must (1) perform at least the same dollar amount of work as the original DBE under the Contract to the extent needed to meet the DBE goal and (2) be certified as a DBE with the work code applicable to the type of work the DBE will perform on the Contract at the time of your request for substitution. Submit your documentation of good faith efforts within 7 days of your request for authorization of the substitution. The Department may authorize a 7-day extension of this submittal period at your request. Refer to 49 CFR 26 app A for guidance regarding evaluation of good faith efforts to meet the DBE goal.

Unless the Department authorizes a request to terminate or substitute a listed DBE, the Department does not pay for work unless it is performed or supplied by the DBE listed on the DBE Commitment form. You may be subject to other sanctions under 49 CFR 26.

Replace the paragraphs of section 5-1.13C with:

Section 5-1.13C applies to a non-federal-aid contract.

Use each DVBE as shown on the Certified DVBE Summary form unless you receive authorization from the Department for a substitution. The substitute must be another DVBE unless DVBEs are not available, in which case, you must substitute with a small business. Any authorization for a substitute is contingent upon the Department of General Services’ approval of the substitute.

The requirement that DVBEs be certified by the bid opening date does not apply to DVBE substitutions after Contract award.

The Department authorizes substitutions for any of the reasons provided in 2 CA Code of Regs § 1896.73.

Include in your substitution request:

1. Copy of the written notice issued to the DVBE with proof of delivery
2. Copy of the DVBE’s response to the notice
3. Name and certification number of the listed DVBE and the proposed substitute

Requests for substitutions of a listed DVBE with a small business must include documentation of the unavailability of DVBEs, including:

1. Contact with the small business/DVBE advocate from the Department and the Department of Veterans Affairs
2. Search results from the Department of General Services’ website of available DVBEs
3. Communication with a DVBE community organization nearest the job site, if applicable
4. Documented communication with the DVBE and small businesses describing the work to be performed, the percentage of the total bid, the corresponding dollar amount, and the responses to the communication

The Department forwards your substitution request to the Department of General Services. The Department of General Services issues a notice of approval or denial. The Department provides you this notice.

If you fail to use a listed DVBE without an authorized substitution request, the Department issues a penalty of up to 10 percent of the dollar amount of the work of the listed DVBE.
Maintain records of subcontracts made with DVBEs. Include in the records:

1. Name and business address of each business
2. Total amount paid to each business

For the purpose of determining compliance with Pub Cont Code § 10115 et seq.:

2. Upon reasonable notice and during normal business hours, permit access to its premises for the purposes of:
   2.1. Interviewing employees.
   2.2. Inspecting and copying books, records, accounts and other material that may be relevant to a matter under investigation.

Replace "Reserved" in section 5-1.20C with:

If the Contract includes an agreement with a railroad company, the Department makes the provisions of the agreement available in the *Information Handout* in the document titled “Railroad Relations and Insurance Requirements.” Comply with the requirements in the document.

Replace section 5-1.20E with:

5-1.20E Water Meter Charges

Section 5-1.20E applies if a bid item for water meter charges is shown on the Bid Item List. The charges are specified in a special provision for section 5-1.20E.

The local water authority will install the water meters.

The charges by the local water authority include:

1. Furnishing and installing each water meter
2. Connecting to the local water authority's main water line, including any required hot tap or tee
3. Furnishing and installing an extension pipe from the main water line to the water meter
4. Sterilizing the extension pipe

Make arrangements and pay the charges for the installation of the water meters.

If a charge is changed at the time of installation, the Department adjusts the lump sum price based on the difference between the specified charges and the changed charges.

Replace section 5-1.20F with:

5-1.20F Irrigation Water Service Charges

Reserved

Add between the 2nd and 3rd paragraphs of section 5-1.23A:

Submit action and informational submittals to the Engineer.
Add between the 5th and 6th paragraphs of section 5-1.23B(1):
For a revised submittal, allow the same number of days for review as for the original submittal.

Delete the 1st sentence in the 10th paragraph of section 5-1.23B(2).

Add to the list in the 1st paragraph of section 5-1.36A:
10. Survey monuments

Add to section 5-1.36C:
If the Contract does not include an agreement with a railroad company, do not allow personnel or equipment on railroad property.
Prevent material, equipment, and debris from falling onto railroad property.

Add to section 5-1.36:

5-1.36E Survey Monuments
Protect survey monuments on and off the highway. Upon discovery of a survey monument not identified and located immediately:
1. Stop work near the monument
2. Notify the Engineer
Do not resume work near the monument until authorized.

Add between the 1st and 2nd paragraphs of section 5-1.37A:
Do not remove any padlock used to secure a portion of the work until the Engineer is present to replace it. Notify the Engineer at least 3 days before removing the lock.

Replace the 1st sentence of the 1st paragraph of section 5-1.39C(2) with:
Section 5-1.39C(2) applies if a plant establishment period of 3 years or more is shown on the Notice to Bidders.

Replace "working days" in the 1st paragraph of section 5-1.43E(1)(a) with:
original working days

Replace "settled" in the last paragraph of section 5-1.43E(1)(d) with:
resolved
Replace items 3.1 and 3.2 in the list in the paragraph of section 5-1.43E(3)(b) with:

3.1. One-time objection to the other's candidate without stating a reason
3.2. Objection to any of the other's subsequent candidates based on a specific breach of the candidate's responsibilities or qualifications under items 1 and 2 above

Replace section 6-2.05C with:

6-2.05C Steel and Iron Materials
Steel and iron materials must be melted and manufactured in the United States except:

1. Foreign pig iron and processed, pelletized, and reduced iron ore may be used in the domestic production of the steel and iron materials
2. If the total combined cost of the materials does not exceed the greater of 0.1 percent of the total bid or $2,500, materials produced outside the United States may be used if authorized

Furnish steel and iron materials to be incorporated into the work with certificates of compliance and certified mill test reports. Mill test reports must indicate where the steel and iron were melted and manufactured.

All melting and manufacturing processes for these materials, including an application of a coating, must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied.

Replace "Precast concrete members specified section 11-2” in the table in section 6-3.05B with:

Precast concrete members specified as tier 1 or tier 2 in section 90-4.01D(1)

Replace "§§ 1727 and 1770–1815” in the 1st sentence of the 1st paragraph of section 7-1.02K(1) with:

§ 1720 et seq.

Replace ""$50” in the 1st sentence in the 6th paragraph of section 7-1.02K(2) with:

$200

Replace "$25” in the 2nd sentence in the 13th paragraph of section 7-1.02K(3) with:

$100
Delete "water or" in the 9th paragraph of section 7-1.03.

Replace "20 days" in the 14th paragraph of section 7-1.04 with:

25 days

Replace "90 days" in the 14th paragraph of section 7-1.04 with:

125 days

Add between the 18th and 19th paragraphs of section 7-1.04:

Temporary facilities that could be a hazard to public safety if improperly designed must comply with design requirements described in the Contract for those facilities or, if none are described, with standard design criteria or codes appropriate for the facility involved. Submit shop drawings and design calculations for the temporary facilities and show the standard design criteria or codes used. Shop drawings and supplemental calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

Replace the 2nd paragraph of section 7-1.11A with:

A copy of form FHWA-1273 is included in section 7-1.11B. The training and promotion section of section II refers to training provisions as if they were included in the special provisions. The Department specifies the provisions in section 7-1.11D of the Standard Specifications. If a number of trainees or apprentices is required, the Department shows the number on the Notice to Bidders. Interpret each FHWA-1273 clause shown in the following table as having the same meaning as the corresponding Department clause:

<table>
<thead>
<tr>
<th>FHWA-1273 section</th>
<th>FHWA-1273 clause</th>
<th>Department clause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training and Promotion</td>
<td>In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.</td>
<td>If section 7-1.11D applies, section 7-1.11D supersedes this subparagraph.</td>
</tr>
<tr>
<td>Records and Reports</td>
<td>If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.</td>
<td>If the Contract requires on-the-job training, collect and report training data.</td>
</tr>
</tbody>
</table>

Replace the form in section 7-1.11B with:
REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 220, and 633.

The contractor and all subcontractors must comply with the requirements of the Equal Employment Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 220, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under
this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to assure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are
with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontracts, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

b. The contractor shall use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements shall be a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board at any time period preceding the end of the project. On-the-job training is being required by special provision, the contractor

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applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this paragraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

b. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualified minorities and women. Failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar
of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein. Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conforming under paragraph 1.b. of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. (1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendations of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or
will notify the contracting officer within the 30-day period that additional time is necessary.

4. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program. Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof) of the types described in section 1(b)(2)(B) of the Davis-Bacon Act, daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-

DIVISION 2 – CIVIL SPECIFICATIONS

DIVISION 2.2 SEGMENT A – CALTRANS SPECIFICATIONS

Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b. (1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. The Payroll Audit Form WH-347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347Instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency.

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5(a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5(a)(3)(ii) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

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(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the “Statement of Compliance” required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire workforce under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeymen’s hourly rate) specified in the contractor’s or subcontractor’s registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice’s level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination.

Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee’s level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeymen wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.
d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor and the prime contractor or any of its subcontractors and the contending agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor’s firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(6) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(6) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).


V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.8. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or any territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contracting agency shall immediately upon written notice or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.
VISUALLY SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor’s own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. “Specialty Items” shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices, and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project.

18 U.S.C. 1020 reads as follows:

OCTOBER 2015
"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation, or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation, or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented,

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 308 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1. Instructions for Certification – First Tier Participants:
   a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.
   b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish certification or an explanation shall disqualify such a person from participation in this transaction.

   c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. It is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default.

   d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

   e. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “participant,” “person,” “principal,” and “voluntarily excluded,” as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subrecipient of Federal funds and a participant (such as the prime or general contractor). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

   f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

   g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions,” provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

   h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, declared ineligible, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epis.gov/), which is compiled by the General Services Administration.
i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

- - - - -

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency;

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

2. Instructions for Certification - Lower Tier Participants:

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "proposed for debarment," "suspended," "ineligible," "debarred," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the entity or general contractor). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers to any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Participant Certification," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not debarred, suspended, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epis.gov), which is compiled by the General Services Administration.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the
department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion—Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.
8 PROSECUTION AND PROGRESS

10-19-12

Replace "working days" in the 1st paragraph of section 8-1.02B(1) with:

original working days

Replace "working days" at each occurrence in the 1st paragraph of section 8-1.02C(1) with:

original working days

Delete the 4th paragraph of section 8-1.02C(1).

Replace "Contract" in the 9th paragraph of section 8-1.02C(1) with:

work

Replace the 1st paragraph of section 8-1.02C(3)(a) with:

Submit a description of your proposed schedule software for authorization.

Delete the last paragraph of section 8-1.02C(3)(a).

Replace section 8-1.02C(3)(b) with:

8-1.02C(3)(b) Reserved

Delete the 3rd paragraph of section 8-1.02C(5).

Replace "Contract" in the last paragraph of section 8-1.02C(5) with:

original

Replace "working days" in the 1st paragraph of section 8-1.02D(1) with:

original working days

Replace "8-1.02D(1)" in the 2nd paragraph of section 8-1.02D(1) with:

8-1.02C(1)
Replace "Contract" in the 3rd paragraph of section 8-1.02D(2) with:

work

10-19-12

Replace "Contract" in item 9 in the list in the 4th paragraph of section 8-1.02D(4) with:

work

10-19-12

Replace "Contract completion" in the 4th paragraph of section 8-1.02D(6) with:

work completion

10-19-12

Replace "Contract working days" in the 4th paragraph of section 8-1.02D(6) with:

original working days

10-19-12

Delete items 1.3 and 1.4 in the list in the 1st paragraph of section 8-1.02D(10).

04-20-12

Delete "unless the Contract is suspended for reasons unrelated to your performance" in the 4th paragraph of section 8-1.05.

10-19-12

Replace the last paragraph of section 8-1.04B with:

The Department does not adjust time for starting before receiving notice of Contract approval.

10-19-12

Replace the 1st paragraph of section 8-1.05 with:

Contract time starts on the last day specified to start job site activities in section 8-1.04 or on the day you start job site activities, whichever occurs first.

10-19-12

Replace the 2nd paragraph of section 8-1.05 with:

Complete the work within the Contract time.

10-19-12

Delete "unless the Contract is suspended for reasons unrelated to your performance" in the 4th paragraph of section 8-1.05.

10-19-12

Replace the headings and paragraphs in section 8-1.06 with:

The Engineer may suspend work wholly or in part due to conditions unsuitable for work progress. Provide for public safety and a smooth and unobstructed passageway through the work zone during the suspension as specified under sections 7-1.03 and 7-1.04. Providing the passageway is force account work. The Department makes a time adjustment for the suspension due to a critical delay.

The Engineer may suspend work wholly or in part due to your failure to (1) fulfill the Engineer's orders, (2) fulfill a Contract part, or (3) perform weather-dependent work when conditions are favorable so that weather-related unsuitable conditions are avoided or do not occur. The Department may provide for a
smooth and unobstructed passageway through the work during the suspension and deduct the cost from payments. The Department does not make a time adjustment for the suspension.

Upon the Engineer’s order of suspension, suspend work immediately. Resume work when ordered.

Replace the 1st sentence in the 1st paragraph of section 8-1.07B with:

For a critical delay, the Department may make a time adjustment.

Add to the end of section 8-1.07C:

The Department does not make a payment adjustment for overhead incurred during non–working days that extend the Contract into an additional construction season.

Replace the 1st paragraph of section 8-1.07C with:

For an excusable delay that affects your costs, the Department may make a payment adjustment.

Replace "8-1.08B and 8-1.08C" in the 1st paragraph of section 8-1.10A with:

8-1.10B and 8-1.10C

Replace section 8-1.10D with:

8-1.10D Reserved

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

9 PAYMENT

Add to the list in the 1st paragraph of section 9-1.03:

3. Any royalties and costs arising from patents, trademarks, and copyrights involved in the work

Replace item 1 in the 3rd paragraph of section 9-1.03 with:

1. Full compensation for all work involved in each bid item shown on the Bid Item List by the unit of measure shown for that bid item

Replace "10" in the last paragraph of section 9-1.03 with:
Replace "in" in the 3rd paragraph of section 9-1.04A with:

for

Add to the end of section 9-1.04A:

For nonsubcontracted work paid by force account for a contract with a TRO bid item, the markups are those shown in the following table instead of those specified in sections 9-1.04B–D:

<table>
<thead>
<tr>
<th>Cost</th>
<th>Percent markup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor</td>
<td>30</td>
</tr>
<tr>
<td>Materials</td>
<td>10</td>
</tr>
<tr>
<td>Equipment rental</td>
<td>10</td>
</tr>
</tbody>
</table>

Replace the heading and the 1st paragraph of section 9-1.04D(3) with:

9-1.04D(3) Equipment Not On the Job Site and Not Required for Original Contract Work

For equipment not on the job site at the time required to perform work paid by force account and not required for original Contract work, the time paid is the time the equipment is operated to perform work paid by force account and the time to return the equipment to its source when the work paid by force account is completed.

Replace item 2 in the 3rd paragraph of section 9-1.04D(3) with:

2. Operated less than 4 hours is paid as 1/2 day

Replace section 9-1.04D(4) with:

9-1.04D(4) Equipment Not On the Job Site and Required for Original Contract Work

For equipment not on the job site at the time required to perform work paid by force account and required for original Contract work, the time paid is the time:

1. To move the equipment to the location of work paid by force account plus an equal amount of time to move the equipment to a location on the job site or its source when the work paid by force account is completed
2. Equipment is operated to perform work paid by force account

Delete ", Huntington Beach," in the 3rd paragraph of section 9-1.07A.

Replace the formula in section 9-1.07B(2) with:

\[ Qh = HMATT \times Xa \]

Replace "weight of dry aggregate" in the definition of the variable \( Xa \) in section 9-1.07B(2) with:

total weight of HMA
Replace the formula in section 9-1.07B(3) with:

\[ Q_{rh} = R_{HMATT} \times 0.80 \times X_{arb} \]

Replace "weight of dry aggregate" in the definition of the variable \( X_{arb} \) in section 9-1.07B(3) with:

total weight of rubberized HMA

Replace the heading of section 9-1.07B(4) with:

Hot Mix Asphalt with Modified Asphalt Binder

Add between "in" and "modified" in the introductory clause of section 9-1.07B(4):

HMA with

Replace the formula in section 9-1.07B(4) with:

\[ Q_{mh} = M_{HMATT} \times [(100 - X_{am}) / 100] \times X_{mab} \]

Replace "weight of dry aggregate" in the definition of the variable \( X_{mab} \) in section 9-1.07B(4) with:

total weight of HMA

Replace the formula in section 9-1.07B(5) with:

\[ Q_{rap} = H_{HMATT} \times X_{aa} \]

Replace "weight of dry aggregate" in the definitions of the variables \( X_{aa} \) and \( X_{ta} \) in section 9-1.07B(5) with:

total weight of HMA

Add after the variable definitions in section 9-1.07B(9):

The quantity of extender oil is included in the quantity of asphalt.

Replace the headings and paragraphs in section 9-1.11 with:

9-1.11A General

Section 9-1.11 applies if a bid item for time-related overhead is included in the Contract. If a bid item for time-related overhead is included, you must exclude the time-related overhead from every other bid item price.
9-1.11B Payment Quantity

The TRO quantity does not include the number of working days to complete plant establishment work.

For a contract with a TRO lump sum quantity on the Bid Item List, the Department pays you based on the following conversions:

1. LS unit of measure is replaced with WDAY
2. Lump sum quantity is replaced with the number of working days bid
3. Lump sum unit price is replaced with the item total divided by the number of working days bid

9-1.11C Payment Inclusions

Payment for the TRO bid item includes payment for time-related field- and home-office overhead for the time required to complete the work.

The field office overhead includes time-related expenses associated with the normal and recurring construction activities not directly attributed to the work, including:

1. Salaries, benefits, and equipment costs of:
   1.1. Project managers
   1.2. General superintendents
   1.3. Field office managers
   1.4. Field office staff assigned to the project
2. Rent
3. Utilities
4. Maintenance
5. Security
6. Supplies
7. Office equipment costs for the project's field office

The home-office overhead includes the fixed general and administrative expenses for operating your business, including:

1. General administration
2. Insurance
3. Personnel and subcontract administration
4. Purchasing
5. Accounting
6. Project engineering and estimating

Payment for the TRO bid item does not include payment for:

1. The home-office overhead expenses specifically related to:
   1.1. Your other contracts or other businesses
   1.2. Equipment coordination
   1.3. Material deliveries
   1.4. Consultant and legal fees
2. Non-time-related costs and expenses such as mobilization, licenses, permits, and other charges incurred once during the Contract
3. Additional overhead involved in incentive/disincentive provisions to satisfy an internal milestone or multiple calendar requirements
4. Additional overhead involved in performing additional work that is not a controlling activity
5. Overhead costs incurred by your subcontractors of any tier or suppliers

9-1.11D Payment Schedule

For progress payments, the total work completed for the TRO bid item is the number of working days shown for the pay period on the Weekly Statement of Working Days.

For progress payments, the Department pays a unit price equal to the lesser of the following amounts:
1. Price per working day as bid or as converted under section 9-1.11B.
2. 20 percent of the total bid divided by the number of original working days

For a contract without plant establishment work, the Department pays you the balance due of the TRO item total as specified in section 9-1.17B.

For a contract with plant establishment work, the Department pays you the balance due of the TRO item total in the 1st progress payment after all non–plant establishment work is completed.

**9-1.11E Payment Adjustments**

The 3rd paragraph of section 9-1.17C does not apply.

The Department does not adjust the unit price for an increase or decrease in the TRO quantity except as specified in section 9-1.11E.

Section 9-1.17D(2)(b) does not apply except as specified for the audit report below.

If the TRO bid item quantity exceeds 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B, the Engineer may adjust or you may request an adjustment of the unit price for the excess quantity. For the adjustment, submit an audit report within 60 days of the Engineer's request. The report must be prepared as specified for an audit report for an overhead claim in section 9-1.17D(2)(b).

Within 20 days of the Engineer's request, make your financial records available for an audit by the State for the purpose of verifying the actual rate of TRO described in your audit. The actual rate of TRO described is subject to the Engineer's authorization.

The Department pays the authorized actual rate for TRO in excess of 149 percent of the quantity shown on the Bid Item List or as converted under section 9-1.11B.

The Department pays for 1/2 the cost of the report; the Contractor pays for the other 1/2. The cost is determined under section 9-1.05.

**Replace the paragraphs of section 9-1.16D with:**

**9-1.16D(1) General**

Section 9-1.16D applies if a bid item for mobilization is shown on the Bid Item List.

Payments for mobilization made under section 9-1.16D are in addition to the partial payments made under Pub Cont Code § 10261.

Section 9-1.16D(2) applies unless the Contract includes a special provision for section 9-1.16D(1) that specifies section 9-1.16D(3) applies.

**9-1.16D(2) Mobilization for Projects Except for Those Over Water Requiring Marine Access**

The Department makes partial payments for mobilization under Pub Cont Code § 10264(a) except the amount of work completed does not include the amount earned for mobilization. The partial payment amount is reduced by a prorated amount bid in excess of the maximum allowed under Pub Cont Code § 10264(a)(5).

The Department pays the item total for mobilization in excess of the maximum allowed under Pub Cont Code § 10264(a)(5) in the 1st payment after Contract acceptance.

**9-1.16D(3) Mobilization for Projects Over Water Requiring Marine Access**

The Department makes partial payments for mobilization under Pub Cont Code § 10264(b) except the amount of work completed does not include the amount earned for mobilization. The partial payment
amount is reduced by a prorated amount bid in excess of the maximum allowed under Pub Cont Code § 10264(b)(6).

The Department pays the item total for mobilization in excess of the maximum allowed under Pub Cont Code § 10264(b)(6) in the 1st payment after Contract acceptance.

Delete "revised Contract" in item 1 of the 1st paragraph of section 9-1.16E(2).

Replace "3179" in the 1st paragraph of section 9-1.16E(4) with:

9000

Replace "2014" in the 1st paragraph of section 9-1.16F with:

2020

Replace the 2nd paragraph of section 9-1.17C with:

Submit either a written acceptance of the proposed final estimate or a claim statement postmarked or hand delivered before the 31st day after receiving the proposed final estimate.

Add between "the" and "final estimate" in the 1st sentence in the 3rd paragraph of section 9-1.17C:

proposed

Replace the 1st sentence in the 6th paragraph of section 9-1.17D(2)(b) with:

The CPA’s audit must be performed as an examination-level engagement under the attestation engagements in the Government Auditing Standards published by the Comptroller General of the United States.

DIVISION II GENERAL CONSTRUCTION
10 GENERAL

Replace the headings and paragraphs in section 10 with:

10-1 GENERAL

Section 10 includes general specifications for general construction work.

10-1.02 WORK SEQUENCING

Before obliterating any traffic stripes, pavement markings, and pavement markers to be replaced at the same location, reference the stripes, markings, and markers. Include limits and transitions with control points to reestablish the new stripes, markings, and markers.
10-1.03 TIME CONSTRAINTS
Reserved

10-1.04 TRAINING AND MEETINGS
Training and meetings are held at times and locations you and the Engineer agree to.

10-1.05–10-1.10 RESERVED

10-2 SUSTAINABLE DESIGN REQUIREMENTS

10-2.01 GENERAL
10-2.01A General
Reserved
10-2.01B–10-2.01H Reserved
10-2.02 CALGREEN TIER 1
10-2.02A–10-2.02H Reserved
10-2.03 LEED
10-2.03A–10-2.03H Reserved

10-3 RESERVED

Replace section 10-4 with:

10-4 WATER USAGE
Section 10-4 includes general specifications for your use of water for construction activities.

The Department encourages you to conserve water in all construction activities.

The Engineer notifies you of any (1) water shortage or (2) mandate from a local water authority to ration water. Within 10 days of the notification, submit a water conservation plan. The plan must include:

1. List of construction activities that require water
2. Measures you will implement for each activity to conserve water
3. Method for curing concrete other than the water method if included in the work
4. Dust palliative you will use for dust control

Any unavailability of water that delays a controlling activity is a material shortage.

Replace section 10-5 with:

10-5 DUST CONTROL
Section 10-5 includes general specifications for controlling dust resulting from the work.

Prevent and alleviate dust by:

1. Applying a dust palliative under section 18
2. Applying temporary soil stabilization under section 13-5
3. Managing material stockpiles under section 13-4.03C(3)

10-6 JOB SITE WATER CONTROL

10-6.01 GENERAL
Section 10-6 includes specifications for controlling water to provide a dry working area at the job site.

OCTOBER 2015
### 11 QUALITY CONTROL AND ASSURANCE

**07-19-13**

**Replace section 11-2 with:**

11-2 RESERVED

**07-19-13**

**Replace the table in the 3rd paragraph of section 11-3.01A with:**

<table>
<thead>
<tr>
<th>AWS code</th>
<th>Year of adoption</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1.1</td>
<td>2010</td>
</tr>
<tr>
<td>D1.3</td>
<td>2008</td>
</tr>
<tr>
<td>D1.4</td>
<td>2011</td>
</tr>
<tr>
<td>D1.5</td>
<td>2010</td>
</tr>
<tr>
<td>D1.6</td>
<td>2007</td>
</tr>
<tr>
<td>D1.8</td>
<td>2009</td>
</tr>
</tbody>
</table>

**07-19-13**

**Replace "does" in the definition of "continuous inspection" in section 11-3.01B with:**

**do**

**07-19-13**

**Replace "gross nonconformance" and its definition in section 11-3.01B with:**

**gross nonconformance:** Rejectable indications are present in more than 20 percent of the tested weld length.

**07-19-13**

**Replace the introductory clause in the 1st paragraph of section 11-3.01C with:**

Replace clause 6.1.3 of AWS D1.1, the 1st paragraph of clause 7.1.2 of AWS D1.4, and clause 6.1.2 of AWS D1.5 with:

**07-19-13**

**Replace the 3rd paragraph of section 11-3.01C with:**

For each inspection, including fit-up, WPS verification, and final weld inspection, the QC Inspector must confirm and document compliance with the specifications, AWS welding codes, and any referenced drawings.

**07-19-13**

**OCTOBER 2015**
Replace the paragraphs in section 11-3.01D with:

The Engineer has the authority to verify the qualifications or certifications of any welder, QC Inspector, or NDT personnel to specified levels by retests or other means determined by the Engineer. If welding will be performed without gas shielding, then qualification must also include welding without gas shielding.

Replace clause 6.14.6.1 of AWS D1.1, clause 7.8 of AWS D1.4, and clause 6.1.3.4 of AWS D1.5 with:

Personnel performing NDT must be qualified and certified under American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the written practice of the NDT firm. The written practice of the NDT firm must comply with or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Individuals who perform NDT, review the results, and prepare the written reports must be one of the following:

1. Certified NDT Level II technicians
2. Level III technicians certified to perform the work of Level II technicians

Replace the heading and the 1st through 3rd paragraphs of section 11-3.01E with:

11-3.01E Weld Joint Details

If weld joint details proposed for use in the work are not prequalified under clause 3 of AWS D1.1 or figure 2.4 or 2.5 of AWS D1.5, submit the proposed WPS and the intended weld joint locations.

Upon authorization of the proposed joint detail locations and qualification of the proposed joint details, welders and welding operators using these details must weld an additional qualification test plate using the WPS variables and the weld joint detail to be used in production. The test plate must:

1. Have the maximum thickness to be used in production and a minimum length of 18 inches.
2. Be mechanically and radiographically tested. Mechanical and radiographic testing and acceptance criteria must comply with the applicable AWS codes.

If a nonprequalified weld joint configuration is proposed using a combination of WPSs for work welded under AWS D1.1, you may conduct a single test combining the WPSs to be used in production, if the essential variables, including weld bead placement, of each process are limited to those established in table 4.5 of AWS D1.1.

Replace the 1st paragraph of section 11-3.01F with:

Replace paragraph 3 of clause 6.26.3.2 of AWS D1.5 with:

3. If indications that exhibit these planar characteristics are present at scanning sensitivity, or other evidence exists to suggest the presence of transverse cracks, a more detailed evaluation of the discontinuity by other means must be performed (e.g., alternate UT techniques, RT, grinding, or gouging for visual inspection or MT of the excavated areas.). For welds that have transverse cracks, excavate the full length of the crack plus 2 inches of weld metal on each side adjacent to the crack and reweld.

Replace "section" in the 2nd paragraph of section 11-3.01F with:

clause
Replace the 1st paragraph of section 11-3.02A with:

Except for stud welding, section 11-3.02 applies to (1) work welded under sections 49, 52, 55, and 75-1.03E and (2) work in section 99 that must comply with an AWS welding code.

Replace the 4th through 6th paragraphs of section 11-3.02C(2) with:

Submit an amended welding QC plan or an addendum to the welding QC plan for any changes to:

1. WPSs
2. NDT firms
3. QC personnel or procedures
4. NDT personnel or procedures
5. Systems for tracking and identifying welds
6. Welding personnel

Allow 15 days for the Engineer's review of an amended welding QC plan or an addendum to the welding QC plan.

Submit 7 copies of each authorized QC plan and any authorized addendums. Make 1 copy available at each location where work is performed.

Replace the 1st paragraph of section 11-3.02C(3) with:

Submit a welding report within 7 days following the performance of any welding. The welding report must include:

1. Daily production log for welding for each day that welding is performed
2. Reports of all visual weld inspections and NDT performed, whether specified, additional, or informational
3. Radiographs and radiographic reports, and other required NDT reports
4. Summary of welding and NDT activities that occurred during the reporting period
5. Reports of each application of heat straightening
6. Summarized log listing the rejected lengths of weld by welder, position, process, joint configuration, and piece number
7. Documentation that you have:
   7.1. Evaluated all radiographs and radiograph reports and NDT and NDT reports
   7.2. Corrected all rejectable deficiencies and that all repaired welds have been reexamined using the required NDT and found acceptable
8. Reports or chart recordings of each application of any stress relieving used
9. Reports and chart recordings for any electroslag welding used

Add between "radiographic" and "envelopes" in the introductory clause in the 3rd paragraph of section 11-3.02C(3):

film

Delete the 3rd sentence in the 5th paragraph of section 11-3.02C(3).
Replace the introductory clause in the 1st paragraph of section 11-3.02D with:

Clauses 6.1.4.1 and 6.1.4.3 of AWS D1.1, the 2nd paragraph of clause 7.1.2 of AWS D1.4, clauses 6.1.3.1 through 6.1.3.3 of AWS D1.5, and clause 7.2.3 of AWS D1.8 are replaced with:

Replace items 1 and 2 in the list in the 2nd paragraph of section 11-3.02D with:

1. Work is welded at a permanent fabrication or manufacturing plant that is certified under the AISC Certification Program for Steel Bridge Fabricators, Intermediate Bridges, and Fracture-Critical Member endorsement if required.
2. Structural steel for building construction work is performed at a permanent fabrication or manufacturing plant that is certified under the AISC Quality Certification Program, Category STD, Standard for Steel Building Structures.

Delete the 3rd paragraph of section 11-3.02D.

Replace the 1st sentence in the 4th paragraph of section 11-3.02D with:

Except for the exempt facilities identified above, an authorized independent third party must witness the qualification tests for welders or welding operators.

Replace the paragraph in section 11-3.02F with:

Welding procedures qualification for work welded under AWS D1.5 must comply with clause 5.12 or 5.12.4 of AWS D1.5 and the following:

1. Unless considered prequalified, qualify fillet welds in each position. Conduct the fillet weld soundness test using the essential variables of the WPS as established by the PQR.
2. For qualifying joints that do not comply with figures 2.4 and 2.5 of AWS D1.5, conduct the test complying with figure 5.3 using the welding parameters that were established for the test conducted complying with figure 5.1.
3. Macroetch tests are required for WPS qualification tests, and acceptance must comply with clause 5.19.3 of AWS D1.5.
4. If a nonstandard weld joint is to be made using a combination of WPSs, you may conduct a test under figure 5.3, combining the qualified or prequalified WPSs to be used in production, if the essential variables, including weld bead placement, of each process are limited to those established in table 5.3 of AWS D1.5.
5. Before preparing mechanical test specimens, inspect the PQR welds by visual and radiographic tests. The backing bar must be 3 inches in width and must remain in place during NDT. Results of the visual and radiographic tests must comply with clause 6.26.2 of AWS D1.5 excluding clause 6.26.2.2. All other requirements for clause 5.17 are applicable.

Add to the list in the 3rd paragraph of section 11-3.02G:

3. Repairs not included in the welding QC plan
Replace the 1st sentence of the 4th paragraph of section 11-3.02G with:

Requests to perform 3rd-time excavations, repairs of cracks, or repairs not included in the welding QC plan must include an engineering evaluation.

Replace the 5th paragraph of section 12-3.01A(1) with:

Repair or replace traffic-handling equipment and devices damaged from any cause during the Contract, including repainting if necessary. The condition of temporary traffic control devices must comply with the current American Traffic Safety Services Association publication "Quality Guidelines for Temporary Traffic Control Devices and Features."

Replace the 1st paragraph of section 12-3.01A(4) with:

Category 2 temporary traffic control devices must be on FHWA's list of acceptable, crashworthy Category 2 hardware for work zones. This list is available on FHWA's Safety Program Web site.

Replace "project" in the 4th paragraph of section 12-3.02C with:

work

Add after "Display" in item 4 in the list in the 2nd paragraph of section 12-3.03B:

or Alternating Diamond

Replace "project" in the 3rd paragraph of section 12-3.07C with:

work

Add to section 12-3:

12.3.18 AUTOMATED WORK ZONE INFORMATION SYSTEM
Reserved
12.3.19–12.3.25 RESERVED

Replace the 7th through 9th paragraphs of section 12-4.02A with:

If pedestrian traffic is allowed to pass through construction areas, provide a temporary pedestrian facility through the construction areas within the highway. Include protective overhead covering as necessary to ensure protection from falling objects and drippings from overhead structures.
At locations where pedestrian openings through falsework are required, provide a temporary pedestrian facility with protective overhead covering during all bridge construction activities.

Temporary pedestrian facilities must comply with section 12-7.

If an activity requires a closure of a walkway, another walkway must be made available nearby, off of the traveled way.

Delete the 12th paragraph of section 12-4.02A.

Replace section 12-4.03 with:

12-4.03 CLOSURE SCHEDULES AND CONDITIONS

12-4.03A General

Submit closure schedule requests and closure schedule amendments using LCS to show the locations and times of the requested closures.

The Department provides LCS training. Request the LCS training at least 30 days before submitting the 1st lane closure request. The Department provides the training within 15 days after your request. The training may be web based.

Except for web-based training, the training is held at a time and location you and the Engineer agree to.

For web-based training, the Engineer provides you the website address to access the training.

Within 5 business days after completion of the training, the Department provides LCS accounts and user identifications to your assigned, trained representatives.

Each representative must maintain a unique password and current user information in the LCS.

12-4.03B Closure Schedules

Every Monday by noon, submit a closure schedule request of planned closures for the next week period. The next week period is defined as Sunday noon through the following Sunday noon.

Submit a closure schedule request not less than 25 days and not more than 125 days before the anticipated start of any activity that reduces:

1. Horizontal clearances of traveled ways, including shoulders, to 2 lanes or less due to activities such as temporary barrier placement and paving
2. Vertical clearances of traveled way, including shoulders, due to activities such as pavement overlays, overhead sign installation, falsework, or girder erection

Submit closure schedule amendments, including adding additional closures, by noon at least 3 business days before a planned closure.

Cancel closure requests using LCS at least 48 hours before the start time of the closure.

You will be notified through LCS of unauthorized closures or closures that require coordination with other parties as a condition for authorization.

The Engineer may reschedule a closure cancelled due to unsuitable weather.

If a closure is not opened to traffic by the specified time, suspend work. No further closures are allowed until the Engineer has reviewed and authorized a work plan submitted by you that ensures that future closures will be opened to traffic by the specified time. Allow 2 business days for review of your proposed work plan. The Department does not compensate you for your losses due to the suspension of work resulting from the late opening of closures.
Notify the Engineer of delays in your activities caused by:

1. Your closure schedule request being denied although your requested closures are within the specified time frame allowed for closures. The Department does not compensate you for your losses due to amendments to the closure schedule that are not authorized.
2. Your authorized closure being denied.

If you are directed to remove a closure before the time designated in the authorized closure schedule, you will be compensated for the delay.

**12-4.03C Contingency Plan**

Section 12-4.03C applies if a contingency plan is specified in the special provisions or if a contingency plan is requested.

If a contingency plan is requested, submit the contingency plan within 1 business day of the request.

The contingency plan must identify the activities, equipment, processes, and materials that may cause a delay in the opening of a closure to traffic. The plan must include:

1. List of additional or alternate equipment, materials, or workers necessary to ensure continuing activities and on-time opening of closures if a problem occurs. If the additional or alternate equipment, materials, or workers are not on site, specify their location, the method for mobilizing these items, and the required time to complete mobilization.
2. General time-scaled logic diagram displaying the major activities and sequence of planned operations. For each activity, identify the critical event when the contingency plan will be activated.

Based on the Engineer's review, additional materials, equipment, workers, or time to complete activities from that specified in the contingency plan may be required.

Submit revisions to a contingency plan at least 3 business days before starting the activity requiring a contingency plan. Allow 2 business days for review of the revised contingency plan.

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**Replace section 12-7 with:**

**07-19-13**

**12-7 TEMPORARY PEDESTRIAN FACILITIES**

**12-7.01 GENERAL**

Section 12-7 includes specifications for constructing temporary pedestrian facilities.

Temporary pedestrian facilities must comply with the *California MUTCD*, Part 6, Chapter 6D, "Pedestrian and Worker Safety."

Design temporary pedestrian facilities with protective overhead covering to support all imposed loads.

The design load and maximum allowable stresses for temporary pedestrian facilities with protective overhead covering must comply with section 48-2.01D(3). The minimum design live load for the temporary pedestrian facilities with protective overhead covering must be 150 psf for the entire structure.

The minimum width of the temporary pedestrian facilities with protective overhead covering between the inside face of handrails must be 60 inches. The clear height of the temporary pedestrian facilities with protective overhead covering measured from the floor surface to the canopy overhead must be at least 8 feet. Provide adequate lighting at all times. Lighting must comply with section 86-6.13.

Submit shop drawings with supporting calculations for temporary pedestrian facilities with protective overhead covering. Shop drawings and calculations must be signed by an engineer who is registered as a civil engineer in the State.
12-7.02 MATERIALS
Walkways must be surfaced with HMA, portland cement concrete, or wood. The surface must be skid resistant and free of irregularities.
Hand railings must be S4S lumber and painted white.
Protective overhead covering of temporary pedestrian facilities must be plywood at least 3/4 inch thick or wood planking with a nominal thickness of 2 inches minimum.

12-7.03 CONSTRUCTION
Construct hand railings on each side of a temporary pedestrian facility as necessary to protect pedestrian traffic from hazards due to work activities or adjacent vehicular traffic.
Maintain temporary pedestrian facilities in good condition and keep them clear of obstructions.

12-7.04 PAYMENT
Not Used

13 WATER POLLUTION CONTROL
05-15-15

Delete item 3 in the list in the 4th paragraph of section 13-1.01A.

Add to section 13-1.01A:

Comply with the Department's general permit issued by the State Water Resources Control Board for Order No. 2012-0011-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Permit, Statewide Storm Water Permit and Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans). The Department's general permit governs stormwater and nonstormwater discharges from the Department's properties, facilities, and activities. The Department's general permit may be viewed at the Web site for the State Water Resources Control Board, Storm Water Program, Caltrans General Permit.

Add to the list in the 1st paragraph of section 13-1.01D(3)(b):

3. Have completed SWRCB approved QSD training and passed the QSD exam

Add to the list in the 2nd paragraph of section 13-1.01D(3)(b):

3. Have completed SWRCB approved QSP training and passed the QSP exam

Replace "NEL violation" in item 3.6.2 in the list in the 1st paragraph of section 13-1.01D(3)(c) with:

receiving water monitoring trigger

OCTOBER 2015
Replace the 1st paragraph in section 13-2.01B with:

Within 7 days after Contract approval, submit 2 copies of your WPCP for review. Allow 5 business days for review.

After the Engineer authorizes the WPCP, submit an electronic copy and 3 printed copies of the authorized WPCP.

If the RWQCB requires review of the authorized WPCP, the Engineer submits the authorized WPCP to the RWQCB for its review and comment. If the Engineer orders changes to the WPCP based on the RWQCB's comments, amend the WPCP within 3 business days.

Replace the 1st paragraph in section 13-3.01B(2)(a) with:

Within 15 days of Contract approval, submit 3 copies of your SWPPP for review. The Engineer provides comments and specifies the date when the review stopped if revisions are required. Change and resubmit a revised SWPPP within 15 days of receiving the Engineer's comments. The Department's review resumes when a complete SWPPP has been resubmitted.

When the Engineer authorizes the SWPPP, submit an electronic copy and 4 printed copies of the authorized SWPPP.

If the RWQCB requires review of the authorized SWPPP, the Engineer submits the authorized SWPPP to the RWQCB for its review and comment. If the Engineer requests changes to the SWPPP based on the RWQCB's comments, amend the SWPPP within 10 days.

Replace "NELs" in item 3.1 in the 3rd paragraph of section 13-3.01B(2)(a) with:

receiving water monitoring triggers

Replace the 3rd paragraph of section 13-3.01B(2)(c) with:

The SAP must identify the sample containers, preservation requirements, holding times, analytical method, and the laboratory certified under the Environmental Laboratory Accreditation Program of the State Water Resources Control Board. For a list of certified laboratories, go to the board's website.

Replace section 13-3.01B(6)(c) with:

13-3.01B(6)(c) Receiving Water Monitoring Trigger Report

Whenever a receiving water monitoring trigger is exceeded, notify the Engineer and submit a receiving water monitoring trigger report within 48 hours after conclusion of a storm event. The report must include:

1. Field sampling results and inspections, including:
   1.1. Analytical methods, reporting units, and detection limits
   1.2. Date, location, time of sampling, visual observation and measurements
   1.3. Quantity of precipitation from the storm event
2. Description of BMPs and corrective actions

Replace "NEL" in the 6th paragraph of section 13-3.01C(1) with:

receiving water monitoring trigger
Replace section 13-3.01C(3) with:

13-3.01C(3) Receiving Water Monitoring Trigger
For a risk level 3 project, receiving water monitoring triggers must comply with the values shown in the following table:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Test method</th>
<th>Detection limit (min)</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>Field test with calibrated portable instrument</td>
<td>0.2</td>
<td>pH</td>
<td>Lower limit = 6.0; Upper limit = 9.0</td>
</tr>
<tr>
<td>Turbidity</td>
<td>Field test with calibrated portable instrument</td>
<td>1</td>
<td>NTU</td>
<td>500 NTU max</td>
</tr>
</tbody>
</table>

The storm event daily average for storms up to the 5-year, 24-hour storm must not exceed the receiving water monitoring trigger for turbidity.

The daily average sampling results must not exceed the receiving water monitoring trigger for pH.

Delete "and NELs are violated" in the 3rd paragraph of section 13-3.03C.

Replace "working days" at each occurrence in section 13-3.04 with.

original working days

Delete the 1st sentence in the 2nd paragraph of section 13-4.03C(3).

Add between the 2nd and 3rd paragraphs of section 13-4.03C(3):

Manage stockpiles by implementing water pollution control practices on:

1. Active stockpiles before a forecasted storm event
2. Inactive stockpiles according to the WPCP or SWPPP schedule

Delete the 7th paragraph of section 13-4.03C(3).

Replace the heading of section 13-4.03E(1) with:

General
Delete the 1st through 5th sentences in the 2nd paragraph of section 13-4.03E(1).

**Replace the 1st sentence of the 1st paragraph of section 13-4.03E(3) with:**

Limit vehicle and equipment cleaning or washing at the job site to that needed for safety and protection of the equipment and compliance with PLACs.

**Replace the paragraph in section 13-4.04 with:**

Not Used

**Replace "20-7.02D(6)" in section 13-5.02C with:**

20-5.03E

Delete "or stockpile" in the 3rd paragraph of section 13-5.02F.

**Replace "20-7.03I(10)" in section 13-5.03C with:**

20-5.03E(3)

**Replace section 13-5.03F with:**

13-5.03F Reserved

Delete "or stockpile" in item 1 in the list in the 1st paragraph of section 13-5.03K.

Delete the 3rd paragraph of section 13-5.03K.

**Replace the 2nd sentence in the 1st paragraph of section 13-9.01A with:**

You may use any of the following systems for temporary concrete washout:

1. Temporary concrete washout facility
2. Portable temporary concrete washout
3. Temporary concrete washout bin

**Replace the 2nd paragraph of section 13-9.01B with:**

Retain and submit an informational submittal for records of disposed concrete waste.
Delete the 4th paragraph of section 13-9.01B.

Delete "if authorized" in the 1st sentence in the 1st paragraph of section 13-9.02A.

Replace "at least 3-inch" in the 3rd sentence in the 1st paragraph of section 13-9.02A with:

6-inch

14 ENVIRONMENTAL STEWARDSHIP
05-15-15
Replace section 14-9.03 with:

14-9.03 RESERVED

Replace "California Department of Public Health (CDPH)" in the 2nd paragraph of section 14-11.02E(1) with:

State Water Resources Control Board

15 EXISTS FACILITIES
10-17-14
Replace section 15-1.03D with:

15-1.03D Reserved

Replace "metal beam guard railing" in the 1st paragraph of section 15-2.01C with:

guardrail

Replace the paragraphs of section 15-2.02B(1) with:

Section 15-2.02B includes specifications for removing pavement, base, subbase, and subgrade.

If only a portion of the pavement is removed, saw-cut the outline of the removal area on a neat line and with a power-driven saw before removing.

For asphalt concrete pavement, saw cuts must be at least 2 inches deep unless otherwise described.
Replace section 15-2.02B(4)(b) with:

15-2.02B(4)(b) Reserved

Add to section 15-2.02B:

15-2.02B(5) Remove Concrete Pavement
15-2.02B(5)(a) General
Remove only the portion of pavement to be replaced or repaired during the same lane closure. If there is overlying material on the concrete pavement, remove it with the pavement.

Do not impact the surface within 18 inches of the pavement to remain in place. Use removal methods that do not damage the remaining pavement and base. Slab-lifting equipment must attach to the pavement.

Instead of disposing of removed concrete pavement by removing it from the job site, you may dispose of it under section 15-3.01.

15-2.02B(5)(b) Saw Cuts
Saw cut using a diamond blade and make cuts perpendicular to the pavement surface. Saw cutting is not required where concrete pavement is adjacent to asphalt concrete pavement.

Saw cut (1) no more than 2 days before removing pavement and (2) such that traffic will not dislodge any pavement piece or segment. Saw cut perpendicular to the traveled way except you may cut parallel or diagonal to the traveled way when removing the pavement during the same lane closure as the saw cutting.

You may make additional saw cuts within the sawed outline.

Saw cuts must be the full depth of the pavement unless otherwise shown.

Saw cut at longitudinal and transverse joints to remove entire slabs. For partial-slab areas, the Engineer determines the exact saw-cut locations.

15-2.02B(5)(c) Reserved
15-2.02B(6) Reserved
15-2.02B(7) Payment
Reserved

Replace section 15-2.02G with:

15-2.02G Remove Guardrail
Where removing guardrail, remove any concrete anchors and steel foundation tubes.

Replace the 1st paragraph of section 15-2.02K with:

Box culverts, concrete pipes, inlets, headwalls, and endwalls must be completely removed if any portion of these structures is (1) within 3 feet of the grading plane in excavation areas, (2) within 1 foot of original ground in embankment areas, or (3) shown to be removed.

Replace "Metal beam guard railing" in the table in the 2nd paragraph of section 15-2.03A(2)(a) with:

Guardrail
Replace the heading of section 15-2.03B with:

Salvage Guardrail

Replace the heading of section 15-2.04D with:

Reconstruct Guardrail

Replace section 15-2.09D with:

15-2.09D Reserved

Replace the 4th paragraph of section 15-2.10B with:

Instead of using new materials similar in character to those in the existing structure, you may use raising devices to adjust a manhole to grade. Before starting paving work, measure and fabricate raising devices. Raising devices must:

1. Comply with the specifications for section 75 except that galvanizing is not required
2. Have a shape and size that matches the existing frame
3. Be match marked by painting identification numbers on the device and corresponding structure
4. Result in an installation that is equal to or better than the existing one in stability, support, and nonrocking characteristics
5. Be fastened securely to the existing frame without projections above the surface of the road or into the clear opening

Replace the heading of section 15-2.10D with:

Adjust Guardrail

Replace the paragraphs of section 15-3.01 with:

Section 15-3 includes specifications for removing all or a portion of a concrete facility.

Concrete facilities include curbs, gutters, gutter depressions, sidewalks, driveways, slope paving, island paving, barriers, retaining walls, sound walls, minor structures, aprons, spillways, and dams.

Where broken-concrete slope protection is shown, use removed concrete for the construction of the broken-concrete slope protection.

Instead of disposing of removed concrete by removing it from the job site, you may dispose of it on the job site by one of the following methods:

1. Burying it in embankments at authorized locations. Removed concrete must be broken into pieces that can be readily handled and incorporated into embankments and placed at a depth of at least 3 feet below finished grade and slope lines. Concrete must not be buried in areas where piling is to be placed or within 10 feet of trees, pipelines, poles, buildings or other permanent objects or structures.
2. Placing it at authorized locations. The removed concrete must not present an unsightly appearance from the highway.
Replace the paragraph of section 15-3.02 with:

Not Used

Delete the 5th paragraph of section 15-3.03.

Add to the end of section 15-4.01A(2):

Allow 20 days for review of the bridge removal work plan.

Replace the 2nd sentence of the 3rd paragraph of section 15-4.02C(1) with:

Paint exposed ends of the remaining reinforcement with 2 applications of organic zinc-rich primer as specified for painting exposed ends of prestressing steel in section 50-1.03B(3).

Replace the 1st paragraph of section 15-5.01C(1) with:

Before starting deck rehabilitation activities, complete the removal of any traffic stripes, pavement markings, and pavement markers.

Replace the 2nd and 3rd paragraphs of section 15-5.01C(2) with:

Perform the following activities in the order listed:

1. Abrasive blast the deck surface with steel shot. Perform abrasive blasting after the removal of any unsound concrete and placement of any rapid setting concrete patches.
2. Sweep the deck surface.
3. Blow the deck surface clean using high-pressure air.

Replace the 2nd paragraph of section 15-5.01C(4) with:

Before removing asphalt concrete surfacing, verify the depth of the surfacing at the supports and midspans of each structure (1) in each shoulder, (2) in the traveled way, and (3) at the roadway crown, if a crown is present.

Delete "and concrete expansion dams" in the 3rd paragraph of section 15-5.01C(4).

Replace the 2nd paragraph of section 15-5.03A(2) with:

For a contract with less than 60 original working days, submit certificates of compliance for the filler material and bonding agents.

Replace "51-1.02C" in the 1st paragraph of section 15-5.03B with:

51-1.02F
Replace the 4th paragraph of section 15-5.03B with:
For a contract with less than 60 original working days, alternative materials must be authorized before use.

Add between the 5th and 6th paragraphs of section 15-5.03C:
The final surface finish of the patched concrete surface must comply with section 51-1.03F.

Delete the 4th paragraph of section 15-5.05C.

Replace "51-1.03F(5)" in the 3rd paragraph of section 15-5.06C(1) with:
51-1.01D(4)(b)

Replace "51-1.03E(5)" in the 5th paragraph of section 15-5.06C(1) with:
51-1.03F(5)

Delete the 9th paragraph of section 15-5.06C(1).

Delete the 15th paragraph of section 15-5.06C(1).

Add between the 18th and 19th paragraphs of section 15-5.06C(1):
Texture the polyester concrete surface before gelling occurs by longitudinal tining under 51-1.03F(5)(b)(iii), except do not perform initial texturing.

Replace section 15-5.06C(2) with:
15-5.06C(2) Reserved

Delete the 3rd paragraph of section 15-5.06D.

Replace the 1st paragraph in section 15-5.07B(4) with:
Payment for furnishing dowels is not included in the payment for core and pressure grout dowel.
Replace section 15-5.09 with:

15-5.09 POLYESTER CONCRETE EXPANSION DAMS

15-5.09A General
Section 15-5.09 includes specifications for constructing polyester concrete expansion dams.

Polyester concrete expansion dams must comply with the specifications for polyester concrete overlays in section 15-5.06, except a trial slab is not required.

Reinforcement must comply with section 52.

15-5.09B Materials
Not Used

15-5.09C Construction
For new asphalt concrete overlays, place the asphalt concrete overlay before starting polyester concrete activities. Saw cut and remove asphalt concrete at expansion dam locations.

For existing asphalt concrete overlays, remove expansion dams and asphalt concrete to the limits shown. Removing expansion dams must comply with section 15-4 except a bridge removal work plan is not required.

Where a portion of the asphalt concrete overlay is to remain, saw cut a 2-inch-deep neat line along the edge to remain in place before removing the asphalt concrete. Do not damage the existing surfacing to remain in place.

Prepare the deck surface under section 15-5.01C(2).

You may use a mechanical mixer to mix the polyester concrete for expansion dams. The mixer capacity must not exceed 9 cu ft unless authorized. Initiate the resin and thoroughly blend it immediately before mixing it with the aggregate. Mix the polyester concrete for at least 2 minutes before placing.

The application rate of methacrylate resin must be approximately 100 sq ft/gal.

You may place and finish expansion dams using hand methods.

Protect expansion dams from moisture, traffic, and equipment for at least 4 hours after finishing.

For expansion dams over 6 feet long, install 1/4-inch-wide joint material at 6-foot intervals across the width of the expansion dam. Joint material must be either expanded polyurethane or expanded polyethylene.

Add to section 15-6.01A(3)(a):

Within 5 days of completing annular space grouting at a culvert, submit the grouting records.

Replace "41-1.01" in item 10.3 in the 2nd paragraph of section 15-6.01A(3)(d) with:

Replace "41-1.02" in 1st paragraph of section 15-6.01B(2) with:
Replace the heading of section 15-6.04 with:

INVERT PAVING

Replace the 1st paragraph of section 15-6.13A(1) with:

Section 15-6.13 includes specifications for installing machine spiral wound PVC pipeliners directly into the culvert.

Replace the heading of section 15-6.13B with:

Machine Spiral Wound PVC Pipeliners, Grouted

DIVISION III  GRADING

16  CLEARING AND GRUBBING

Replace "20-3.03B(4)" in the 3rd paragraph of section 16-1.01 with:

20-2.02C(2)

Replace "20-1.03D" in the 2nd paragraph of section 16-1.03B with:

20-3.01C(2)

18  DUST PALLIATIVE

Replace section 18 with:

18  DUST PALLIATIVES

18-1.01  GENERAL

18-1.01A  Summary

Section 18 includes specifications for applying dust palliatives.

The dust palliative must be any of the following:

1. Water
2. Dust suppressant
3. Dust control binder

Water must comply with section 17.
18-1.01B Definitions
Reserved

18-1.01C Submittals
If a dust suppressant or dust control binder is to be used, submit a dust treatment plan at least 15 days before starting job site activities. The dust treatment plan must include:

1. Product name and type
2. Manufacturer's name
3. Polymer emulsion type if synthetic polymer emulsion is used, including identification of:
   3.1. Individual components greater than 5 percent by volume in blends of polymers of different compositions
   3.2. Additives greater than 2 by volume
4. MSDS
5. Proposed methods for applying products
6. Application rates and number of passes
7. Required weather conditions for application, including ambient and surface temperatures, wind conditions, and allowable period before expected precipitation
8. Drying time or curing time required before traffic is allowed on the treated surface

Submit the manufacturer's instructions for the material to be used as an informational submittal.

Submit a certificate of compliance for the dust suppressant, dust control binders, and fibers.

For dust suppressants, include with the certificate of compliance:

1. Test results verifying compliance with the quality characteristic requirements in section 18-1.01D. The results must be from a test conducted within 6 months before the date of the certificate of compliance.
2. Test results from a test conducted within 2 years before the date of the certificate of compliance verifying compliance with the following environmental requirements:
   2.1. Maximum constituent concentration levels
   2.2. US EPA regulatory requirements for:
   2.2.1. Volatile organic compounds
   2.2.2. Semivolatile organic compounds
   2.2.3. Toxicity characteristic leaching
   2.2.3. Modified synthetic leaching procedure
   2.3. Aquatic toxicity

18-1.01D Quality Control and Assurance
Dust palliatives must comply with US EPA requirements and RWQCB requirements for soil stabilizers.

Dust suppressants must be tested by an EPA-accredited laboratory. Liquid chemical treatments must be tested before dilution. Solid products must be mixed with water to a 25 percent concentration before testing. The chemical constituent concentration for each dust suppressant must not exceed the maximum levels shown in the following table:
**Maximum Constituent Concentration Levels**

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Test method</th>
<th>Requirement maximum level (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arsenic</td>
<td>EPA Method 200.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Barium</td>
<td></td>
<td>100.0</td>
</tr>
<tr>
<td>Cadmium</td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>Lead</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>Mercury</td>
<td>EPA Method 245.1</td>
<td>0.05</td>
</tr>
<tr>
<td>Selenium</td>
<td>EPA Method 200.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
<td>10.0</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>EPA Method 365.4</td>
<td>2500.0</td>
</tr>
<tr>
<td>Cyanide</td>
<td>EPA Method 335.4</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Dust suppressants must comply with the US EPA requirements for the quality characteristics when tested under the test methods shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volatile organic compounds (VOC)</td>
<td>EPA Method 8260</td>
</tr>
<tr>
<td>Semivolatile organic compounds (SVOC)</td>
<td>EPA Method 8270</td>
</tr>
<tr>
<td>Toxicity characteristic leaching procedure</td>
<td>EPA Method 1311</td>
</tr>
<tr>
<td>Modified synthetic leaching procedure</td>
<td>EPA Method 1312</td>
</tr>
</tbody>
</table>

The aquatic toxicity for dust suppressant must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic toxicity(^a) (LC50 min, ppm)</td>
<td>ASTM E729 or EPA Method 600/4-90/027F and EPA Method 600/4-91/002</td>
<td>10</td>
</tr>
<tr>
<td>Aquatic toxicity(^b) (rating)</td>
<td>ASTM E729 or EPA Method 600/4-90/027F and EPA Method 600/4-91/002</td>
<td>slightly toxic or better</td>
</tr>
<tr>
<td>Renewal toxicity(^a) (LC50 min, ppm)</td>
<td>ASTM E1295</td>
<td>10</td>
</tr>
<tr>
<td>Renewal toxicity(^b) (rating)</td>
<td>ASTM E1295</td>
<td>slightly toxic or better</td>
</tr>
</tbody>
</table>

\(^a\) Using *Ceriodaphnia dubia* (water flea), *Oncorhynchus mykiss* (rainbow trout), *Pimephales promelas* (fathead minnow), and *Americamysis bahia* (mysid shrimp)

\(^b\) Using *Ceriodaphnia dubia* (water flea)

**18-1.02 MATERIALS**

**18-1.02A General**

Dust suppressants and control binders must be either (1) miscible in water or (2) a material that is directly applied to the surface without mixing with water.

**18-1.02B Dust Suppressants**

**18-1.02B(1) General**

Dust suppressants must be one of the following:
18-1.02B(2) Petroleum-Based Organic Products

Petroleum-based organic dust suppressants must be asphalt emulsion, petroleum resin, base oil, mineral oil, or synthetic fluid.

Asphalt emulsion must be Grade SS1h.

Petroleum resin must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residue (min, %)</td>
<td>ASTM D6934</td>
<td>60</td>
</tr>
<tr>
<td>pH</td>
<td>ASTM D1429</td>
<td>4.0–7.0</td>
</tr>
<tr>
<td>Specific gravity at 16 °C (min)</td>
<td>ASTM D1298</td>
<td>1.00</td>
</tr>
<tr>
<td>Kinematic viscosity at 25 °C (min, Saybolt Furol seconds)</td>
<td>ASTM D2170</td>
<td>188</td>
</tr>
<tr>
<td>Flash point (min °C)</td>
<td>ASTM D92</td>
<td>205</td>
</tr>
<tr>
<td>Particle charge test</td>
<td>ASTM D7402</td>
<td>Positive</td>
</tr>
</tbody>
</table>

*Use ASTM D2161 to convert the mm²/s value to Saybolt Furol seconds

Base and mineral oils must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base and mineral oil content (min, %)</td>
<td>-</td>
<td>75</td>
</tr>
<tr>
<td>Specific gravity at 16 °C (min)</td>
<td>ASTM D1298</td>
<td>0.85–0.90</td>
</tr>
<tr>
<td>Brookfield absolute viscosity at 68 °C (max, cP)</td>
<td>ASTM D2196</td>
<td>250</td>
</tr>
<tr>
<td>Flash point (min, °C)</td>
<td>ASTM D93</td>
<td>150</td>
</tr>
</tbody>
</table>

Synthetic fluids must comply with 40 CFR 35 and the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base and mineral oil content (min, %)</td>
<td>--</td>
<td>75</td>
</tr>
<tr>
<td>Specific gravity at 16 °C (min)</td>
<td>ASTM D1298</td>
<td>0.85–0.90</td>
</tr>
<tr>
<td>Brookfield absolute viscosity at 68 °C (max, cP)</td>
<td>ASTM D2196</td>
<td>250</td>
</tr>
<tr>
<td>Flash point (min, °C)</td>
<td>ASTM D93</td>
<td>150</td>
</tr>
</tbody>
</table>

18-1.02B(3) Nonpetroleum-Based Organic Products

Nonpetroleum-based organic dust suppressants must be lignosulfonate, plant oil, or tall oil pitch rosin.

Lignosulfonate must comply with the requirements shown in the following table:
### Lignosulfonate Requirements

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lignin sulfonate content ready to use (min, %)</td>
<td>ASTM D4900</td>
<td>25</td>
</tr>
<tr>
<td>Residue total solids content (min %)</td>
<td>ASTM D4903 or D2834</td>
<td>52</td>
</tr>
<tr>
<td>Lignin sulfonate content of residue (min, %)</td>
<td>--</td>
<td>50</td>
</tr>
<tr>
<td>Reducing sugars content of residue (min, %)</td>
<td>ASTM D5896 or D6406</td>
<td>25</td>
</tr>
<tr>
<td>pH</td>
<td>ASTM D1293</td>
<td>6.0–9.0</td>
</tr>
<tr>
<td>Specific gravity (min)</td>
<td>ASTM D1429</td>
<td>1.20</td>
</tr>
<tr>
<td>Brookfield absolute viscosity at 25°C (max, cP)</td>
<td>ASTM D2196</td>
<td>1,000</td>
</tr>
</tbody>
</table>

Plant oil must comply with the requirements shown in the following table:

### Plant Oil Requirements

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residue active solids content (min, %)</td>
<td>ASTM D4903</td>
<td>50</td>
</tr>
<tr>
<td>Specific gravity (min)</td>
<td>ASTM D1429</td>
<td>0.93</td>
</tr>
<tr>
<td>Brookfield viscosity (cP)</td>
<td>ASTM D2196</td>
<td>48</td>
</tr>
</tbody>
</table>

Tall oil pitch rosin must comply with the requirements shown in the following table:

### Tall Oil Pitch Rosin Requirements

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rosin acid content (min, %)</td>
<td>ASTM D1240</td>
<td>10</td>
</tr>
<tr>
<td>Residue active solids content (min, %)</td>
<td>ASTM D2834</td>
<td>45</td>
</tr>
<tr>
<td>pH</td>
<td>ASTM D1293</td>
<td>3.0–9.0</td>
</tr>
<tr>
<td>Specific gravity (min)</td>
<td>ASTM D1429</td>
<td>1.00</td>
</tr>
<tr>
<td>Brookfield absolute viscosity at 25°C (cP)</td>
<td>ASTM D2196</td>
<td>50–200</td>
</tr>
</tbody>
</table>

### 18-1.02B(4) Hygroscopic Products

Hygroscopic dust suppressants must be calcium chloride, calcium chloride flake, or magnesium chloride.

Calcium chloride must comply with the requirements shown in the following table:

### Calcium Chloride\(^{a}\) Requirements

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium chloride content (%)</td>
<td>ASTM E449</td>
<td>28–42</td>
</tr>
<tr>
<td>Total magnesium as MgCl(_2) (max, %)</td>
<td>ASTM E449</td>
<td>6.0</td>
</tr>
<tr>
<td>Total alkali chlorides as NaCl (max, %)</td>
<td>ASTM E449</td>
<td>6.0</td>
</tr>
<tr>
<td>Calcium hydroxide content (max, %)</td>
<td>ASTM E449</td>
<td>0.2</td>
</tr>
<tr>
<td>pH with 5 percent solution</td>
<td>ASTM D1293</td>
<td>7.0–9.0</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>ASTM D1429</td>
<td>1.28–1.44</td>
</tr>
</tbody>
</table>

\(^{a}\)ASTM D98 or AASHTO M144
Calcium chloride flake must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium chloride content (%)</td>
<td>ASTM E449</td>
<td>28–42</td>
</tr>
<tr>
<td>Total magnesium as MgCl₂ (max, %)</td>
<td>ASTM E449</td>
<td>6.0</td>
</tr>
<tr>
<td>Total alkali chlorides as NaCl (max, %)</td>
<td>ASTM E449</td>
<td>6.0</td>
</tr>
<tr>
<td>Calcium hydroxide content (max, %)</td>
<td>ASTM E449</td>
<td>0.2</td>
</tr>
<tr>
<td>pH with 5 percent solution</td>
<td>ASTM D1293</td>
<td>7.0–9.0</td>
</tr>
<tr>
<td>Gradation percent passing 3/8-inch sieve #4 sieve #30 sieve</td>
<td>ASTM C136</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80–100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0–5</td>
</tr>
</tbody>
</table>

*ASTM D98 or AASHTO M144

Magnesium chloride must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium chloride content (%)</td>
<td>ASTM D4691 or ASTM D511*</td>
<td>28–33</td>
</tr>
<tr>
<td>Sulfate content as magnesium sulfate (max, %)</td>
<td>ASTM D4691*</td>
<td>4.0</td>
</tr>
<tr>
<td>Potassium content as potassium chloride (max, %)</td>
<td>ASTM E449</td>
<td>0.5</td>
</tr>
<tr>
<td>Sodium chloride content (max, %)</td>
<td>ASTM E449</td>
<td>1.0</td>
</tr>
<tr>
<td>pH with 5% solution</td>
<td>ASTM D1293</td>
<td>7.0–9.0</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>ASTM D1429</td>
<td>1.31 ± 0.02</td>
</tr>
</tbody>
</table>

*You may use another appropriate atomic absorption spectrophotometry method such as that in Standard Methods for the Examination of Water and Waste Water by APHA-AWWA-WPCF.

18-1.02B(5) Synthetic Polymer Emulsions

Synthetic polymer emulsions must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residue active solids content (min, %)</td>
<td>ASTM D2834</td>
<td>40</td>
</tr>
<tr>
<td>pH</td>
<td>ASTM D1429</td>
<td>4.0–9.5</td>
</tr>
<tr>
<td>Specific gravity at 16 °C</td>
<td>ASTM D1298</td>
<td>1.00–1.15</td>
</tr>
<tr>
<td>Brookfield absolute viscosity (max, cP)</td>
<td>ASTM D2196</td>
<td>1,000</td>
</tr>
<tr>
<td>Polymer film tensile strength – dry (psi)</td>
<td>ASTM D412</td>
<td>500</td>
</tr>
<tr>
<td>Retained coagulum on #100 sieve (max, %)</td>
<td>ASTM D1417</td>
<td>0.1</td>
</tr>
<tr>
<td>Ash content (max, %)</td>
<td>ASTM D5040</td>
<td>2</td>
</tr>
</tbody>
</table>
18-1.02C Dust Control Binders

Dust control binders must comply with the specifications for a general purpose tackifier in section 21-1.02F(1).

Fibers must comply with section 21-1.02E.

18-1.03 CONSTRUCTION

18-1.03A General

Monitor dust conditions and apply dust palliative for dust control as described and as ordered. Reapply dust palliative at any time to control dust.

Apply a dust suppressant to:

1. Temporary haul roads
2. Construction staging, material storage, and layout areas
3. Compacted soil or aggregate base roads or driveways
4. Paved surfaces

Apply a dust control binder to:

1. Rough–graded soils
2. Completed slopes
3. Soil stockpiles unless another practice is already used

Do not use a dust suppressant or dust control binder within 100 feet of a wetland or body of water.

18-1.03B Equipment

Apply dust suppressants that are miscible in water with either (1) a pressure-type water distributor truck equipped with a spray system or (2) a pressure-type asphalt distributor truck as specified in section 93-1.03C.

Apply dust suppressant flakes to the surface using a spreader or spinner disk.

Apply dust control binders with either (1) a pressure-type water distributor truck equipped with a spray system or (2) hydraulic spray equipment as specified for applying hydromulch in section 21-1.03E.

18-1.03C Mixing and Application Rates

Use the mix proportions and application rate for the corresponding dust suppressant as shown in the following table:
Dust suppressant | Mix proportions | Application rate
--- | --- | ---
Asphaltic emulsion, Grade SS1H | 5 parts water to 1 part emulsion | 0.20–1.0 gal/sq yd
Petroleum resin emulsion | 5 parts water to 1 part emulsion | 0.20–1.0 gal/sq yd
Base and mineral oil | Apply undiluted | 0.30–0.35 gal/sq yd
Lignosulfonate | 1 part water to 1 part concentrate | 1.0 gal/sq yd
Plant oil | Apply undiluted | 0.25–0.50 gal/sq yd
Tall oil pitch rosin | 5 parts water to 1 part emulsion for clayey soil and 10 parts water to 1 part emulsion for sandy soil. | 0.30–1.0 gal/sq yd
Calcium chloride solution (Hygroscopic) | Apply undiluted | 0.20–0.35 gal/sq yd
Calcium chloride flakes (Hygroscopic) | -- | 1.0–1.5 lb/sq yd
Magnesium chloride (Hygroscopic) | Apply undiluted | 0.30–0.50 gal/sq yd
Synthetic polymer emulsion | 9 parts water to 1 part concentrate | 0.50 gal/sq yd

Apply hygroscopic materials under the manufacturer's instructions.

Apply calcium chloride flakes to a moist surface.

Allow surfaces treated with a dust suppressant to cure before opening to traffic.

Use the mix proportions and application rate for the corresponding dust control binder as shown in the following table:

Dust control binder | Mix proportions | Application rate
--- | --- | ---
Guar | 11 to 15 pounds per 1,000 gallons of water | 44–59 lb/acre
Psyllium | Enough water to allow for uniform slurry flow | 80–200 lb/acre
Starch | Manufacturer's recommended mix proportions with water | 150 lb/acre
Liquid acrylic copolymers and polymers\(^a\) | 10 parts water to 1 part polymer | 1,175 gal/acre
Liquid methacrylate and acrylate polymers | Manufacturer's recommended mix proportions with water | 20 gal/acre
Copolymers of sodium acrylates and acrylamides | Manufacturer's recommended mix proportions with water | 3–10 lb/acre
Polyacrylamide and copolymer of acrylamide | 10 pounds per 1,000 gallons of water | 5 lb/acre
Hydro-colloid polymers | Manufacturer's recommended mix proportions with water | 54–64 lb/acre

\(^a\)Mix and handle the polymeric compound in a manner that will not cause foaming. You may add an antifoaming agent.

Do not allow stormwater runoff from polyacrylamide treated soils unless water passes through:
1. Sediment basin if the total drainage area is greater than or equal to 5 acres.
2. Sediment trap or a series of check dams if the total drainage area is less than 5 acres. Maximize the number of check dams used and space them evenly in the drainage channel so as to maximize sediment settlement.

You may add fibers to dust control binders at a rate of 2,000 lb/acre.

You may use reduced application rates when reapplying dust palliatives if authorized.

18-1.04 PAYMENT
Not Used

19 EARTHWORK
10-17-14
Replace "20-3.03B(4)" in the 2nd paragraph of section 19-1.01A with:

20-2.02C(2)

Replace the 3rd paragraph in section 19-2.01A with:
Pavement removal within the limits of roadway excavation must comply with section 15-2.02B.

Delete the 2nd paragraph in section 19-2.03A.

Add to the 2nd paragraph of section 19-2.03D:
Topsoil must comply with section 21.

Replace the 2nd paragraph of section 19-3.01A(2)(b) with:
For cofferdams on or affecting railroad property, allow 85 days for review.

Add to the list in the 1st paragraph of section 19-3.01A(2)(d):
9. Provisions for discontinuous rows of soil nails

Replace "sets" in the 3rd and 4th paragraphs of section 19-3.01A(2)(d) with:
copies

Add to section 19-3.01A(3)(b):
For soil nail walls, wall zones are specified in the special provisions.

OCTOBER 2015
For ground anchor walls, a wall zone is the entire wall unless otherwise specified in the special provisions.

Delete the 2nd sentence in the 4th paragraph of section 19-3.01A(3)(b).

Replace "90" in the paragraph of section 19-3.02G with:

90-1

Add to section 19-3.02:

19-3.02I Filter Fabric
Filter fabric must be Class A.

Replace the heading of section 19-3.03C with:

19-3.03B(4) Cofferdams

Replace the heading of section 19-3.03D with:

19-3.03B(5) Water Control and Foundation Treatment

Replace the 1st paragraph of section 19-3.03E(3) with:

Compact structure backfill behind lagging of soldier pile walls by hand tamping, mechanical compaction, or other authorized means.

Add to the end of section 19-3.03E(3):

If filter fabric is shown behind the lagging:

1. Immediately before placing the filter fabric, remove any loose or extraneous material and sharp objects from the surface to receive the filter fabric.
2. Handle and place the filter fabric under the manufacturer's instructions. Stretch, align, and place the fabric without wrinkling.
3. Stitch the adjacent borders of filter fabric or overlap the adjacent borders by 12 to 18 inches. If stitching the border, use yarn of a contrasting color. Yarn size and composition must be as recommended by the fabric manufacturer. Use 5 to 7 stitches per inch of seam.
4. Repair any damaged filter fabric by placing a piece of filter fabric large enough to cover the damaged area and comply with the overlapping or stitching requirements.

Replace the 2nd paragraph of section 19-3.03F with:

Do not backfill over or place material over slurry cement backfill until 4 hours after placement. When concrete sand is used as aggregate and the in-place material is free draining, you may start backfilling as soon as the surface water is gone.
Add between the 2nd and 3rd paragraphs of section 19-3.03K:

Before you excavate for the installation of ground anchors in a wall zone:

1. Complete stability testing
2. Obtain authorization of test data

Replace the 2nd sentence of the 7th paragraph of section 19-3.03K:

Stop construction in unstable areas until remedial measures have been taken. Remedial measures must be submitted and authorized.

Add between the 8th and 9th paragraphs of section 19-3.03K:

When your excavation and installation methods result in a discontinuous wall along any soil nail row, the ends of the structurally completed wall section must extend beyond the ends of the next lower excavation lift by a distance equal to twice the lift height. Maintain temporary slopes at the ends of each wall section to ensure slope stability.

Replace the 9th paragraph of section 19-3.03K:

Do not excavate to the next underlying excavation lift until the following conditions have been attained for the portion of the soil nail or ground anchor wall in the current excavation lift:

1. Soil nails or ground anchors are installed and grouted.
2. Reinforced shotcrete facing is constructed.
3. Grout and shotcrete have cured for at least 72 hours.
4. Specified tests are complete for that portion of wall and the results are authorized.
5. Soil nail facing anchorages are attached or ground anchors are locked off.

Replace the 2nd sentence in the 7th paragraph of section 19-3.04 with:

Structure excavation more than 0.5 foot from the depth shown is paid for as a work-character change if you request an adjustment or the Engineer orders an adjustment.

Replace "Contract completion time" in the 8th paragraph of section 19-6.03D with:

work completion date

Add to section 19:

19-10–19-20 RESERVED
20 LANDSCAPE
05-30-14

Replace the headings and paragraphs in section 20 with:

20-1 GENERAL

20-1.01 GENERAL

20-1.01A Summary
Section 20-1 includes general specifications for performing landscaping.

If an irrigation system is to be installed in an existing planting area to be maintained, check for plant deficiencies under section 20-3.02A(4) before starting irrigation work.

Perform a functional test for each irrigation system under 20-2.01A(4)(d):

1. Before planting the plants
2. After planting the plants
3. Before the start of the plant establishment work

If a plant is to be transplanted or an irrigation component is to be relocated, transplant plant or protect irrigation components before performing other construction activities in the area.

Perform roadside clearing:

1. As required to prepare the job site for construction work
2. Until the start of the plant establishment work or Contract acceptance, whichever comes first

20-1.01B Definitions
Reserved

20-1.01C Submittals
At least 15 days before applying any pesticide, submit a copy of the licensed pest control adviser's recommendation.

At the end of each week, submit a report documenting the application of all pesticides as an informational submittal. Use form Report of Chemical Spray Operations.

Before mixing a pesticide, submit a copy of the registered label for the pesticide as an informational submittal. If unable to copy, allow the Engineer to read the label on the container.

20-1.01D Quality Control and Assurance

20-1.01D(1) General
Obtain a recommendation from a licensed pest control adviser for the use of all pesticides under the Food & Agri Code. The recommendation must include the pesticides to be used, rates of application, methods of application, and application areas.

The pesticide applicator must have an active and valid qualified applicator license or certificate from the Department of Pesticide Regulation.

20-1.01D(2) Progress Inspections
The Engineer will perform progress inspections before:

1. Cultivating work starts
2. Pressure testing of irrigation pipe on the supply side of control valves
3. Testing of low voltage conductors
4. Planting work starts
5. Completion of planting work

Notify the Engineer at least 4 business days before each inspection is required. Allow at least 3 business days for the Engineer's inspection.

Unless otherwise authorized, do not proceed with the next construction activity until the inspection has been completed and any required corrective work has been performed and authorized.

20-1.02 MATERIALS
20-1.02A General
Reserved

20-1.02B Water

Water available from an existing Department-owned facility within the project limits or an irrigation system to be installed under the Contract is furnished at no charge.

If water is not available, make arrangements for supplying water. Water must be of a quality that will promote plant growth.

20-1.02C Pesticides

Pesticides must comply with the Department of Pesticide Regulation.

Insecticide must be imidacloprid.

Rodenticides must be brodifacoum, bromadiolone, or diphacinone.

Do not use oil or pelleted forms of pesticides for weed control.

For weed control, use a pesticide with a photosensitive dye that produces a contrasting color when sprayed on the ground. The color must disappear between 2 to 3 days after being applied. The dye must not stain surfaces or injure plants or wildlife when applied at the manufacturer's recommended application rate.

20-1.03 CONSTRUCTION
20-1.03A General

Take precautions to prevent irrigation water from:

1. Wetting vehicles, pedestrians, and pavement
2. Eroding soil

3. Causing excess runoff

Water plants under the Model Water Efficient Landscape Ordinance, 23 CA Code of Regs § 490 et seq., and local water agency requirements.

Water plants at night unless otherwise authorized.

Dispose of removed, pruned, and damaged vegetative material.

You may reduce removed vegetative material to chips with a maximum thickness of 1/2 inch and spread within the job site at locations determined by the Engineer. Chipped material must not be substituted for wood mulch, nor must the chipped material be placed within areas to receive wood mulch.

20-1.03B Pesticides

Notify the Engineer of pesticide application times at least 24 hours before each application.

Mix and apply pesticides under the requirements of the Department of Pesticide Regulation and the instructions on the pesticide product label.
Do not apply pesticides:
1. On Saturdays and holidays unless authorized
2. Whenever weather and wind conditions are unsuitable for application
3. Within the plant basin
4. On the foliage and woody parts of the plant

If a granular preemergent is used, it must be covered with mulch on the same work day. Do not apply granular preemergent in plant basins.

Do not apply preemergents:
1. To groundcover plants before the plants have been planted a minimum of 3 days and have been thoroughly watered
2. Within 18 inches of trees, shrubs, and seeded areas

20-1.03C Roadside Clearing

20-1.03C(1) General
Perform roadside clearing by:

1. Removing and disposing of trash and debris
2. Controlling the following pests:
   2.1. Rodents
   2.2. Insects
   2.3. Weeds
3. Removing existing plants as described

Control rodents by using rodenticides or traps.

20-1.03C(2) Remove Existing Plants
Remove existing plants as described. Removal of existing plants includes removing their stumps and roots 2 inches or larger in diameter to a minimum depth of 12 inches below finished grade. Backfill holes resulting from stump removal to finished grade with material obtained from adjacent areas.

If a plant is to be planted within existing groundcover area, remove existing groundcover from within an area 6 feet in diameter centered at each plant location.

20-1.03C(3) Weed Control
Control weeds by the use of pesticides, hand pulling, or mowing.

If pesticides are used to control weeds, apply pesticides before the weeds reach the seed stage of growth or exceed 4 inches in length, whichever occurs first. Do not use pesticides at cutting plant locations.

Where cuttings are to be planted, control weeds by hand pulling within an area 2 feet in diameter centered at each plant location.

If weeds are to be controlled by hand pulling, hand pull weeds before they reach the seed stage of growth or exceed 4 inches in length, whichever occurs first.

Where liner, plug, or seedling plants are to be planted 10 feet or more apart, control weeds by the use of pesticides or hand pulling within an area 2 feet in diameter centered at each plant location. Where liner, plug, or seedling plants are to be planted less than 10 feet apart, control weeds by the use of pesticides within the entire area.

Control weeds by mowing outside of mulched areas, plant basins, groundcover areas, and within areas to be seeded. Mowing must extend to the edges of pavement, dikes, curbs, sidewalks, walls, and fences.

If mowing is to be performed within areas to be seeded, perform mowing as needed until the start of the seeding operation specified in section 21.
Mowing must be performed before the weeds reach the seed stage of growth or exceed 6 inches in length, whichever occurs first. Mow weeds to a height of 3 inches.

20-1.03C(4) Disposal of Removed Groundcover, Weeds, and Mowed Material
Dispose of hand pulled weeds the same day they are pulled. Dispose of removed groundcover within 3 days.

Dispose of mowed material from the initial mowing. Disposal of material from subsequent mowing is not required.

20-1.03D Cultivation
Cultivation must be by mechanical methods and performed until the soil is in a loose condition to a minimum depth of 6 inches. Soil clods must not be larger than 2 inches in maximum dimension after cultivation.

The areas to be cultivated must extend 12 inches beyond the outer limit of each planting area requiring cultivation.

After initial cultivation, place soil amendment and fertilizer at specified rates.
Recultivate to thoroughly mix native soil and amendments.
Do not drive on cultivated areas after cultivation.
Planting areas that have been cultivated and become compacted must be recultivated.
Rocks and debris encountered during soil preparation in planting areas must be brought to the surface of the ground.
Remove rocks and debris as ordered. This work is change order work.

20-1.03E Weed Germination
Reserved

20-1.04 PAYMENT
Items paid for by area are measured parallel to the ground surface.

Planting areas that do not require cultivation but are within the cultivation areas will not be deducted.

20-2 IRRIGATION

20-2.01 GENERAL
20-2.01A General
20-2.01A(1) Summary
Section 20-2 includes specifications for installing irrigation systems.
The irrigation systems shown are diagrammatic.

20-2.01A(2) Definitions
Reserved

20-2.01A(3) Submittals
20-2.01A(3)(a) General
Submit shop drawings for the electrical components of the irrigation system except electrical service 30 days before installation. The drawings must:

1. Include schematic wiring diagrams showing wire sizes and routes between electrical components
2. Show conduit sizes
3. Bear the written approval of the controller manufacturer or the manufacturer’s authorized agent
4. Be accompanied by:
4.1. Colored wire and splice samples
4.2. Manufacturer's descriptive and technical literature

After the work shown on the drawing is complete, submit 3 copies of the as-built shop drawings including any wire modifications for each controller installed.

For each controller, laminate and place in an envelope 1 copy of:
1. As-built schematic wiring diagram including wiring modifications
2. 11 by 17 inches as-built irrigation plan

The laminate must be clear, mat-finished plastic that is at least 10 mils thick. The envelope must be heavy-duty plastic.

Attach the envelope to the inside of the controller enclosure or cabinet door. If the door is not large enough to secure the envelope, submit the envelope and its contents.

20-2.01A(3)(b) Manufacturer's Instructions
Submit as an informational submittal the manufacturer's installation instructions 15 days before installing:
1. Couplings for conduits used for irrigation conduits
2. Plastic pipe and fittings
3. Solvent cement for plastic pipe and flexible hose
4. Sprinklers
5. Flow sensors

20-2.01A(3)(c) Maintenance and Operation Manuals
Before Contract acceptance, submit as an informational submittal a manufacturer's maintenance and operation manual for each type of controller installed.

20-2.01A(4) Quality Control and Assurance
20-2.01A(4)(a) General
Reserved

20-2.01A(4)(b) Pressure Testing
20-2.01A(4)(b)(i) General
Perform pressure testing for leakage on irrigation supply lines:
1. In the Engineer's presence
2. On business days between 8 a.m. and 5 p.m. unless authorized
3. Before backfilling supply line trenches
4. With irrigation system gate valves open
5. With open ends of the supply line and fittings plugged or capped

Notify the Engineer at least 48 hours before performing a pressure test.

Choose either Method A or B to test supply lines installed by trenching and backfilling and supply lines that are completely visible after installation.

All other supply lines, including those installed in the ground by methods other than trenching and backfilling must be tested by Method A.

Test irrigation supply line in conduit by Method A with the testing period modified to 0.5 hour and no allowable pressure drop.

20-2.01A(4)(b)(ii) Method A
Method A pressure testing procedures for leakage must comply with the following:
1. Pressure gauge must be calibrated from 0 to 200 psi in 5 psi increments and be accurate to within a tolerance of 2 psi.
2. Supply line must be filled with water and connected to a pressure gauge. Place the pipeline under a pressure of 125 psi. Remove the source of pressure and leave the line under the required pressure.

3. Test the supply line under the required pressure for a period of 1 hour. The pressure gauge must remain in place until each test period is complete.

4. Leaks that develop in the tested portion of the system must be located and repaired after each test period if a drop of more than 5 psi is indicated by the pressure gauge. After the leaks have been repaired, repeat the 1 hour pressure test until the drop in pressure is 5 psi or less.

If a system consists of a new supply line connected to an existing line, the new supply line must be isolated from the existing line and tested.

20-2.01A(4)(b)(iii) Method B

Method B pressure testing procedures for leakage must comply with the following:

1. Before any portion of the supply line on the upstream side of a control valve is backfilled, water must be turned on for that portion of the line and maintained at full pressure from the water source for a period not less than 8 consecutive hours after all air has been expelled from the line. Before any portion of the supply line on the downstream side of the control valve is backfilled, perform the same test for a period not less than 1 hour.

2. Repair leaks that develop in the tested portion of the system. After the leaks have been repaired, repeat the pressure test until no leaks occur as determined by the Engineer.

20-2.01A(4)(c) Sprinkler Coverage Check

After installation of the sprinklers, check and adjust the entire sprinkler system for proper orientation and uniform coverage.

20-2.01A(4)(d) Irrigation System Functional Tests

The functional tests for each irrigation controller or group of controllers and associated irrigation system served by a single electric service point must consist of at least 1 complete cycle of operation. The Engineer determines the length of the cycle.

Notify the Engineer at least 10 days before performing each functional test.

20-2.01A(4)(e) Final Irrigation System Check

Perform the final check of the existing and new irrigation system between 20 and 30 days before Contract acceptance. The Engineer determines the length of the cycle.

Remote control valves connected to existing and new irrigation controllers must be checked for automatic operation when the controllers are in automatic mode.

20-2.01B Materials

20-2.01B(1) General

Use minor concrete for replacing removed concrete facilities.

HMA for replacing removed asphalt concrete surfacing and facilities must comply with section 39. You may use minor HMA if authorized.

20-2.01B(2) Garden Valves

Each garden valve must:

1. Be inverted nose type and of brass or bronze construction with female thread inlet
2. Have a replaceable seat washer, rising valve stem within a protective collar, and male thread hose outlet
3. Have a loose key handle

20-2.01B(3) Recycled Water Identification

Irrigation components used for recycled water must be manufactured or painted purple. Recycled water irrigation pipe and tubing must have a permanent label with the wording "CAUTION RECYCLED WATER"
every 24 inches in 2 rows spaced approximately 180 degrees apart in the longitudinal direction of the pipe or tubing.

The recycled water warning sign must be a decal or a decal attached to a 1/16-inch thick aluminum plate or tag.

Each warning sign decal must:
1. Show the phrase "Recycled Water, Do Not Drink" and the drinking glass graphic symbol
2. Be UV fade and weather resistant and manufactured from flexible vinyl with or without mylar
3. Have a purple background, black text, and self-adhesive backing

Each warning tag must:
1. Show the phrase "RECYCLED WATER" and the drinking glass graphic symbol
2. Be UV fade and weather resistant
3. Be purple, double-sided, and manufactured from polyurethane
4. Have an integral neck attachment and attachment hole capable of withstanding 178 lb of pull-out resistance
5. Have hot-stamped black lettering

Posts and hardware for warning signs must comply with section 56-4.

Concrete sprinkler protectors used with recycled water must be painted purple.

20-2.01B(4) Location Markers
Location markers must be schedule 40 white PVC plastic pipe.

20-2.01B(5) Pull Boxes
Pull boxes must comply with section 86-2.06 and be no. 5 or larger unless otherwise shown. Pull boxes for low voltage conductors must not have side openings.

Pull box covers used solely for irrigation electrical service must be marked "IRRIGATION".

20-2.01B(6) Unions
Unions must be brass or malleable iron capable of withstanding the maximum required working pressure.

20-2.01B(7) Valve Boxes and Covers
Valve boxes must be precast concrete.

Covers must be:
1. Concrete, steel, or cast iron.
2. Marked "WATER" in cast-in letters not less than 1 inch high.
3. 1 piece, except 2 pieces are required when the weight of the valve box cover exceeds 35 lb.

The valve box covers must include a polyurethane label with the appropriate controller letter and station number as shown.

20-2.01B(8) Wye Strainers
Wye strainers must:
1. Have a cast iron or all bronze body
2. Have a removable stainless steel strainer screen:
   2.1. With an open area equal to at least 3 times the cross-sectional area of the pipe based on an iron pipe size
   2.2. With 40-mesh woven wire, except:
      2.2.1. For a backflow preventer assembly, the screen must be 20-mesh woven wire mesh or perforated sheet with 0.045-inch diameter holes
      2.2.2. For a valve assembly, the screen must be 80-mesh woven wire mesh
The wye strainer filter housing must:

1. Withstand a working pressure of 150 psi
2. Be manufactured of reinforced polypropylene plastic

20-2.01C Construction
20-2.01C(1) General

Immediately shut off water to broken supply lines, valves, or sprinkler assemblies. Repair irrigation systems within 24 hours after a malfunction or damage occurs.

Connect underground metallic pipes, valves, or fittings made of dissimilar metals through a dielectric coupling or bushing.

You may install conduits, conductors, and supply lines by methods other than trenching provided that they are not damaged and are installed at the depths specified.

20-2.01C(2) Trenching and Backfilling

Trench and backfill under section 86-2.01.

Remove plants under 20-1.03C as necessary to perform trenching. If plants are to remain, adjust trench alignment to minimize damage.

If removal of:

1. Turf is required, remove to a maximum width of 12 inches.
2. Groundcover is required, remove to a maximum width of 6 feet. Existing Carpobrotus and Delosperma may be rototilled if the backfill for the trenches does not contain plants longer than 6 inches in length.

Make a 2-inch deep sawcut along neat lines around the perimeter of the pavement to be removed at locations determined by the Engineer.

The trench must have uniform bearing throughout the entire length and must be free of jagged rubble or sharp objects. Ensure conduit, supply line, and joints are not moved or damaged by backfill operations.

For a project with multiple water service points, excavate and backfill trenches for 1 service point at a time.

Trenches for irrigation supply lines and conduits 3 inches and larger must be 5 times the pipe or conduit diameter deep and 2 times the pipe or conduit diameter wide.

Trenches for irrigation supply lines and conduits 2-1/2 inches or less in diameter must be a minimum of 12 inches below finished grade, measured from the top of the installed pipe.

Trenches must be at least 4 feet from curbs, dikes, and paved shoulders.

Rocks and debris encountered during trenching operations must be brought to the surface of the ground. Remove rocks and debris as ordered. This work is change order work.

If trenching requires the removal of plants, in areas with:

1. Turf, replace turf with sod under section 20-3.03C(3)(e).
2. Groundcover, replace groundcover plants from flats and plant at 12 inches on center under section 20-3.03C. No replacement of Carpobrotus and Delosperma is required if removed by rototilling.
Where existing surfacing is removed, replace the structural section to match the materials removed. Replacement concrete must be of uniform smoothness, color, and texture equal to the adjacent concrete surface. Dispose of removed material. Install supply line and conduits at the bottom of trenches and backfill with sand to a depth of 2 inches over the top of the supply lines and conduits. Excluding the part of the trench backfilled with surfacing or pavement, the remainder of the trench must be backfilled with material that is excavated from the trench. Rock, broken concrete, asphalt concrete and other particles larger than 2 inches in greatest dimension must not be used.

20-2.01C(3) Pull Boxes
Install pull boxes under section 86-2.06 at the following locations:
1. At all conductor splices except splices made in valve boxes
2. Within 5 feet of irrigation controllers
3. At ends of electrical conduits
4. At other locations shown

20-2.01C(4) Valve Boxes and Covers
Install and identify each valve box as shown.

In walkways and paved areas, install the top of the valve box flush with the surrounding finished grade.

20-2.01C(5) Recycled Water Warning Signs
Install recycled water warning signs on irrigation facilities using recycled water.

Install sign decals directly to clean, smooth surfaces. Clean the surface with alcohol or an equivalent cleaner before applying the decal.

Install a 4 by 4 inch warning sign decal to each:
1. Backflow preventer assembly
2. Irrigation controller enclosure cabinet door

Install a 2 by 2 inch warning tag to the each remote control valve and valve box cover.
Install a 2-1/2 by 3 inches sign decal to each sprinkler riser.

Under local regulations, install a 12 by 12 inch warning sign decal on an aluminum plate and attach to gates, fences, and walls located in the vicinity of a recycled water irrigation system. On gates and fences, install signs with S hooks and C clips or 14-gauge galvanized steel wire. On concrete walls or other rough surfaces, install signs with a silicon-based adhesive.

20-2.01C(6) Garden Valves
Furnish 3 keys for each garden valve before Contract acceptance.

20-2.01D Payment
Not Used

20-2.02 EXISTING IRRIGATION FACILITIES
20-2.02A General

20-2.02A(1) Summary
Section 20-2.02 includes specifications for checking, testing, operating, replacing, and relocating existing irrigation facilities.

20-2.02A(2) Definitions
Reserved
**20-2.02A(3) Submittals**
Submit a list of irrigation system deficiencies within 7 days after checking the existing facilities.

**20-2.02A(4) Quality Control and Assurance**
After irrigation facilities have been relocated, demonstrate in the presence of the Engineer that the relocated facilities function properly.

Certify each existing backflow preventer under section 20-2.03A(4).

**20-2.02B Materials**
Valve box covers must be the same size as the covers they replace.

Control and neutral conductors must be the same size and color as the control and neutral conductors they replace.

**20-2.02C Construction**
**20-2.02C(1) General**
Notify the Engineer at least 4 business days before shutting off the water supply to any portion of the existing irrigation system and immediately after restoring the water supply to any portion of the existing irrigation system.

If an irrigation facility to be relocated is determined unsuitable by the Engineer, replace irrigation facility under section 20-2. This work is change order work.

**20-2.02C(2) Check and Test Existing Irrigation Facilities**
Before performing irrigation system work, check existing irrigation facilities to remain in place or to be relocated. The Engineer determines the test watering cycle lengths. Check for deficiencies including missing parts, damaged components, and improper operation. Correct deficiencies as ordered. The correction of deficiencies is change order work.

**20-2.02C(3) Operate Existing Irrigation Facilities**
If the Contract includes a bid item for operate existing irrigation facilities, after performing work under section 20-2.02C(2), operate existing irrigation facilities through Contract acceptance.

Operate existing irrigation facilities except for water meters, underground supply lines, control and neutral conductors, and electrical conduits.

Check for proper operation at least once every 30 days. Adjust, repair, or replace existing irrigation facilities within 7 days of finding any deficiency.

Operate irrigation systems using the automatic irrigation controller until Contract acceptance. You may operate irrigation controllers manually during plant replacement, fertilization, weed germination, and repair work.

Program the irrigation controllers for seasonal requirements.

**20-2.02C(4) Replace Valve Box Covers**
Existing valve box covers shown to be replaced must remain in place until the new covers are ready to be installed.

Dispose of removed valve box covers.

**20-2.02C(5) Relocate Backflow Preventer Assemblies**
Relocate backflow preventer assembly as shown and install under section 20-2.03C.

**20-2.02C(6) Relocate Water Meters**
Relocate water meter as shown.
20-2.02C(7) Relocate Irrigation Controllers
Relocate irrigation controller as shown and install under section 20-2.07C.

20-2.02D Payment
Not Used

20-2.03 BACKFLOW PREVENTER ASSEMBLIES
20-2.03A General
20-2.03A(1) Summary
Section 20-2.03 includes specifications for installing a backflow preventer assembly.

20-2.03A(2) Definitions
Reserved

20-2.03A(3) Submittals
Reserved

20-2.03A(4) Quality Control and Assurance
Each backflow preventer assembly must be certified by a backflow preventer tester. The tester must have an active and valid certification from the water purveyor having jurisdiction.

If the local water purveyor does not have a certification program, the tester must be certified by AWWA or a nearby county with a certification program.

Notify the Engineer at least 5 business days before certifying backflow preventer assembly.

Certify each backflow preventer assembly annually and within 10 days before Contract acceptance.

20-2.03B Materials
20-2.03B(1) General
Each backflow preventer assembly must include:

1. Backflow preventer including gate valve, wye strainer, brass or malleable iron unions, fittings, and supports
2. Blanket
3. Enclosure
4. Concrete pad

Concrete for the pad must be minor concrete, except the concrete must not contain less than 463 pounds of cementitious material per cubic yard. Hand mixing of the concrete is allowed.

20-2.03B(2) Backflow Preventers
Each backflow preventer must:

1. Be reduced-pressure principle type.
2. Comply with the requirements of the water purveyor that has jurisdiction.
3. Be factory-assembled with:
   3.1.2 check valves
   3.2.1 pressure differential relief valve
   3.3.4 test cocks
   3.4.2 shut-off valves manufactured from iron or bronze. Shut-off valves must be one of the following:
      3.4.1. Resilient wedge gate valves
      3.4.2. Resilient seated and fully ported ball valves
      3.4.3. Resilient seated butterfly valves

Backflow preventer components must be capable of withstanding a working pressure of 150 psi.
20-2.03B(3) Backflow Preventer Blankets
Each backflow preventer blanket must:

1. Be polyester fabric coated with vinyl or polymeric resin
2. Be resistant to UV light, water, mildew, and fire
3. Have an R-value from R-30 to R-38

Blankets must have a securing mechanism that includes either zippers, hook-pile tape, grommets, snaps, buttons, or any combination of these. Wherever the backflow preventer is not in an enclosure, the securing mechanism must be capable of accepting a padlock.

20-2.03B(4) Backflow Preventer Enclosures
Each backflow preventer enclosure must:

1. Have expanded metal sides, ends, and top panels fabricated from 9-gauge minimum thickness stainless sheet steel with openings of approximately 3/4 by 1-3/4 inches
2. Have expanded metal panels attached to the 3/16-inch thick steel frame by a series of welds not less than 1/4 inch in length and spaced not more than 4 inches on center, along the edges of the enclosure
3. Have Type 304 stainless steel lock guards with a minimum thickness of 12 gauge.
4. Have hexagonal nuts and lock-type washers
5. Be powder coated by the manufacturer to match color no. 20450 of FED-STD-595.
6. Have padlock clasp or latch and lock mechanism

20-2.03C Construction
Finish exposed top surfaces of concrete pad with a medium broom finish applied parallel to the long dimension of pads.

Install hold-downs for the backflow preventer assembly enclosure when concrete is still plastic.

20-2.03D Payment
Not Used

20-2.04 CAM COUPLER ASSEMBLIES
20-2.04A General
Section 20-2.04 includes specifications for installing a cam coupler assembly.

20-2.04B Materials
Each cam coupler assembly must consist of a cam coupler, dust cap, check valve, pipes, fittings, concrete thrust block, and valve box with woven wire cloth and gravel.

Cam couplers and keys must be manufactured of brass or bronze and be able to withstand a working pressure of 150 psi.

Furnish 3 loose cam coupler keys before Contract acceptance.

20-2.04C Construction
Install cam coupler assemblies in valve boxes as shown.

20-2.04D Payment
Not Used

20-2.05 CONTROL AND NEUTRAL CONDUCTORS
20-2.05A General
20-2.05A(1) Summary
Section 20-2.05 includes specifications for installing control and neutral conductors.
20-2.05A(2) Definitions
Reserved

20-2.05A(3) Submittals
Reserved

20-2.05A(4) Quality Control and Assurance
Perform field tests on control and neutral conductors. Field tests must comply with the specifications for lighting circuits in section 86-2.14B.

Where the conductors are installed by trenching and backfilling, perform field tests after a minimum of 6 inches of backfill material has been placed and compacted over the conductors.

20-2.05B Materials
Control and neutral conductors must comply with the requirements in section 86-2.08.

For connections between 24-volt irrigation controllers and valve solenoids, use control and neutral conductors. Conductors must include a control conductor for each valve and a common neutral.

Conductor insulation color, except for the stripes, must be continuous throughout. The color of the conductors must be consistent from the controller to each valve. Neutral conductors must be white. Do not use white for control conductors. Do not use conductors with green insulation except as permitted by the NEC.

Conductors must be:

1. No. 12 AWG or larger or no. 14 AWG or larger for armor-clad
2. Rated for 36 V or 600 V for armor-clad
3. Rated for direct burial
4. Underground feeder cable Type UF and TWU
5. Solid, uncoated copper for armor-clad
6. Not less than 90 percent of the AWG diameter required

No. 10 and smaller conductors must be insulated with a minimum of 56 mils of PVC or a minimum of 41 mils of polyethylene. No. 8 and larger conductors must be insulated with a minimum of 70 mils of PVC.

No. 10 and smaller armor-clad conductors must be insulated with a minimum of 41 mils of polyethylene. No. 8 and larger armor-clad conductors must be insulated with 54 to 60 mils of PVC.

Armor-clad conductors must include:

1. Stainless steel tape armor, Type 304 and helically wrapped with a 33 percent minimum overlap. The tape must be 0.5 inch wide and at least 0.005 inch thick.
2. PVC outer conductor jacket that is UV resistant and complies with the ICEA S-61-402, NEMA standard WC5 and UL listing 1263. The jacket nominal thickness must be 24 to 30 mils thick.

20-2.05C Construction
20-2.05C(1) General
Reserved

20-2.05C(2) In Open Trenches
Do not install control and neutral conductors above each other in an open trench. Wrap conductors together with electrical tape at 5 foot intervals.

Where conductors are installed in the same trench as supply line, install at the same depth as the line. At other locations, install conductors not less than 12 inches below finished grade.

Where conductors are not in a supply line trench, install conductors at least 4 feet from curbs, dikes, and paved shoulders.
20-2.05C(3) In Conduits
Install conductors in electrical conduit if conductors are to be:

1. Surface mounted
2. Installed in or on structures
3. Installed under paved areas
4. Installed in irrigation conduits
5. Placed in concrete

20-2.05C(4) Splicing
Splice low voltage control and neutral conductors under sections 86-2.09C, 86-2.09D, and 86-2.09E, except do not use method B. Tape used for splice insulation must be PVC tape.

Leave at least 2 feet of slack for each conductor at each:
1. Pull box
2. Valve box for each conductor that is connected to other facilities within the box or spliced within the box

Do not splice conductors in irrigation controller cabinets.

Permanent splice connections must be made with freshly cut and skinned conductors. Do not use temporary splices made for testing valve circuits as permanent splices.

20-2.05C(5) Marking
Mark control and neutral conductors in pull boxes, valve boxes, at irrigation control terminals, and at splices.

Mark conductor terminations and splices with adhesive cloth wrap-around markers. Seal markers with clear, heat-shrinkable sleeves.

Mark nonspliced conductors with clip-on C-shaped white extruded PVC sleeves. Sleeves must have black indented legends of uniform depth with transparent overlays over the legends and chevron cuts for the alignment of 2 or more sleeves.

Identify markers for the control conductors with the appropriate irrigation controller and station number.

20-2.05D Payment
Not Used

20-2.06 FLOW SENSORS
20-2.06A General
Section 20-2.06 includes specifications for installing a flow sensor.

20-2.06B Materials
Each flow sensor must be an inline type with a nonmagnetic spinning impeller as the only moving part.

The electronics housing must:

1. Be schedule 80 PVC or cast 85-5-5-5 bronze
2. Include glass-filled polyphenylene sulfide
3. Be easily removable from the meter body and include 2 ethylene-propylene O-rings

The impeller must be tungsten carbide.

The electronics must be rated to withstand prolonged water immersion conditions and include 2 single conductor 18 AWG leads, 48 inches long.

The insulation must be direct burial UF type colored red for the positive lead and black for the negative lead.
The flow sensor must be capable of withstanding:

1. 100 to 400 psi operating pressure depending on sensor size shown
2. Liquid temperatures up to 220 degrees F
3. Flows from 1/2 to 15 ft/sec

20-2.06C Construction
Install flow sensor as shown.

20-2.06D Payment
Not Used

20-2.07 IRRIGATION CONTROLLERS
20-2.07A General

20-2.07A(1) Summary
Section 20-2.07 includes specifications for installing irrigation controllers.

20-2.07A(2) Definitions

irrigation controller: "Smart" irrigation controller as defined by the Irrigation Association.

remote irrigation control system (RICS): Centralized water management system that consists of a base station, centralized server, satellite controllers.

base station: Designated computer located at a Department maintenance facility or District Office that collects data from a series of satellite controllers through a centralized server.

centralized server: Designated server or web-based application that collects data from all base stations.

web-based application: Encrypted managing software that is coded in a browser-supported language and is executable via a common internet web browser (e.g., Microsoft Internet Explorer, Firefox, Safari, etc.).

satellite controller: Irrigation controller that communicates directly to a base station or centralized server.

network communication: Identified means through which satellite controllers, base stations, and a centralized server communicate to one another (i.e., fiber optics, spread spectrum, phone line, etc.).

remote access device: Device (i.e., FCC compliant radio remote, cell phone or wireless, etc.) used to communicate with satellite controllers from a remote location.

20-2.07A(3) Submittals
Submit as an informational submittal, a complete manufacturer’s maintenance and operations manual for each type of controller installed. Submit the manual at the time the wiring plans and diagrams are placed inside the controller enclosure or cabinet door.

20-2.07A(4) Quality Control and Assurance
Provide training by a qualified person on the use and adjustment of the irrigation controllers installed 30 days before Contract acceptance.

Modifications to electrical components must be done by the manufacturer before shipment to the job site.

The installation date and expiration date of the manufacturer’s guarantee for the controllers must be permanently marked on the inside face of the controller.

20-2.07B Materials
20-2.07B(1) General
Conventional A/C powered irrigation controllers must operate on 110/120 V, 60 Hz(ac) and supply 24 to 30 VAC, 60 Hz(ac) for operating electrical remote control valves.
Concrete for the pad and foundation must be minor concrete, except the concrete must not contain less than 463 pounds of cementitious material per cubic yard. Hand mixing of the concrete is allowed.

20-2.07B(2) Irrigation Controllers

20-2.07B(2)(a) General

The irrigation controllers must:

1. Be A/C, battery, solar, or 2-wire as shown
2. Be from a single manufacturer.
3. Be fully automatic and capable of operating a complete 30-day or longer irrigation program.
4. Have a switch or button on the face of the irrigation control panel showing that the irrigation controller can be turned on or off and provide for automatic or manual operation. Manual operation must allow cycle start at the desired station and allow for the minimum activation of a single station or have the option to operate multiple stations in sequential or simultaneous operation modes.
5. Have non-volatile memory.
6. Have a watering time display on the face of the control panel.
7. Have a panel and circuit board connected to the low voltage control and neutral conductors by means of a plug and receptacle connectors located within the cabinet enclosure.
8. Have a variable or incremental timing adjustment ranging from 1 minute to 360 minutes per station.
9. Be capable of operating at least 3 program schedules.
10. Be capable of having at least 4 start times per program schedule.
11. Have an output that can energize a pump start circuit or a remote control master valve.
12. Be protected by fuses and circuit breakers.
13. Display a program and station affected by a sensory alert without altering other watering schedules not affected by the alert.
14. Be capable of global manual and automatic seasonal adjustments to all valves in any given program.
15. Automatically alter watering schedule in accordance with evapotranspiration data provided by a local weather station or have an internal programmed default of historical evapotranspirational data for a given region.
16. Support a flow sensor, rain sensor, or weather station and have automatic shut-off capability.
17. Be capable of communicating with the remote access device.

If the irrigation controller is installed in an enclosure cabinet, the cabinet must be stainless steel and must comply with section 86-3.04A.

Irrigation controllers not installed in enclosure cabinets must be weatherproof, constructed of fiberglass or metal and have a door lock with 2 keys provided.

RICS must meet the requirements of an irrigation controller and be capable of being accessible only through a secured and encrypted server that is password and firewall protected by the Department or be accessible through a firewall secure remote server that is independent from any Department servers. The Department will set up and manage the network communication.

20-2.07B(2)(b) Battery Powered Irrigation Controllers

Reserved

20-2.07B(2)(c) Solar Powered Irrigation Controllers

Reserved

20-2.07B(2)(d) Two-wire Irrigation Controllers

Reserved

20-2.07B(3) Irrigation Controller Enclosure Cabinets

The irrigation controller enclosure cabinet must:

1. Be stainless steel.
2. Include a mounting panel. Fabricate mounting panels with one of the following:
   2.1. 3/4-inch exterior AC grade veneer plywood. Paint panels with 1 application of an exterior, latex
Based, wood primer and 2 applications of an exterior, vinyl acrylic enamel, white in color. Paint panels on all sides and edges before installation of the panels in the cabinets and the equipment on the panels.

2.2. 3/16-inch thick aluminum sheets.
2.3. 10-gauge cold-rolled steel sheets.
2.4. 0.157-inch stainless steel metal sheets.

3. Provide cross ventilation, roof ventilation, or a combination of both. Ventilation must not compromise the weather resistance properties of the cabinet and must be fabricated by the cabinet manufacturer.

4. Include protection against lightning damage.

5. Have an area inside the cabinet doors for storage of the as-built schematic wiring diagram and irrigation plans.

6. Have padlock clasp or latch and lock mechanism.

20-2.07B(4) Rain Sensors
A rain sensor unit must be a solid state, automatic shut-off type, and compatible with the irrigation controller. The rain sensor unit must automatically interrupt the master remote control valves when approximately 1/8 inch of rain has fallen. The irrigation controller must automatically be enabled again when the accumulated rainfall evaporates from the rain sensor unit collection cup.

Rain sensor units must be one of the following:

1. Rated 24 V(ac) to 30 V(ac)
2. Wireless and FCC compliant

20-2.07C Construction
Finish exposed top surface of concrete pad with a medium broom finish applied parallel to the long dimension.

Locate irrigation controllers in pedestal or wall mounted enclosures as shown.

Install electrical components for automatic irrigation systems under section 86-1.02.

Install irrigation controllers under the manufacturer’s instructions and as shown.

If 2 or more irrigation controllers operate the same remote master control valve, furnish and install an isolation relay under the controller manufacturer’s instructions.

Where direct burial conductors are to be connected to the terminal strip, connect the conductors with the open-end-crimp-on wire terminals. Exposed wire must not extend beyond the crimp of the terminal and the wires must be parallel on the terminal strip.

Install rain sensor units for irrigation controllers on the irrigation controller enclosure cabinets. Provide protection against lightning damage.

20-2.07D Payment
Payment for electrical service for 120-volt or higher is not included in the payment for irrigation controller.

20-2.08 Irrigation Conduit
20-2.08A General
20-2.08A(1) Summary
Section 20-2.08 includes specifications for installing irrigation conduit under a roadway or other facility to accommodate electrical conduit for control and neutral conductors and irrigation supply lines.

Before performing work on irrigation systems, locate existing conduits shown to be incorporated into the new work.

Before removing or disturbing existing Type A pavement markers that show the location of the existing conduit, mark the location of the existing conduit on the pavement.
20-2.08A(2) Definitions
Reserved

20-2.08A(3) Submittals
Reserved

20-2.08A(4) Quality Control and Assurance
Demonstrate the conduits are free of obstructions after placement of base and surfacing.

Before and after extending the irrigation supply line in a conduit, pressure test the supply line under section 20-2.01A(4)(b).

After conductors are installed in a conduit, test the conductors under section 20-2.05A(4).

Assign a technical representative to direct and control the directional bore activities. The representative must be present during directional bore activities. Unless otherwise authorized, perform directional bore activities in the presence of the Engineer.

20-2.08B Materials
20-2.08B(1) General
Reserved

20-2.08B(2) ABS Composite Pipe Conduit
ABS composite pipe and couplings must comply with ASTM D 2680. Couplings must be solvent cement type.

20-2.08B(3) Corrugated High Density Polyethylene Pipe Conduit
Corrugated high density polyethylene pipe must comply with ASTM F 405 and F 667 or be Type S and comply with AASHTO M252 and M294. Couplings and fittings must be as recommended by the pipe manufacturer.

20-2.08B(4) Corrugated Steel Pipe Conduit
Corrugated steel pipe conduit must comply with section 66. The nominal thickness of metal sheets for pipe must be 0.064 inch for corrugated steel pipe and 0.060 inch for corrugated aluminum pipe. Coupling bands and hardware must comply with section 66.

20-2.08B(5) Polyvinyl Chloride Pipe Conduit
PVC pipe conduit must be schedule 40 and comply with ASTM D 1785.

Fittings must be schedule 80.

20-2.08B(6) Welded Steel Pipe Conduit
Welded steel pipe must comply with ASTM A 53. Pipe must be black and have either welded or threaded joints.

The minimum wall thickness for the various sizes of welded steel pipe must comply with the dimensions shown in the following table:

<table>
<thead>
<tr>
<th>Pipe size, nominal (inch)</th>
<th>Minimum wall thickness (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.216</td>
</tr>
<tr>
<td>4</td>
<td>0.237</td>
</tr>
<tr>
<td>6</td>
<td>0.280</td>
</tr>
<tr>
<td>8</td>
<td>0.277</td>
</tr>
<tr>
<td>10</td>
<td>0.279</td>
</tr>
<tr>
<td>12</td>
<td>0.330</td>
</tr>
</tbody>
</table>
20-2.08C Construction

20-2.08C(1) General

When existing conduits are to be incorporated in new work, excavate exploratory holes for locating existing conduits at the locations indicated by existing markers or as directed. Excavate and backfill exploratory holes to a maximum size of 2-1/2 feet in width, 5 feet in depth, and 5 feet on each side of the marker or directed location parallel to the roadway. If the conduit is not found and if ordered, increase the size of the exploratory holes beyond the dimensions specified. The additional excavation and backfill is change order work.

If extending an existing conduit, remove conductors from the conduit.

Use a coupling band if the new conduit matches the existing conduit diameter, otherwise overlap the conduit at least 12 inches.

After extending existing conduits, install conductors that match the color and size of the existing conductors without splices. Splice conductors in adjacent pull boxes.

If installing a control and neutral conductor and electrical conduit through the irrigation conduit, install a no. 5 pull box at each end.

Remove debris found in the conduit before performing other work. Debris found more than 3 feet from the ends of the conduits is removed as change order work.

Extend conduit 2 feet beyond all paving unless otherwise shown.

Cap the ends of unused conduit.

Designate the location of each conduit by cementing a Type A pavement marker as shown. Type A pavement markers and adhesive must comply with section 85.

20-2.08C(2) Welded Steel Pipe Conduit

20-2.08C(2)(a) General

Install welded steel pipe by directional boring or jack and drill.

Install top of conduits:

1. 18 to 30 inches below the finished surface in sidewalk areas
2. 40 to 52 inches below the finished grade in other paved areas

20-2.08C(2)(b) Directional Boring

Notify the Engineer 2 business days before starting directional bore activities.

The diameter of the boring tool for directional boring must be only as large as necessary to install the conduit.

Mineral slurry or wetting solution may be used to lubricate the boring tool and to stabilize the soil surrounding the boring path. The mineral slurry or wetting solution must be water based.

The directional bore equipment must have directional control of the boring tool and have an electronic boring tool location detection system. During operation, the directional bore equipment must be able to determine the location of the tool both horizontally and vertically.

20-2.08C(2)(c) Jack and Drill

Notify the Engineer 2 business days before starting jack and drill activities.

Jacking or drilling pits must be no closer than 2 feet from pavement edge whenever possible.

If authorized, small holes may be cut in the pavement to locate or remove obstructions.

Do not use excessive water that will soften subgrade or undermine pavement.
20-2.08C(3) Schedule 40 Pipe Conduit

Where schedule 40 pipe conduit 2 inches or less in outside diameter is installed under surfacing, you may install by directional boring under section 20-2.08C(2)(b).

For conduit 2 inches or less in diameter, the top of the conduit must be a minimum of 18 inches below surfacing.

Extend schedule 40 pipe conduit 6 inches beyond surfacing. Cap ends of conduit until used.

20-2.08D Payment

Schedule 40 PVC pipe conduit is paid for as plastic pipe (schedule 40) (supply line).

20-2.09 IRRIGATION SUPPLY LINE

20-2.09A General

20-2.09A(1) Summary

Section 20-2.09 includes specifications for installing irrigation supply line.

If the supply line location interferes with the excavation of plant holes, relocate the plant hole to clear the supply line. Do not install supply lines through plant holes unless shown.

Supply lines, control and neutral conductors and electrical conduits installed in common trenches must not be installed above each other.

20-2.09A(2) Definitions

Reserved

20-2.09A(3) Submittals

Submit a certificate of compliance for polyethylene pipe and plastic pipe supply line.

20-2.09A(4) Quality Control and Assurance

Solvent cement must comply with the local Air Quality Management District requirements.

20-2.09B Materials

20-2.09B(1) General

Irrigation supply pipe must be metal or plastic as shown.

PCC for thrust blocks must be produced from commercial-quality aggregates. The concrete must contain at least 295 pounds of cementitious material per cubic yard.

20-2.09B(2) Copper Pipe Supply Line

Copper pipe must be Type K rigid pipe and comply with ASTM B 88. Fittings must be wrought copper or cast bronze either soldered or threaded.

Solder must be 95 percent tin and 5 percent antimony.

20-2.09B(3) Galvanized Steel Pipe Supply Line

Galvanized steel pipe supply line and couplings must be standard weight and comply with ASTM A 53, except that the zinc coating must not be less than 90 percent of the specified amount. Except for couplings, fittings must be galvanized malleable iron, banded and threaded, and comply with ANSI B16.3, Class 150.

Joint compound must be nonhardening and noncorrosive. Do not use pipe thread sealant tape.

20-2.09B(4) Drip Irrigation Tubing

Drip irrigation tubing must be virgin polyethylene plastic and comply with ASTM D 2737.

The drip irrigation tubing must be distribution tubing with preinstalled in-line emitters.
If preinstalled in-line drip irrigation tubing is not shown, you may install emitters that match the distribution requirements shown. The emitters must be barbed or threaded-type outlet devices with dual silicone diaphragms and installed under the manufacturer's instructions.

The emitters must meet the flow rate and operating pressure range shown.

The wall thickness of polyethylene tubing must comply with the following requirements when tested under ASTM D 2122:

<table>
<thead>
<tr>
<th>Pipe size, nominal (inch)</th>
<th>Minimum wall thickness (inch)</th>
<th>Maximum wall thickness (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>0.050</td>
<td>0.070</td>
</tr>
<tr>
<td>5/8</td>
<td>0.055</td>
<td>0.075</td>
</tr>
<tr>
<td>3/4</td>
<td>0.060</td>
<td>0.080</td>
</tr>
</tbody>
</table>

The polyethylene tubing fittings must be leak-free, compression type and have female sockets with an internal barb to provide a positive pipe-to-fitting connection that will not separate at the designed pressure.

**20-2.09B(5) Plastic Pipe Supply Line**

Plastic pipe supply line must be PVC pipe that is NSF approved.

Schedule 40 plastic pipe supply line must comply with ASTM D 1785.

Class 315 plastic pipe supply line must comply with ASTM D 2241.

PVC gasketed bell joints must comply with ASTM D 2672, ASTM D2241, ASTM D 3139, and ASTM F 477.

For solvent-cemented type joints, the primer and solvent cement must be made by the same manufacturer. The primer color must contrast with the color of the pipe and fittings.

Solvent-cemented fittings must be injection molded PVC, schedule 40, and comply with ASTM D 2466.

Fittings for supply line placed in irrigation conduit must be schedule 80.

Fittings for plastic pipe supply line larger than 4 inches must be ductile iron under section 20-2.14C(2)(b).

If UV-resistant plastic pipe supply line is required, the pipe must be homogeneous, uniform color and be manufactured of:

1. At least 80 percent vinyl chloride resin with UV stabilizers
2. Non-PVC resin modifiers and coloring ingredients
3. Coloring ingredients with UV stabilizers

**20-2.09C Construction**

**20-2.09C(1) General**

Cut pipe straight and true. After cutting, ream out the ends to the full inside diameter of the pipe.

Prevent foreign material from entering the irrigation system during installation. Immediately before assembling, clean all pipes, valves, and fittings. Flush lines before attaching sprinklers, emitters, and other terminal fittings. Reuse water from waterline flushing for landscape irrigation if practicable.

Pipe supply lines installed between the water meter and backflow preventer assembly must be installed not less than 18 inches below finished grade measured to the top of the pipe.

Where a connection is made to existing supply lines, bell and gasketed fittings or compression fittings may be used.
Install a thrust block at each change in direction on the main supply line, terminus run, and at other
locations shown.

Where supply lines cross paved ditches more than 3 feet deep at their flow line, install galvanized steel
pipe for the entire span of the ditch.

Secure UV resistant plastic pipe supply line on grade as shown.

**20-2.09C(2) Galvanized Steel Pipe Supply Line**

Coat male pipe threads on galvanized steel pipe according to the manufacturer's instructions.

**20-2.09C(3) Drip Irrigation Tubing**

Install drip irrigation tubing on grade and under manufacturer's instructions.

Install a flush valve and an air-relief valve if recommended by the drip valve assembly manufacturer.

**20-2.09C(4) Plastic Pipe Supply Line**

For PVC pipe 1-1/2 inches in diameter or smaller, cut the pipe with PVC cutters.

For solvent-cemented type joints, apply primer and solvent-cement separately under the manufacturer's
instructions.

Wrap the male portion of each threaded plastic pipe fitting with at least 2 layers of pipe thread sealant
tape.

Install plastic pipe supply line mains with solvent-cemented type joints not less than 18 inches below
finished grade measured to the top of the pipe.

Install plastic pipe supply line laterals with solvent-cemented type joints not less than 12 inches below
finished grade measured to the top of the pipe.

Snake plastic pipe installed by trenching and backfilling methods.

**20-2.09D Payment**

Supply line pipe and drip irrigation tubing are measured along the slope.

**20-2.10 SPRINKLER ASSEMBLIES**

**20-2.10A General**

Section 20-2.10 includes specifications for installing sprinkler assemblies.

**20-2.10B Materials**

**20-2.10B(1) General**

Each sprinkler assembly must meet the characteristics shown in the irrigation legend.

Where shown, a sprinkler assembly must have a flow shut-off device that automatically stops the flow of
water on the downstream side of the device when the assembly is broken. You may use a sprinkler
assembly with a preinstalled flow shut-off device or you must install a flow shut-off device under the
manufacturer's instructions.

Flexible hose for sprinkler assembly must be leak-free, nonrigid and comply with ASTM D 2287, cell Type
6564500. The hose wall thickness must comply with ASTM D 2122 for the hose diameters shown in the
following table:

<table>
<thead>
<tr>
<th>Hose diameter, nominal (inch)</th>
<th>Minimum wall thickness (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>0.127</td>
</tr>
<tr>
<td>3/4</td>
<td>0.154</td>
</tr>
<tr>
<td>1</td>
<td>0.179</td>
</tr>
</tbody>
</table>

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Solvent cement and fittings for flexible hose must comply with section 20-2.09B(5).

### 20-2.10B(2) Pop-Up Sprinkler Assemblies
Each pop-up sprinkler assembly must include a body, nozzle, swing joint, pressure compensation device, check valve, sprinkler protector, and fittings as shown.

### 20-2.10B(3) Riser Sprinkler Assemblies
Each riser sprinkler assembly must include a riser or flexible hose, threaded nipple, swing joint, check valve, and nozzle as shown. The riser must be UV resistant schedule 80, PVC 1120 or PVC 1220 pipe and comply with ASTM D 1785.

### 20-2.10B(4) Tree Well Sprinkler Assemblies
Each tree well sprinkler assembly must include a body, riser, swing joint, perforated drainpipe, and drain cap. The perforated drainpipe must be commercial grade, rigid, PVC pipe with holes spaced not more than 6 inches on center on 1 side of the pipe.

Drain cap must be commercially available, 1 piece, injection molded drain grate manufactured from structural foam polyolefins with UV light inhibitors. Drain grate must be black.

Gravel for filling the drainpipe must be graded such that 100 percent passes the 3/4-inch sieve and 100 percent is retained on the 1/2-inch sieve. Gravel must be clean, washed, dry, and free from clay or organic material.

### 20-2.10C Construction
Install pop-up and riser sprinkler assembly:

1. 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. 10 feet from paved shoulders
3. 3 feet from fences and walls

If sprinkler assembly cannot be installed within these limits, the location will be determined by the Engineer.

Set sprinkler assembly riser on slopes perpendicular to the plane of the slope.

Install tree well sprinkler assembly as shown.

### 20-2.10D Payment
Not Used

### 20-2.11 VALVES
#### 20-2.11A General
Section 20-2.11 includes specifications for installing valves.

#### 20-2.11B Materials
##### 20-2.11B(1) General
Valves must:

1. Include a valve box and cover
2. Be the same size as the supply line that the valve serves unless otherwise shown
3. Be bottom, angled, or straight inlet configuration

##### 20-2.11B(2) Ball Valves
Ball valve must be a two-piece brass or bronze body and comply with the requirements shown in the following table:
<table>
<thead>
<tr>
<th>Property</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nonshock working pressure, min</td>
<td>400 psi</td>
</tr>
<tr>
<td>Seats</td>
<td>PTFE</td>
</tr>
<tr>
<td>O-ring seals</td>
<td>PTFE</td>
</tr>
</tbody>
</table>

Ball valve must be the same size as the supply line that the valve serves.

**20-2.11B(3) Check Valves**

Each check valve must:

1. Be schedule 80 PVC and factory set to 5 psi for adjustable spring check valve
2. Be Class 200 PVC for swing check valves on non pressurized plastic irrigation supply line

**20-2.11B(4) Drip Valve Assemblies**

Each drip valve assembly must include:

1. Remote control valve
2. Wye filter with:
   1.1. Filter housing that:
      1.1.1. Can withstand a working pressure of 150 psi
      1.1.2. Is manufactured of reinforced polypropylene plastic
   1.2. Reusable stainless steel filter cartridge with a 200 mesh size filtration
3. Ball valve under 20-2.11B(2)
4. Schedule 80 PVC pipes and fittings
5. Pressure regulator

**20-2.11B(5) Garden Valve Assemblies**

Each garden valve assembly must have:

1. Garden valve
2. Location marker

**20-2.11B(6) Gate Valves**

Gate valves must be:

1. Flanged or threaded type
2. Iron or bronze body
3. Bronze trimmed with one of the following:
   3.1. Internally threading rising stem
   3.2. Nonrising stem
4. Able to withstand a working pressure of 150 psi
5. Same size as the pipeline that the valves serves unless otherwise shown

Gate valves smaller than 3 inches must have a cross handle.

Gate valves 3 inches or larger must be flanged type with a square nut. Furnish 3 long shank keys before Contract acceptance.

Gate valves attached to the outlets of a wye strainer must have seating rings on the discharge side of the gate valves must be PTFE. Valve wedges must be driven obliquely by cam action into the seating rings.

**20-2.11B(7) Pressure Regulating Valves**

Pressure regulating valve must be:

1. Flanged or threaded type
2. Brass, bronze, cast iron, or plastic body
3. Spring diaphragm type
4. Pilot controlled
Pressure regulating valve must have no internal filter screens.

20-2.11B(8) Pressure Relief Valves
Pressure relief valve must have a brass or bronze body, stainless steel springs, bronze nickel chrome seats, composition seat discs, female bottom inlets, and female side outlets.

20-2.11B(9) Quick Coupling Valves
Quick coupling valve must be 3/4 inch double slotted with a self-closing cap, 3/4-inch brass key and 3/4-inch brass hose swivel unless otherwise shown. Except for the cap, quick coupling valve must be brass or bronze construction. Furnish 3 loose quick coupling brass keys and brass hose swivels before Contract acceptance.

20-2.11B(10) Remote Control Valves
20-2.11B(10)(a) General
Each remote control valve must:

1. Be normally closed type.
2. Be glass filled nylon, brass, or bronze.
3. Be completely serviceable from the top without removing the valve body from the system.
4. Be equipped with a device that regulates and adjusts the flow of water and be provided with a manual shut-off. The manual shut-off for valves larger than 3/4 inch must be operated by a cross handle.
5. Have solenoids compatible with the irrigation controller.
6. Have a manual bleed device.
7. Be capable of withstanding a pressure of 200 psi
8. Have replaceable compression discs or diaphragms.
9. Have threaded fittings for inlets and outlets.
10. Have DC latching solenoids when used with solar or battery controllers. Solenoids must operate on 3.5 V.

20-2.11B(10)(b) Remote Control Valves with Flow Sensor
Reserved

20-2.11B(10)(c) Remote Control Valves with Pressure Regulator
Each remote control valve with pressure regulator must be factory assembled as 1 unit.

20-2.11B(11) Wye Strainer Assemblies
Each wye strainer assembly must include:

1. Wye strainer
2. Garden valve

20-2.11C Construction
20-2.11C(1) General
Install control valves:

1. 6-1/2 to 8 feet from curbs, dikes, and sidewalks
2. 10 feet from paved shoulders
3. 3 feet from fences, walls, or both

If a control valve cannot be installed within these limits, the location will be determined by the Engineer.

20-2.11C(2) Check Valves
Unless otherwise shown, install spring-action check valves as necessary to prevent low head drainage.

20-2.11C(3) Garden Valve Assemblies
Install a location marker 8 to 10 inches from the back of each garden valve.
20-2.11C(4) Pressure Regulating Valves
Install pressure regulating valves with threaded connections and a union on the inlet side of the valves.

20-2.11C(5) Wye Strainer Assemblies
Unless shown, install wye strainer assembly on the upstream side of the remote control valves.
Install garden valve so that when the system is flushed, the discharge sprays out of the valve box.

20-2.11D Payment
Not Used

20-2.14 SUPPLY LINE ON STRUCTURES

20-2.14A General
20-2.14A(1) General
20-2.14A(1)(a) Summary
Section 20-14 includes specifications for installing water supply lines through bridges and on the exterior of concrete structures.

20-2.14A(1)(b) Definitions
Reserved

20-2.14A(1)(c) Submittals
Submit a work plan for temporary casing support at the abutments as an informational submittal.

20-2.14A(1)(d) Quality Control and Assurance

20-2.14A(1)(d)(i) General
Before installing seismic expansion assemblies or expansion assemblies, the Engineer must authorize the extension setting.

20-2.14A(1)(d)(ii) Regulatory Requirements
Piping materials must bear the label, stamp, or other markings of the specified standards.

20-2.14A(1)(d)(iii) Site Tests
Test water supply lines before:
1. Backfilling
2. Beginning work on box girder cell decks
3. Otherwise covering the water supply lines

Furnish pipe anchorages to resist thrust forces occurring during testing.

Test the water supply lines as 1 unit. The limits of the unit must be 5 feet beyond the casing at each end of the bridge.

Cap each end of the water supply lines before testing. Caps must be rated for the test pressure.

Test water supply lines under section 20-2.01A(4)(b), except that the testing period must be 4 hours with no pressure drop.

For water supply lines 4 inches and larger testing must meet the following additional requirements:
1. Testing pressure must be at least 120 psi
2. Air relief valve must not be subjected to water pressure due to testing

If water supply lines fail testing, retest the lines after repair.
20.2.14A(2) Materials

20.2.14A(2)(a) General

Protect stored piping from moisture and dirt. Elevate piping above grade. Support piping to prevent sagging and bending.

Protect flanges, fittings, and assemblies from moisture and dirt.

20.2.14A(2)(b) Air Release Valve Assemblies

Air release valve assemblies include an air release valve, ball valve, tank vent, nipples, and pipe saddle. Assemblies must comply with the following:

1. Air release valves must have a cast iron body with stainless steel trim and float, 1-inch NPT inlet, 1/2-inch NPT outlet, and 3/16-inch orifice.
2. Ball valves must have a 2-piece bronze body with chrome plated or brass ball, 1-inch full-size port, and be rated for at least 400 psi.
3. Tank vents must have a 1/2-inch NPT inlet and downward-facing double openings with screened covers.
4. Nipples must be schedule 40 galvanized steel pipe.
5. Pipe saddle must be rated for at least 150 psi and compatible with water supply line. Pipe saddle must be (1) single strap pipe saddle for water supply lines smaller than 4 inches or (2) double strap pipe saddle for water supply lines 4 inches and larger. You may use a tee fitting for galvanized steel water supply lines.

20.2.14A(2)(c) Casings

Casings must be welded steel pipe casing complying with section 70-7.

20.2.14A(2)(d) Pipe Wrap Tape

Pipe wrap tape must be pressure sensitive tape made from PVC or polyethylene. Pipe wrap tape must be at least 50 mils thick and not wider than 2 inches.

20.2.14A(2)(e) Pipe Hangers

Pipe hangers must comply with section 70-7.02C.

The pipe hanger must be rated for the water supply line. If casings are shown, include the casings weight.

20.2.14A(2)(f) Epoxy Adhesives

Epoxy used for anchoring concrete pipe supports must comply with section 70-7.02D.

20.2.14A(2)(g) Concrete Pipe Supports

Concrete pipe supports must comply with section 70-7.02D.

20.2.14A(2)(h) Pipe Clamps and Anchors

Metal clamps must be commercial quality steel complying with section 75-1.02. Anchors must comply with the specifications for concrete anchorage devices in section 75-1.03C.

20.2.14A(2)(i) Pull Boxes

Pull boxes and covers must comply with section 20-2.01B(5).

20.2.14A(3) Construction

20.2.14A(3)(a) General

Support water supply lines as described.

Where water supply lines penetrate bridge superstructure concrete, either form or install pipe sleeves at least 2 pipe sizes larger than the pipe.

20.2.14A(3)(b) Preparation

Clean the interior of the pipe before installation. Cap or plug openings as pipe is installed to prevent the entrance of foreign material. Leave caps or plugs in place until the next pipe section is installed.
20-2.14A(3)(c) Installation
20-2.14A(3)(c)(i) General
Reserved

20-2.14A(3)(c)(ii) Casings
Install casings under section 70-7.03.

Seal casing end with 8 inches of polyurethane foam at dirt stop or pipe end seal.

Wrap damaged supply line coatings with pipe wrap tape. Wrap field joints and fittings that are in contact with the earth.

Wrapping must comply with the following:
1. Clean and prime area as recommended by the tape manufacturer.
2. Tightly wrap tape with 1/2 uniform overlap, free from wrinkles and voids, to provide not less than a 100 mil thickness.
3. The tape must conform to joint or fitting contours.
4. Extend tape at least 6 inches over adjacent pipe.

20-2.14A(3)(c)(iv) Pipe Clamps and Anchors
Install water supply lines on the exterior surfaces of bridges or other concrete structures with metal clamps and anchors.

Drilling of holes for anchors must comply with the following:
1. Drill holes to manufacturers recommended depth.
2. Drilling tools must be authorized.
3. Do not drill holes closer than 6 inches to the edge of a concrete structure.
4. Relocate holes if reinforcing steel is encountered. Fill abandoned holes with mortar. Mortar must comply with section 51-1.02F.

Where water supply lines are mounted vertically for more than 2 feet, install clamps and anchors within 6 inches of the elbows.

Where water supply lines are mounted vertically for more than 10 feet, install additional clamps and anchors at 10 foot centers unless otherwise shown.

20-2.14A(3)(d) Sequences of Operation
If the bridge superstructure is to be prestressed do not place mortar around casings in abutments and hinges until bridge superstructure prestressing has been completed.

20-2.14A(4) Payment
Supply line on structures is measured from end to end, along the centerline.

The Department does not pay for failed tests.

20-2.14B Supply Line on Structures, Less than 4 Inches
20-2.14B(1) General
20-2.14B(1)(a) Summary
Section 20-2.14B includes specifications for installing water supply lines smaller than 4 inches.

20-2.14B(1)(b) Definitions
Reserved

20-2.14B(1)(c) Submittals
Product data for materials includes catalog cuts, performance data, and installation instructions.
Submit product data for:

1. Water supply line
2. Expansion assemblies
3. Casing insulators
4. Pipe end seals
5. Pipe anchorages
6. Air release valve assemblies
7. Casings
8. Pipe hangers
9. Epoxy adhesives
10. Concrete pipe supports

20-2.14B(1)(d) Quality Control and Assurance
Reserved

20-2.14B(2) Materials
20-2.14B(2)(a) General
Reserved

20-2.14B(2)(b) Water Supply Line
Water supply lines must comply with section 20-2.09.

20-2.14B(2)(c) Expansion Assemblies
Expansion assemblies must consist of a hose with ends, insulated flange connections, and elbows. Expansion assemblies must have the same nominal inside diameter as the water supply line. Working pressure must be at least 150 psi.

Hose must be medium or heavy weight, crush and kink resistant, rated for at least 150 psi. Cover must be flexible, oil resistant rubber or synthetic, reinforced with at least 2-ply synthetic yarn or steel wire. The inner tube must meet FDA and USDA Standards for potable water. Hose ends must be stainless steel flanged connections with stainless steel crimped bands or swaged end connectors. Do not use barbed ends with band clamps.

Elbows must be 45 degree, standard weight galvanized steel fittings.

20-2.14B(2)(d) Casing Insulators
Casing insulators must be:

1. 2-piece, high-density, injection-molded polyethylene, nonconductive inner liner, with cadmium-plated nuts and bolts.
2. Factory constructed to ensure the water supply line is centered in the casing. Insulators must not allow any contact between pipe and casing and have at least 2 runners seated on the bottom of the casing.
3. Sized for the casing and water supply line shown.

20-2.14B(2)(e) Pipe Anchorages
Pipe anchorages must consist of an I-beam, U-bolts, anchors, and double nuts.

Use concrete anchorage devices for anchors on existing bridges. Use L-anchor bolts for anchors on new bridges.

Fabricate the I-beam from 1/2-inch steel plate. Steel plate, U-bolts, L-anchors, and nuts must comply with section 75-1.02. Concrete anchorage devices must comply with section 75-1.03C.

20-2.14B(2)(f) Pipe End Seals
Pipe end seals must consist of a pipe end seal, stainless steel bands, and polyurethane foam.
Pipe end seal must be factory constructed from seamless neoprene and sized for the casing and water supply line shown. Neoprene must be at least 1/8 inch thick. Stainless steel bands must be crimped.

Polyurethane foam must be expanding foam spray that is water resistant and moisture cured.

**20-2.14B(3) Construction**
Locate pipe anchorage halfway between expansion assemblies.

Pipe end seal must be pulled onto the casing during pipe installation. Do not use wrap-around type end seals.

**20-2.14B(4) Payment**
Supply line on structures is paid for as galvanized steel pipe (supply line on bridge).

**20-2.14C Supply Line on Structures, 4 Inches and Larger**

**20-2.14C(1) General**

**20-2.14C(1)(a) Summary**
Section 20-2.14C includes specifications for installing water supply lines 4 inches and larger.

**20-2.14C(1)(b) Definitions**
Reserved

**20-2.14C(1)(c) Submittals**
Product data for materials includes catalog cuts, performance data, and installation instructions.

Submit product data for:

1. Water supply line
2. Expansion assemblies
3. Flange insulating gaskets
4. Casing insulators
5. Seismic expansion assemblies
6. Lateral restraint assemblies
7. Air release valve assemblies
8. Casings
9. Pipe hangers
10. Epoxy adhesives
11. Concrete pipe supports

Submit the maximum range and preset dimension for each expansion assembly or seismic expansion assembly as an informational submittal.

Submit at least 5 sets of product data to OSD, Documents Unit. Each set must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two sets will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

**20-2.14C(1)(d) Quality Control and Assurance**
Reserved

**20-2.14C(2) Materials**

**20-2.14C(2)(a) General**
Reserved

**20-2.14C(2)(b) Water Supply Line**
Ductile iron pipe connections to expansion assemblies must be a flanged joint complying with ANSI/AWWA C115/A21.15. Flange gaskets must be rated for a working pressure of 350 psi. Fasteners must comply with section 75-1.02, except that stainless steel fasteners must not be used.

All other ductile iron pipe and fitting joints must be push-on, restrained type complying with ANSI/AWWA C111/A21.11. Push-on, restrained type joints may use proprietary dimensions and proprietary restrained joint locking systems.

Ductile iron pipe and fittings must have an asphaltic coating complying with ANSI/AWWA C151/A21.51, and a cement mortar lining complying with ANSI/AWWA C104/A21.4.

20-2.14C(2)(c) Expansion Assemblies
Expansion assemblies must be a sleeve type expansion joint. The expansion assembly must have:

1. Ductile iron body complying with ANSI/AWWA C153/A21.53
2. Flanged ends complying with ANSI/AWWA C110/A21.10
3. Fusion bonded epoxy internal lining complying with ANSI/AWWA C213 at least 15 mils thick
4. Internal expansion sleeve limiting stop collars and be pressure balanced
5. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches
6. NSF 61 certification

The expansion assembly must be factory set at 1/2 the extension capacity.

20-2.14C(2)(d) Flange Insulating Gaskets
Flange insulating gaskets must consist of a dielectric flange gasket, insulating washers and sleeves, and commercial quality steel bolts and nuts. Dielectric flange gasket must have a dielectric strength of at least 500 vpm.

20-2.14C(2)(e) Casing Insulators
Casing insulators must be:

1. 2-piece, 8-inch, 14-gauge epoxy-coated or galvanized steel band, four 2-inch-wide glass-reinforced polyester or polyethylene runners, with cadmium-plated nuts and bolts.
2. Coated with at least 15-mils heat-fused PVC to provide a nonconductive inner liner.
3. Factory constructed to ensure the water supply line is centered in the casing. Insulators must not allow any pipe to casing contact and have at least 2 runners seated on the bottom of the casing.
4. Sized for the casing and water supply line shown.

20-2.14C(2)(f) Dirt Stops
Dirt stops must consist of a redwood cover with polyurethane foam.

Use construction heart grade redwood complying with 57-2.01B(2). Construct cover to fit snugly around the water supply line. The cover must be 2 inches taller and 2 inches wider than the casing.

Polyurethane foam must be expanding foam spray that is water resistant and moisture cured.

20-2.14C(2)(g) Seismic Expansion Assemblies
Seismic expansion assemblies must be a sleeve type expansion joint with integral ball joints at each end.

Seismic expansion assemblies must have:

1. Ability to withstand at least 15 degree angular deflection at each end and maximum movement in all 3 planes at the same time
2. Ductile iron body complying with ANSI/AWWA C153/A21.53
3. Flanged ends complying with ANSI/AWWA C110/A21.10
4. Fusion bonded epoxy internal lining complying with ANSI/AWWA C213 at least 15 mils thick
5. Internal expansion sleeve limiting stop collars and pressure balanced
6. Ball joints contained in flanged retainers with seal gaskets
7. Working pressure of at least 350 psi for sizes 24 inches and smaller and 250 psi for sizes larger than 24 inches
8. NSF 61 certification

The seismic expansion assembly must be factory set at 1/2 the extension capacity.

20-2.14C(2)(h) Lateral Restraint Assemblies
Lateral restraint assemblies must be (1) constructed from commercial quality steel components complying with section 75-1.02, (2) adjustable, and (3) able to resist a horizontal force of 10 percent of the contributory dead load.

20-2.14C(3) Construction
Each ductile iron pipe must be connected and fully extended (pulled out) after joint assembly before the next pipe section is added.

Install flange insulating gaskets on the outside flange of seismic expansion assemblies and expansion assemblies.

20-2.14C(4) Payment
Supply line on structures is paid for as supply line (bridge).

20-2.15 TEMPORARY IRRIGATION SYSTEMS
Reserved

20-2.16–20-2.19 RESERVED

20-3 PLANTING

20-3.01 GENERAL
20-3.01A General
20-3.01A(1) Summary
Section 20-3 includes specifications for performing planting work in new and existing landscapes.

20-3.01A(2) Definitions
Reserved

20-3.01A(3) Submittals
20-3.01A(3)(a) General
Submit nursery invoices showing species or variety and inspection certificates for plants.
Submit documentation of clearance from the county agricultural commissioner for plants obtained from a county outside the project limits.
If a root stimulant is required, submit a copy of the root stimulant manufacturer's product sheet and instructions for the application of the root stimulant.
If cuttings are to be taken from outside the right-of-way, submit proof of permits and payment of associated fees. Notify the Engineer of the location at least 15 days before taking cuttings.

20-3.01A(3)(b) Vendor Statements
At least 60 days before planting the plants, submit a statement from the vendor that the order for the plants required, including sample plants used for inspection, has been received and accepted by the vendor. The statement from the vendor must include the plant names, sizes, and quantities and the anticipated delivery date.

20-3.01A(3)(c) Certificates of Compliance
Submit a certificate of compliance for:

1. Sod
20-3.01A(4) Quality Control and Assurance

Plants must comply with federal and state laws requiring inspection for diseases and infestations. Inspection certificates required by law must accompany each shipment of plants.

Obtain clearance from the county agricultural commissioner before planting plants delivered from a county outside the project limits.

The Engineer inspects the roots of container-grown sample plants by removing earth from the rootball of not less than 2 plants, nor more than 2 percent of the total number of plants of each species or variety. If container-grown plants are purchased from several sources, the Engineer inspects the roots of not less than 2 of each sample plant species or variety from each source. The rootball of container grown plants must not show evidence of being underdeveloped, deformed, or having been restricted.

If the Engineer finds noncompliant plants, the entire lot represented by the noncompliant sample plants will be rejected.

Cuttings with mature or brown stems and cuttings that have been trimmed will be rejected.

20-3.01B Materials
20-3.01B(1) General

Notify the Engineer at least 10 days before the plants are shipped to the job site.

20-3.01B(2) Plants
20-3.01B(2)(a) General

Plants must be the variety and size shown and true to the type or name shown. Plants must be individually tagged or tagged in groups identifying the plants by species or variety. Tagging is not required for cuttings.

Plants must be healthy, well-formed, not root-bound, free from insect pests and disease, and grown in nurseries inspected by the Department of Food and Agriculture.

The plants must comply with the size and type shown in the following table:

<table>
<thead>
<tr>
<th>Plant group designation</th>
<th>Description</th>
<th>Container size (cu in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No. 1 container</td>
<td>152–251</td>
</tr>
<tr>
<td>B</td>
<td>No. 5 container</td>
<td>785–1242</td>
</tr>
<tr>
<td>C</td>
<td>Balled and burlapped</td>
<td>--</td>
</tr>
<tr>
<td>E</td>
<td>Bulb</td>
<td>--</td>
</tr>
<tr>
<td>F</td>
<td>In flats</td>
<td>--</td>
</tr>
<tr>
<td>H</td>
<td>Cutting</td>
<td>--</td>
</tr>
<tr>
<td>I</td>
<td>Pot</td>
<td>--</td>
</tr>
<tr>
<td>K</td>
<td>24-inch box</td>
<td>5775–6861</td>
</tr>
<tr>
<td>M</td>
<td>Liner(^a)</td>
<td>--</td>
</tr>
<tr>
<td>O</td>
<td>Acorn</td>
<td>--</td>
</tr>
<tr>
<td>P</td>
<td>Plugs(^b)</td>
<td>--</td>
</tr>
<tr>
<td>S</td>
<td>Seedling(^c)</td>
<td>--</td>
</tr>
<tr>
<td>U</td>
<td>No. 15 container</td>
<td>2768–3696</td>
</tr>
</tbody>
</table>

\(^a\)Do not use containers made of biodegradable material.

\(^b\)Grown in individual container cells.

\(^c\)Bare root.

Trucks used for transporting plants must be equipped with covers to protect plants from windburn.

Handle and pack plants in an authorized way for the species or variety.
20-3.01B(2)(b) Cuttings

20-3.01B(2)(b)(i) General
Take cuttings at random from healthy, vigorous plants. Make cuts with sharp, clean tools. Do not take more than 25 percent of an individual plant and not more than 50 percent of the plants in an area.

Keep cuttings covered and wet until planted. Do not allow cuttings to dry or wither.

Plant cuttings no more than 2 days after being cut.

20-3.01B(2)(b)(ii) *Carpobrotus* and *Delosperma* Cuttings
You may take cuttings for new *Carpobrotus* and *Delosperma* groundcover from the existing highway planting areas, but these areas may not provide enough material to complete the work. Contact the local District’s encroachment permit office to obtain a permit to harvest cuttings, identify acceptable cutting harvest areas, and to determine acceptable quantities to take.

Take tip cuttings from healthy, vigorous Carpobrotus and Delosperma plants that are free of pests and disease.

*Carpobrotus* cuttings must be 10 inches or more in length and not have roots.

*Delosperma* cuttings must be 6 inches or more in length and not have roots.

20-3.01B(2)(b)(iii) Willow Cuttings
Take willow cuttings from areas shown or designated by the Engineer.

Willow cuttings must be:

1. Reasonably straight
2. 20 to 24 inches in length
3. 3/4 to 1-1/2 inch in diameter at the base of the cutting

Cut the top of each willow cutting square above a leaf bud. Cut the base below a leaf bud at approximately a 45 degree angle. Trim off leaves and branches flush with the stem of the cutting.

20-3.01B(2)(b)(iv) Cottonwood Cuttings
Cottonwood cuttings must comply with the requirements for willow cuttings in section 20-3.01B(2)(b)(iii).

20-3.01B(2)(b)(v)–20-3.01B(2)(b)(viii) Reserved

20-3.01B(2)(c) Sod
Sod must:

1. Be grown to comply with the Food & Agri Code
2. Be free from weeds and undesirable types of grasses and clovers
3. Be field-grown on soil containing less than 50 percent silt and clay
4. Have less than 1/2-inch-thick thatch
5. Not be less than 8 months or more than 16 months old
6. Be machine-cut to a uniform soil thickness of 5/8 ± 1/4 inch, not including top growth and thatch

Protect sod with tarps or other protective covers during delivery. Do not allow sod to dry out during delivery or before placement.

20-3.01B(3) Soil Amendment
Soil amendment must comply with the requirements in the Food & Agri Code. Soil amendment must be one or a combination of the following:

1. Sphagnum peat moss
2. Nitrolized fir bark
3. Vermiculite
4. Perlite
20-3.01B(4) Fertilizers
20-3.01B(4)(a) General
Deliver fertilizer in labeled containers showing weight, chemical analysis, and manufacturer’s name.
Fertilizer must comply with the requirements of the Food & Agri Code.

20-3.01B(4)(b) Slow-release Fertilizers
Slow-release fertilizer must be a pelleted or granular form with a nutrient release over an 8 to 12 month period and must comply with the chemical analysis ranges shown in the following table:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Content (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>16–21</td>
</tr>
<tr>
<td>Phosphoric acid (P)</td>
<td>6–8</td>
</tr>
<tr>
<td>Water soluble potash (K)</td>
<td>4–10</td>
</tr>
</tbody>
</table>

20-3.01B(4)(c) Packet Fertilizers
Packet fertilizer must be a biodegradable packet with a nutrient release over a 12 month period. Each packet must have a weight of 10 ± 1 grams and must comply with the chemical analysis shown in the following table:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Content (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>20</td>
</tr>
<tr>
<td>Phosphoric acid (P)</td>
<td>10</td>
</tr>
<tr>
<td>Water soluble potash (K)</td>
<td>5</td>
</tr>
</tbody>
</table>

20-3.01B(4)(d) Organic Fertilizers
Organic fertilizer must be pelleted or granular with a cumulative nitrogen release rate of no more than 70 percent for the first 70 days after incubation at 86 degrees F with 100 percent at 350 days or more. Organic fertilizer must comply with the chemical analysis shown in the following table:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Content (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen (N)</td>
<td>5–7</td>
</tr>
<tr>
<td>Phosphoric acid (P)</td>
<td>1–5</td>
</tr>
<tr>
<td>Water soluble potash (K)</td>
<td>1–10</td>
</tr>
</tbody>
</table>

20-3.01B(5) Root Stimulants
Root stimulant must be a commercial quality product.

20-3.01B(6) Plaster Sand
Backfill material for the transplant palm tree planting holes must be 100 percent commercial quality washed plaster sand.

20-3.01B(7) Root Barrier
Root barrier must be an injection molded or extruded modular panel made of high-density polypropylene or polyethylene plastic.
Each panel must:
1. Be at least 1/16-inch thick
2. Have at least 4 molded root-deflecting vertical ribs 0.5- to 0.8-inch wide, 6 to 8 inches apart

OCTOBER 2015
3. Have a locking strip or an integral male-female sliding lock designed to resist slippage between panels.
4. Be at least 2 feet wide and 2 feet in depth.

20-3.01B(8) Root Protectors
Each root protector must be:

1. Fabricated from 1-inch, hexagonal pattern, 20-gauge mesh wire
2. Closed bottom design with a height and diameter that provides a minimum of 6 inches of clearance between the root ball and the sides and bottom of the wire cylinder.

Wire edges at the top of the cylinder must be the uncut manufactured finished edge free of sharp points.

20-3.01B(9) Foliage Protectors
Each foliage protector must be:

1. Fabricated from 1-inch, hexagonal pattern, 20-gauge mesh wire
2. Approximately 4 feet high and 2 feet in diameter.

Wire edges at the top of the cylinder must be the uncut manufactured finished edge free of sharp points. Other wire edges that are cut must be free of sharp points.

Support stakes must be one of the following:

1. 3/4-inch reinforcing steel bar a minimum of 5 feet long with an orange or red plastic safety cap that fits snugly onto the top of the reinforcing steel bar.
2. 2 inch nominal diameter or 2 by 2 inch nominal size wood stakes a minimum of 5 feet long. Wood stakes must be straight.

The jute mesh cover must comply with section 21-1.02O(2). Twine required to hold the jute mesh cover in place must be 1/8-inch diameter manila hemp twine.

20-3.01B(10) Wood Plant Stakes
Each plant stake must be nominal 2 by 2 inch or nominal 2-inch diameter and of sufficient length to keep the plant in an upright position.

Plant stakes for vines must be nominal 1 by 1 inch, 18 inches long.

20-3.01B(11) Plant Ties
Plant ties must be extruded vinyl-based tape, 1 inch wide and at least 10 mils thick.

20-3.01C Construction
20-3.01C(1) General
Apply a root stimulant under the manufacturer's instructions to the plants specified in the special provisions.

Before transporting the plants to the planting area, thoroughly wet the root ball.

20-3.01C(2) Pruning
Prune plants under the latest edition of ANSI A300 part 1, Pruning, published by the Tree Care Industry Association.

Do not use tree seal compounds to cover pruning cuts.

20-3.01C(3) Watering
Water existing plants to be maintained, transplanted trees, and new plants as needed to keep the plants in a healthy growing condition.
20-3.01C(4) Replacement Plants

Plants that show signs of failure to grow at any time or are so injured or damaged as to render them unsuitable for the purpose intended, must be removed, replaced, and replanted. Replace unsuitable plants within 2 weeks after the Engineer marks or indicates that the plants must be replaced.

Replacement planting must comply with the original planting requirements, spacing, and size provisions described for the plants being replaced.

Replacement planting for transplanted trees must comply with the work plan and be planted in the same planting hole.

Replacement ground cover plants must be the same species specified for the ground cover being replaced. Other replacement plants must be the same species as the plants being replaced.

Place orders for replacement plants with the vendor at the appropriate time so that the replacement plants are not in a root-bound condition.

The Department does not pay for replacement plants or the planting of replacement plants.

20-3.01C(5) Maintain Plants

Maintain plants from the time of planting until Contract acceptance if no plant establishment period is specified or until the start of the plant establishment period.

20-3.01D Payment

Reserved

20-3.02 EXISTING PLANTING

20-3.02A General

20-3.02A(1) Summary

Section 20-3.02 includes specifications for pruning existing plants, transplanting trees, and maintaining existing planted areas.

Transplant palm trees between March 15 and October 15.

20-3.02A(2) Definitions

Reserved

20-3.02A(3) Submittals

Submit a work plan for:

1. Transplanting trees. The work plan must include methods for lifting, transporting, storing, planting, guying, and maintaining each tree to be transplanted. Include root ball size, method of root ball containment, and a maintenance program for each tree.
2. Maintaining existing planted areas. The work plan must include weed control, fertilization, mowing and trimming of turf areas, watering, and controlling rodents and pests.

Submit a copy of the manufacturer’s product sheet for root stimulant including application instructions.

20-3.02A(4) Quality Control and Assurance

Inspect for deficiencies of existing planted areas in the presence of the Engineer. Complete the inspection within 15 days after the start of job site activities.

Deficiencies requiring corrective action include:

1. Weeds
2. Dead, diseased, or unhealthy plants
3. Missing plant stakes and tree ties
4. Inadequate plant basins and basin mulch
5. Other deficiencies needing corrective action to promote healthy plant life
20-3.02B Materials
Not Used

20-3.02C Construction
20-3.02C(1) General
Correct deficiencies of existing planted areas as ordered within 15 days of the order. Correction of deficiencies is change order work.

After deficiencies are corrected, perform work to maintain existing planted areas in a neat and presentable condition and to promote healthy plant growth through Contract acceptance.

20-3.02C(2) Prune Existing Plants
Prune existing plants as shown.

If no bid item for prune existing plants is included, prune existing plants as ordered. Pruning existing plants is change order work.

20-3.02C(3) Transplant Trees
Prune each tree to be transplanted immediately before lifting.

If the tree to be transplanted is a palm, prune by removing dead fronds and frond stubs from the trunk. Remove green fronds up to 2 rows of fronds away from the center of growth. Tie the remaining 2 rows of fronds in an upright position with light hemp or manila rope. Remove fronds and frond stubs at the trunk in a manner that will not injure the trunk. Remove fronds and frond stubs for Phoenix dactylifera (Date Palm) approximately 4 inches from the trunk.

Prepare each hole in the new location before lifting the tree to be transplanted.

Lift tree to be transplanted as described in the work plan.

Comply with section 20-3.03C(3) for handling and planting each tree to be transplanted.

Until replanted, cover exposed root ball with wet burlap or canvas and cover the crown with 90 percent shade cloth.

Replant each tree on the same day it is lifted if possible. If the transplant location is not ready to receive the tree, store and maintain the tree to be transplanted until the transplant location is authorized. Store tree in an upright position.

Replace damaged transplanted tree under 20-3.01C(4) and with the number of trees specified in the special provisions.

The replacement trees must be planted in individual plant holes at the location determined by the Engineer within the area of the tree being replaced. Comply with section 20-3.03C(2) for the planting of the replacement trees.

20-3.02C(4) Maintain Existing Planted Areas
If a bid item for maintain existing planted areas is included, the existing plant basins must be kept well-formed and free of sediment. If the existing plant basins need repairs, and the basins contain mulch, replace the mulch after the repairs are done.

Control weeds within the existing planted area and:

1. From the existing planted area limit to the adjacent edges of paving and fences if less than or equal to 12 feet
2. From the existing planted area limit to 6 feet beyond the outer limit of the existing planted area if the adjacent edge of paving or fence is more than 12 feet away
3. Within a 3-foot radius from each existing tree and shrub
If no bid item for maintaining existing planted areas is included, maintain existing planted areas as ordered. Maintain existing planted areas is change order work.

20-3.02D Payment
Not Used

20-3.03 PLANTING WORK

20-3.03A General
Section 20-3.03 includes specifications for planting plants.

20-3.03B Materials
Not Used

20-3.03C Construction
20-3.03C(1) General
Do not begin planting until authorized.

If an irrigation system is required, do not begin planting in an area until the functional test has been completed and authorized for the irrigation system serving that area.

20-3.03C(2) Preparing Planting Areas
The location of each plant is as shown unless the Engineer designates otherwise. If the Engineer designates the location, it will be marked by a stake, flag, or other marker.

Conduct work so the existing flow line in drainage ditches is maintained. Material displaced by your operations that interferes with drainage must be removed.

Where a minimum distance to a drainage ditch is shown, locate the plant so that the outer edge of its basin wall is at least the minimum distance shown for each plant involved.

Excavate each planting hole by hand digging or by drilling. The bottom of each planting hole must be flat. Do not use water for excavating the hole.

Unless a larger planting hole is specified, the planting hole must be large enough to receive the root ball or the total length and width of roots, backfill, amendments, and fertilizer. Where rock or other hard material prohibits the hole from being excavated, a new hole must be excavated and the abandoned hole backfilled.

20-3.03C(3) Planting Plants
20-3.03C(3)(a) General
Do not plant plants in soil that is too wet, too dry, not properly conditioned as specified, or in an unsatisfactory condition for planting.

Do not distribute more plants than can be planted and watered on that day.

Water plants immediately after planting. Apply water until the backfill soil around and below the roots or ball of earth around the roots of each plant is thoroughly saturated. When watering with a hose, use a nozzle, water disbursement device, or pressure reducing device. Do not allow the full force of the water from the open end of the hose to fall within the basin around any plant. Groundcover plants in areas with an irrigation system must be watered by sprinklers. Several consecutive watering cycles may be necessary to thoroughly saturate the soil.

If shown, install root barriers between trees and concrete sidewalk or curb. Install panels flush with finished grade and join with locking strips or integral male-female sliding locks. Install barriers with root deflectors facing inward.

If a tree grate is shown, install root barrier panels 0.5 inch above finish grade or as shown.

Adjust planting locations so that each tree or shrub is at least 8 feet away from any sprinkler.
Where a tree, shrub, or vine is to be planted within a groundcover area or cutting planting area, plant it before planting groundcover or cuttings.

Where shrubs and groundcovers are shown to be planted in groups, the outer rows directly adjacent to the nearest roadway or highway fence must be parallel to the nearest roadway or highway fence. Stagger shrubs and groundcovers in adjacent rows. Adjust the alignment of the plants within the outer rows.

Core holes in concrete masonry block wall as shown.

Where a vine is to be planted against a wall or fence, plant it as close as possible to the wall or fence. If a vine planted next to a wall is to be staked, stake and tie the vine at the time of planting. A vine planted next to a fence must be tied to the fence at the time of planting.

Protect tree trunks from injury. Do not:

1. Drag tree
2. Use chains to move a tree
3. Lay tree on the ground

20-3.03C(3)(b) Trees, Shrubs, and Vines

After preparing holes, thoroughly mix soil amendment and granular fertilizer at the rate shown with native soil to be used as backfill material. Remove containers from plants in such a manner that the ball of earth surrounding the roots is not broken. Do not cut plant containers before delivery of the plants to the planting area. Plant and water plants immediately after removal from their containers.

Place packet fertilizer in the backfill within 6 to 8 inches of the ground surface and approximately 1 inch from the root ball. If more than 1 packet is required per plant, distribute the packets evenly around the root ball.

If a root stimulant is to be used, apply it according to the manufacturer's instructions.

If required, install root protectors in the plant holes as shown.

Ensure roots are not restricted or distorted.

Distribute backfill uniformly throughout the entire depth of the plant hole without clods or lumps. After the planting holes have been backfilled, jet water into the backfill with a pipe or tube inserted into the bottom of the hole until the backfill material is saturated for the full depth. If the backfill material settles below this level, add additional backfill to the required level. If a plant settles deeper than shown, re-plant it at the required level.

Remove nursery stakes after planting.

Install 2 plant stakes for each plant to be staked at the time of planting as shown. Ensure the rootball is not damaged.

Tie the plant to the stakes with 2 plant ties, 1 tie to each stake. Each tie must form a figure 8 by crossing the tie between the plant and the stake as shown. Install ties at the lowest position that will support the plant in an upright position. Ties must provide trunk flexibility but not allow the trunk to rub against the stakes. Wrap each end of the tie 1-1/2 turns around the stake and securely tie.

Construct a watering basin around each plant as shown.

If required, install a foliage protector:

1. Over the plant within 2 days after planting.
2. Vertically and centered over the plant as shown

If foliage protectors are required:

1. Cut the bottom of the wire cylinder to match the slope of the ground. Do not leave sharp points of wire after cutting. Sharp points must be bent over or blunted.
2. Install 2 support stakes for foliage protectors vertically and embed in the soil on opposite sides of the plant as shown and in a transverse direction to the prevailing wind.
3. Either weave the support stakes through the wire cylinder mesh at 6 inch maximum centers or fasten the wire cylinder to the support stakes at 6 inch maximum centers.
4. Wire cylinder must be snug against the support stakes but loose enough to be raised for pesticide application or to perform weeding within the plant basin.
5. Install jute mesh cover over the foliage protector and secure with twine as shown.

20-3.03C(3)(c) Groundcover Plants
Each groundcover planting area irrigated by a single control valve must be completely planted and watered before planting other groundcover planting areas.

Plant groundcover plants in moist soil, and in neat, straight rows, spaced as shown.
Apply fertilizer to groundcover plants and water into the soil immediately after planting.

20-3.03C(3)(d) Cuttings, Liners, Plugs, and Seedling Plants
20-3.03C(3)(d)(i) General
Apply fertilizer to cuttings, liners, plugs, and seedling plants and water immediately after planting.
Ensure the soil is moist to a minimum depth of 8 inches before planting cuttings.
If a root stimulant is to be used, apply it according to the manufacturer's instructions.

20-3.03C(3)(d)(ii) Willow Cuttings
Unless otherwise shown, for willow cuttings excavate planting holes perpendicular to the ground line by using a steel bar, auger, post hole digger, or similar tools. Holes must be large enough to receive the cuttings and fertilizer packet. Plant willow cuttings to the specified depths without damaging the bark.
Where rock or other hard material prohibits the excavation of the planting holes, excavate new holes and backfill the unused holes.
Plant willow cuttings during the period specified in the special provisions.
Apply root stimulant according to the manufacturer’s instructions.
Plant the base of the cutting 10 to 12 inches deep with 3 to 5 bud scars exposed above the ground. If more than 5 bud scars are exposed, trim off the excess willow cutting length.
Place 1 fertilizer packet in the backfill of each cutting, 6 to 8 inches below the ground surface and approximately 1 inch from the cutting.
Backfill the plant holes with excavated material after planting. Distribute the excavated material evenly within the hole without clods, lumps, or air pockets. Compact the backfill so that the cutting cannot be easily removed from the soil. Do not damage the cutting’s bark.
Dispose of trimmings and unused cuttings.

20-3.03C(3)(d)(iii) Cottonwood Cuttings
Reserved

20-3.03C(3)(d)(iv) Carpobrotus and Delosperma Cuttings
Plant Carpobrotus cuttings to a depth so that not less than 2 nodes are covered with soil. The basal end of Delosperma cuttings must not be less than 2 inches below the surface of the soil and the basal end of Carpobrotus cuttings must not be less than 4 inches below the surface of the soil.
Apply root stimulant to Delosperma cuttings before planting.
Do not plant Carpobrotus or Delosperma cuttings in soil that does not contain sufficient moisture at an average depth of 2 inches below the surface.
20-3.03C(3)(d)(v) Liner Plants
Plant liner plants during the period specified in the special provisions.

If a foliage protector is required, install under section 20-3.03C(3)(b).

20-3.03C(3)(d)(vi) Plug Plants
Plant plug plants during the period specified in the special provisions.

20-3.03C(3)(d)(vii) Seedling Plants
Plant seedling plants during the period specified in the special provisions.

20-3.03C(3)(e) Sod
After all other planting is performed, grade sod areas to drain and to a smooth and uniform surface. Fine grade and roll sod areas before placing sod.

Areas adjacent to sidewalks, edging, and other paved borders and surfaced areas must be 1 inch below the finished surface elevation of the facilities, after fine grading, rolling, and settlement of the soil.

Place sod such that the end of each adjacent strip is staggered a minimum of 2 feet. Place the edge and end of sod firmly against adjacent sod and against sidewalks, edging, and other paved borders and surfaced areas.

Lightly roll the entire sodded area to eliminate air pockets and ensure close contact with the soil after placement of sod. Water the sodded areas so that the soil is moist to a minimum depth of 4 inches after rolling. Do not allow the sod to dry out.

If irregular or uneven areas appear in the sodded areas, restore to a smooth and even appearance.

Trim sod to a uniform edge at sidewalks, edging, and other paved borders and surfaced areas. Trimming must be repeated whenever the edge of sod extends 1 inch beyond the edge of the edging, sidewalks, and other paved borders and surfaced areas. Remove and dispose of trimmed sod.

Mow sod when it has reached a height of 4 inches. Mow sod to a height of 2.5 inches.

20-3.03D Payment
Soil amendment is measured in the vehicle at the point of delivery.

Measurement for slow-release fertilizer, organic fertilizer, or iron sulfate is determined from marked weight or sack count.

Various sizes and types of plants are measured by either the product of the average plant density and the total area planted or by actual count of the living plants in place, determined by the Engineer. The average plant density is the number of living plants per sq yd determined from actual count of test areas chosen representing the total planted area. The size and location of the test areas is determined by you and the Engineer, except that the total area tested must be equal to not less than 3 percent nor more than 5 percent of the planted area being determined. The Engineer makes the final determination of the areas to be tested.

20-3.04–20-3.08 RESERVED

20-4 PLANT ESTABLISHMENT WORK

20-4.01 GENERAL

20-4.01A Summary
Section 20-4 includes specifications for performing plant establishment work.

Plant establishment consists of caring for the plants, including watering, fertilizing, pruning, replacing damaged plants, pest control, and operating and repairing of all existing irrigation facilities used and irrigation facilities installed as part of the new irrigation system.
Working days on which no work is required, as determined by the Engineer, will be credited as a plant establishment working day, regardless of whether or not you perform plant establishment work.

Working days whenever you fail to adequately perform plant establishment work will not be credited toward the plant establishment working days.

20-4.01B Definitions

Type 1 plant establishment: Plant establishment period with the number of working days specified for plant establishment beginning after all work has been completed except for plant establishment work and other bid items specified to be performed until Contract acceptance.

Type 2 plant establishment: Plant establishment period with the number of working days specified for plant establishment beginning after all planting work has been completed except for plant establishment work and other bid items specified to be performed until Contract acceptance, provided that the Contract must not be accepted unless the plant establishment work has been satisfactorily performed for at least the number of working days specified for plant establishment.

If maintenance and protection relief is granted for a completed portion of the work under section 5-1.38, Type 2 plant establishment period for the completed portion of the work is the time between completion of all planting work except for plant establishment work, and the granting of maintenance and protection relief, provided that the relief must not be granted unless the plant establishment work in the completed portion of the work has been satisfactorily performed for at least the number of working days specified for the plant establishment period.

20-4.01C Submittals

20-4.01C(1) General
Submit seasonal watering schedules for use during the plant establishment period within 10 days after the start of the plant establishment period. Remote irrigation control system watering schedule must utilize the remote irrigation control system software program.

Submit updated watering schedules within 5 business days after any changes have been made to the authorized schedules.

Submit a revised watering schedule for each irrigation controller not less than 30 days before completion of the plant establishment period.

20-4.01C(2) Notification
The Engineer will notify you in writing when the plant establishment period begins and will furnish statements regarding the number of working days credited to the plant establishment period after the notification.

Notify the Engineer at least 5 business days before applying each application of fertilizer.

20-4.01D Quality Control and Assurance
Provide training by a qualified person on the use and adjustment of the irrigation controllers installed, 30 days before completion of the plant establishment period.

Perform a final inspection of the plant establishment work in the presence of the Engineer between 20 and 30 days before Contract acceptance.

20-4.02 MATERIALS
20-4.02A General
Reserved

20-4.02B Fertilizers
Fertilizer must comply with section 20-3.01B(5).
20-4.03 CONSTRUCTION
20-4.03A General
Remove trash and debris.

Surplus earth accumulated in roadside clearing and planting areas must be removed.

Trim and mow turf areas as specified for sod in section 20-3.03C(3)(e). Dispose of trimmed and mowed material.

If irregular or uneven areas appear within turf areas, restore to a smooth and even appearance. Reseed turf seed areas.

Remove the tops of foliage protectors if plants become restricted.

Remove foliage protectors, including support stakes, within 30 days before the completion of the plant establishment period.

Keep plant basin walls well formed.

Clean new wye strainers and existing wye strainers that are a part of the new irrigation system annually until the completion of the plant establishment period. The last cleaning must be done within 15 days before the completion of the plant establishment period.

Remove, clean, and reinstall new filters and existing filters that are a part of the new irrigation system annually until the completion of the plant establishment period. The last cleaning must be done within 15 days before the completion of the plant establishment period.

20-4.03B Plant Growth Control
Prune plants planted as part of the Contract as authorized.

Remove plant growth that extends within 2 feet of sidewalks, curbs, dikes, shoulders, walls or fences.

Remove proposed and existing ground cover from within the plant basins, including basin walls, turf areas, and planting areas within edging.

Vines next to walls and fences must be kept staked and tied. Train vines on fences and walls or through cored holes in walls.

20-4.03C Fertilizers
Apply fertilizer to the plants as specified and water into the soil after each application.

Apply fertilizer at the rates shown and spread with a mechanical spreader, whenever possible.

20-4.03D Weed Control
Control weeds under section 20-1.03C(3).

20-4.03E Plant Staking
Replace the plant stakes that are inadequate to support plants with larger stakes.

Remove plant stakes when the Engineer determines they are no longer needed.

20-4.03F Replacement Plants
Replacement plants must comply with section 20-3.01C(4).

Replacement of plants up to and including the 125th plant establishment working day must be with a plant of the same size as originally specified. Plants of a larger container size than those originally specified for replacement plants may be used during the first 125 working days of the plant establishment period.

Replacement of plants after the 125th plant establishment working day must comply with the following size requirements:
Other replacement plants must be the same size as originally specified.

Replacement ground cover plants must comply with the following spacing requirements:

<table>
<thead>
<tr>
<th>Original spacing (inches)</th>
<th>On center spacing of replacement ground cover plants (inches)</th>
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<tbody>
<tr>
<td></td>
<td>Number of completed plant establishment working days</td>
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<tr>
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<td>36</td>
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20-4.03G Watering
Operate the electric automatic irrigation systems in the automatic mode unless authorized.
If any component of the electric automatic irrigation system is operated manually, the day will not be credited as a plant establishment working day unless the manual operation is authorized.
Water plants utilizing the remote irrigation control system software program unless authorized.
Implement the watering schedule at least 10 days before completion of the plant establishment period.

20-4.04 PAYMENT
Not Used

20-5 LANDSCAPE ELEMENTS

20-5.01 GENERAL
20-5.01A General
Section 20-5 includes specifications for constructing and installing landscape elements.

20-5.01B Materials
Not Used

20-5.01C Construction
Earthwork must comply with section 19.

20-5.01D Payment
Not Used

20-5.02 EDGING
20-5.02A General
Section 20-5.02 includes specifications for constructing landscape edging.
20-5.02B Materials

20-5.02B(1) General

Reserved

20-5.02B(2) Header Board Edging
Lumber for header board edging must be one of the following types:

1. Construction grade cedar
2. Pressure-treated Douglas fir
3. Construction heart grade redwood complying with section 57-2.01B(2)

Lumber must be:

1. Rough cut from sound timber.
2. Straight. Sweep must not exceed 1 inch in 6 feet.
3. Free from loose or unsound knots. Knots must be sound, tight, well spaced, and not to exceed 2 inches in size on any face.
4. Free of shakes in excess of 1/3 the thickness of the lumber.
5. Free of splits longer than the thickness of the lumber.
6. Free of other defects that would render the lumber unfit structurally for the purpose intended.

Edging anchors for header board edging must be stakes of the size and shape shown.

20-5.02B(3) Metal Edging
Metal edging must be commercial quality, made of aluminum or steel, and have an L-shaped design. Edging must be a minimum of 4 inches in height. The thickness must be as recommended by the manufacturer for the use intended.

Edging anchors must be from the same manufacturer as the metal edging.

20-5.02B(4) High Density Polyethylene Edging
HDPE edging must be commercial quality and a minimum of 4 inches in height. The thickness must be as recommended by the manufacturer for commercial installation for the use intended.

Edging anchors must be from the same manufacturer as HDPE edging.

20-5.02B(5) Concrete Edging
Concrete for edging must be minor concrete.

20-5.02B(6)–20-5.02B(10) Reserved

20-5.02C Construction

20-5.02C(1) General
Where edging is used to delineate the limits of inert ground cover or mulch areas, install edging before installing inert ground cover or mulch areas.

Saw cut surfaces where (1) asphalt concrete or concrete surfacing must be removed to permit the installation of edging and (2) no joint exists between the surfacing to be removed and the surfacing to remain in place. The surfacing must be cut in a straight line to a minimum depth of 2 inches with a power-driven saw before the surfacing is removed. Spike or stake spacing must comply with the manufacturer’s instructions for use and site conditions.

20-5.02C(2) Header Board Edging
Each stake must be driven flush with the top edge of the header board edging and the stake top must be beveled away from the header board at a 45 degree angle. Attach stake to header board with a minimum of two 12-penny hot dipped galvanized nails per stake.

20-5.02C(3) Metal and High Density Polyethylene Edging
Spike or stake spacing must comply with the manufacturer’s instructions for use and site conditions.
20-5.02C(4) Concrete Edging
Construct and finish minor concrete edging under section 73-2.

20-5.02C(5)–20-5.02C(9) Reserved

20-5.02D Payment
Edging is measured parallel to the ground surface.

20-5.03 INERT GROUND COVERS AND MULCHES

20-5.03A General

20-5.03A(1) General

20-5.03A(1)(a) Summary
Section 20-5.03 includes specifications for installing inert ground covers and mulches.

20-5.03A(1)(b) Definitions
Reserved

20-5.03A(1)(c) Submittals
Submit:
1. Filter fabric product data including the manufacturer's product sheet and installation instructions
2. Certificate of compliance for filter fabric at least 5 business days before delivery of the material to the job site

20-5.03A(1)(d) Quality Control and Assurance
Reserved

20-5.03A(2) Materials
Soil sterilant must be oxadiazon granular preemergent and must comply with section 20-1.02C.
Filter fabric must be Class A. Staples for filter fabric must comply with section 21-1.02R.

20-5.03A(3) Construction

20-5.03A(3)(a) General
Before performing inert ground cover and mulch work, remove plants and weeds to ground level.

20-5.03A(3)(b) Earthwork
Excavate areas to receive inert ground cover or mulch to the depth shown. Maintain the planned flow lines, slope gradients, and contours of the job site. Grade subgrade to a smooth and uniform surface and compact to not less than 90 percent relative compaction.

20-5.03A(3)(c) Treatment of Soil
After compaction, apply soil sterilant at the maximum label rate. Do not apply soil sterilant more than 12 inches beyond the inert ground cover or mulch limits. The soil sterilant application and inert ground cover or mulch placement must be completed within the same work day.

20-5.03A(3)(d) Filter Fabric
Immediately before placing filter fabric, surfaces to receive filter fabric must be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Align fabric and place in a wrinkle-free manner.

Overlap adjacent rolls of the fabric from 12 to 18 inches. Spread each overlapping roll in the same direction. Fasten fabric with staples flush with the adjacent fabric to prevent movement of fabric by placement of inert ground cover or mulch.

Repair or replace fabric damaged during placement of inert ground cover or mulch with sufficient fabric to comply with overlap requirements.
20-5.03B Rock Blanket

20-5.03B(1) General

20-5.03B(1)(a) Summary
Section 20-5.03B includes specifications for placing rock blanket.

20-5.03B(1)(b) Definitions
Reserved

20-5.03B(1)(c) Submittals
Submit a 1 sq yd sample of the various rock sizes.

20-5.03B(1)(d) Quality Control and Assurance
Reserved

20-5.03B(2) Materials

20-5.03B(2)(a) General
Do not use filter fabric.

20-5.03B(2)(b) Concrete
Concrete must be minor concrete.

20-5.03B(2)(c) Rock
Rock must be clean, smooth, and obtained from a single source and must comply with the following grading requirements:

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<tr>
<th>Screen size (inches)</th>
<th>Percentage passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>50-85</td>
</tr>
<tr>
<td>4</td>
<td>0-50</td>
</tr>
</tbody>
</table>

20-5.03B(2)(d) Mortar
Mortar must comply with section 51-1.02F.

20-5.03B(3) Construction
Place concrete as shown.

Rock must be placed while concrete is still plastic. Remove concrete adhering to the exposed surfaces of the rock.

Loose rocks or rocks with a gap greater than 3/8 inch must be reset by an authorized method. The rock gap is measured from the edge of the rock to the surrounding concrete bedding.

Place mortar as shown.

20-5.03B(4) Payment
Rock blanket is measured parallel to the rock blanket surface.

20-5.03C Gravel Mulch

20-5.03C(1) General

20-5.03C(1)(a) Summary
Section 20-5.03C includes specifications for placing gravel mulch.
20-5.03C(1) Definitions
Reserved

20-5.03C(1)(c) Submittals
Submit a 5-lb sample of the gravel mulch.

20-5.03C(1)(d) Quality Control and Assurance
Reserved

20-5.03C(2) Materials
Gravel mulch must be:
1. Uniform gray color
2. From a single source only
3. Crushed rock that complies with the following grading requirements:

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Percent passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/4 inch</td>
<td>100</td>
</tr>
<tr>
<td>3/4 inch</td>
<td>60-80</td>
</tr>
<tr>
<td>1/2 inch</td>
<td>45-65</td>
</tr>
<tr>
<td>No. 40</td>
<td>5-20</td>
</tr>
</tbody>
</table>

20-5.03C(3) Construction
Place gravel and compact by rolling.
The finished gravel mulch surface must be smooth and uniform, maintaining original flow lines, slope gradients, and contours of the job site.

20-5.03C(4) Payment
Gravel mulch is measured parallel to the gravel mulch surface.

20-5.03D Decomposed Granite
20-5.03D(1) General
20-5.03D(1)(a) Summary
Section 20-5.03D includes specifications for placing decomposed granite.

20-5.03D(1)(b) Definitions
Reserved

20-5.03D(1)(c) Submittals
Five business days before delivery of the materials to the job site, submit:
1. Solidifying emulsion product data including the manufacturers’ product sheets and installation instructions
2. Certificate of compliance for solidifying emulsion
3. 5-lb sample of the decomposed granite

20-5.03D(1)(d) Quality Control and Assurance
Test plot must be:
1. Constructed at an authorized location
2. At least 3 by 12 feet
3. Constructed using the materials, equipment, and methods to be used in the work
4. Authorized before starting work
Notify the Engineer not less than 7 days before constructing the test plot.

The Engineer uses the authorized test plot to determine acceptability of the work.

If ordered, prepare additional test plots. Additional test plots are change order work.

If the test plot is not incorporated into the work, the Engineer may order you to remove it.

20-5.03D(2) Materials

20-5.03D(2)(a) General

Decomposed granite must be:

1. Uniform gray or tan color
2. From one source only
3. Crushed granite rock that complies with grading requirements shown in the following table:

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Percent passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8 inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>95–100</td>
</tr>
<tr>
<td>No. 8</td>
<td>75–80</td>
</tr>
<tr>
<td>No. 16</td>
<td>55–65</td>
</tr>
<tr>
<td>No. 30</td>
<td>40–50</td>
</tr>
<tr>
<td>No. 50</td>
<td>25–35</td>
</tr>
<tr>
<td>No. 100</td>
<td>20–25</td>
</tr>
<tr>
<td>No. 200</td>
<td>5–15</td>
</tr>
</tbody>
</table>

Note: Grading based upon AASHTO T11-82 and T27-82

20-5.03D(2)(b) Solidifying Emulsion

Solidifying emulsion must be either a water-based polymer or nontoxic organic powdered binder specifically manufactured to harden decomposed granite. The solidifying emulsion must not alter the decomposed granite color.

20-5.03D(3) Construction

Do not place decomposed granite during rainy conditions.

Mix solidifying emulsion thoroughly and uniformly throughout the decomposed granite and under the manufacturer's instructions. Mix the material in the field using portable mixing equipment, or delivered in mixer trucks from a local ready-mixed plant.

Place decomposed granite uniformly in layers no more than 1-1/2 inch thick. Compact each layer of decomposed granite to a relative compaction of not less than 90 percent. Begin compaction within 6 to 48 hours of placement.

If the material was mixed in the field, apply an application of solidifying emulsion after compaction as recommended by the manufacturer. Prevent runoff or overspray of solidifying emulsion onto adjacent paved or planting areas.

The finished decomposed granite surface must be smooth and uniform, compacted to a relative compaction of not less than 90 percent, maintaining original flow lines, slope gradients, and contours of the job site.

20-5.03D(4) Payment

Not Used
20-5.03E Wood Mulch

20-5.03E(1) General

20-5.03E(1)(a) Summary
Section 20-5.03E includes specifications for placing wood mulch.

20-5.03E(1)(b) Definitions
Reserved

20-5.03E(1)(c) Submittals
Submit a certificate of compliance for mulch.

Submit a 2 cu ft mulch sample with the mulch source listed on the bag and obtain approval before delivery of mulch to the job site.

20-5.03E(1)(d) Quality Control and Assurance
Reserved

20-5.03E(2) Materials

20-5.03E(2)(a) General
Mulch must not contain more than 0.1 percent of deleterious materials such as rocks, glass, plastics, metals, clods, weeds, weed seeds, coarse objects, sticks larger than the specified particle size, salts, paint, petroleum products, pesticides or other chemical residues harmful to plant or animal life.

Do not use filter fabric.

20-5.03E(2)(b) Tree Bark Mulch
Tree bark mulch must be derived from cedar, Douglas fir, or redwood species.

Tree bark mulch must be ground so that at least 95 percent of the material by volume is less than 2 inches and no more than 30 percent by volume is less than 1 inch.

20-5.03E(2)(c) Wood Chip Mulch
Wood chip mulch must:
1. Be derived from clean wood
2. Not contain leaves or small twigs
3. Contain at least 95 percent wood chips by volume with average thickness of 1/16 to 3/8 inch in any direction and 1/2 to 3 inches in length

20-5.03E(2)(d) Shredded Bark Mulch
Shredded bark mulch must:
1. Be derived from trees
2. Be a blend of loose, long, thin wood, or bark pieces
3. Contain at least 95 percent wood strands by volume with average thickness of 1/8 to 1-1/2 inches in any direction and 2 to 8 inches in length

20-5.03E(2)(e) Tree Trimming Mulch
Tree trimming mulch must:
1. Be derived from chipped trees and may contain leaves and small twigs.
2. Contain at least 95 percent material by volume less than 3 inches and no more than 30 percent by volume less than 1 inch

20-5.03E(2)(f)–20-5.03E(2)(j) Reserved

20-5.03E(3) Construction
Spread mulch placed in areas outside of plant basins to a uniform thickness as shown.
Mulch must be placed at the rate described and placed in the plant basins or spread in areas as shown after the plants have been planted. Mulch placed in plant basins must not come in contact with the plant crown and stem.

Spread mulch from the outside edge of the proposed plant basin or plant without basin to the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings. If the proposed plant or plant without basin is 12 feet or more from the adjacent edges of shoulders, paving, retaining walls, dikes, edging, curbs, sidewalks, walls, fences, and existing plantings, spread the mulch 6 feet beyond the outside edge of the proposed plant basin or plant without basin.

Do not place mulch within 4 feet of:

1. Flow line of earthen drainage ditches
2. Edge of paved ditches
3. Drainage flow lines

20-5.03E(4) Payment
Mulch is measured in the vehicle at the point of delivery.

20-5.04 RESERVED

20-5.05 SITE FURNISHINGS
20-5.05A General
Section 20-5.05 includes specifications for installing site furnishings.

20-5.05B–20-5.05Z Reserved
20-5.06–20-5.10 RESERVED

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21  EROSION CONTROL
07-19-13
Replace ", bonded fiber matrix, and polymer-stabilized fiber matrix" in the 1st paragraph of section 21-1.01B with:

and bonded fiber matrix

Delete the last paragraph of section 21-1.02E.

Replace section 21-1.02F(2) with:

21-1.02F(2)  Reserved

Replace "20-7.02D(1)" in the 1st paragraph of section 21-1.02H with:

20-3.01B(4)
Replace section 21-1.02J with:

21-1.02J Reserved

Replace the row for organic matter content in the table in the 4th paragraph of section 21-1.02M with:

<table>
<thead>
<tr>
<th>Organic matter content</th>
<th>TMECC 05.07-A</th>
<th>% dry weight basis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loss-on-ignition organic matter method (LOI)</td>
<td>30–100</td>
</tr>
</tbody>
</table>

Replace the paragraph in section 21-1.02P with:

Fiber roll must be a premanufactured roll filled with rice or wheat straw, wood excelsior, or coconut fiber. Fiber roll must be covered with biodegradable jute, sisal, or coir fiber netting secured tightly at each end and must be one of the following:

1. 8 to 10 inches in diameter and at least 1.1 lb/ft
2. 10 to 12 inches in diameter and at least 3 lb/ft

Fiber roll must have a minimum functional longevity of 1 year.

Add between the 1st and 2nd paragraphs of section 21-1.03A:

Remove and dispose of trash, debris, and weeds in areas to receive erosion control materials.

Remove and dispose of loose rocks larger than 2-1/2 inches in maximum dimension unless otherwise authorized.

Protect the traveled way, sidewalks, lined drainage channels, and existing vegetation from overspray of hydraulically-applied material.

Replace section 21-1.03B with:

21-1.03B Reserved

Replace "3 passes" in item 2 in the list in the 2nd paragraph of section 21-1.03G with:

2 passes

Replace section 21-1.03I with:

21-1.03I Reserved

Add between the 4th and 5th paragraphs of section 21-1.03P:

If soil conditions do not permit driving the stakes into the soil, drill pilot holes to facilitate driving of the stakes.
Delete the 1st and 2nd sentences of the 3rd paragraph in section 21-1.04.

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28 CONCRETE BASES
11-15-13
Replace "Reserved" in section 28-1 with:

Section 28 includes specifications for constructing new concrete base and replacing existing base.

Replace section 28-2 with:

07-19-13

28-2 LEAN CONCRETE BASE

28-2.01 GENERAL

28-2.01A Summary
Section 28-2 includes specifications for constructing lean concrete base (LCB).

28-2.01B Definitions

coarse aggregate: Aggregate retained on a no. 4 sieve.

fine aggregate: Aggregate passing a no. 4 sieve.

28-2.01C Submittals

28-2.01C(1) General
At least 25 days before field qualification, submit the name of your proposed testing laboratory.

At least 10 days before field qualification, submit:

1. Aggregate qualification test results
2. Proposed aggregate gradation
3. Mix design, including:
   3.1. Proportions
   3.2. Types and amounts of chemical admixtures
4. Optional notice stating intent to produce LCB qualifying for a transverse contraction joint waiver under section 28-2.03D

Submittals for cementitious material must comply with section 90-1.01C(3).

Submit QC test results within 24 hours of test completion.

28-2.01C(2) Field Qualification

For each field qualification for each mix design, manufacture 12 specimens under ASTM C 31 and submit six of the specimens from 24 to 72 hours after manufacture. Use one batch for all 12 specimens.

Submit field qualification data and test reports including:

1. Mixing date
2. Mixing equipment and procedures used
3. Batch volume in cu yd, the minimum is 5 cu yd
4. Type and source of ingredients used

11-15-13
07-19-13
5. Age and strength from compression strength results

Field qualification test reports must be signed by the official in responsible charge of the laboratory performing the tests.

28-2.01D Quality Control and Assurance

28-2.01D(1) General

Stop LCB activities and immediately notify the Engineer whenever:

1. Any quality control or acceptance test result does not comply with the specifications
2. Visual inspection shows noncompliant LCB

If LCB activities are stopped, before resuming activities:

1. Inform the Engineer of the adjustments you will make
2. Remedy or replace the noncompliant LCB
3. Obtain authorization

Molds for compressive strength testing under ASTM C 31 or ASTM C 192 must be 6 by 12 inches.

Quality control and assurance for cementitious materials and admixtures must comply with section 90-1.01D(1)

28-2.01D(2) Aggregate Qualification Testing

Qualify the aggregate for each proposed aggregate source and gradation. Qualification tests include (1) sand equivalent and (2) average 7-day compressive strength under ASTM C 39 on 3 specimens manufactured under ASTM C 192. The cement content for this test must be 300 lb/cu yd, and the 7-day average compressive strength must be at least 610 psi. Cement must be Type II portland cement under section 90-1.02B(2).

LCB must have from 3 to 4 percent air content during aggregate qualification testing.

28-2.01D(3) Field Qualification Testing

Before placing LCB, you must perform field qualification testing and obtain authorization for each mix design. Retest and obtain authorization for changes to authorized mixed designs.

Proposed mix designs must be field qualified before you place the LCB represented by those mix designs. Use an American Concrete Institute (ACI) certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations.

Notify the Engineer at least 5 days before field qualification. Perform field qualification within the job site or a location authorized by the Engineer.

Field qualification testing includes compressive strength, air content, and penetration or slump in compliance with the table titled "Quality Control Requirements."

Field qualification testing for compressive strength must comply with the following:

1. Manufacture 12 cylinders under ASTM C 31 from a single batch
2. Perform 3 tests; each test consists of determining the average compressive strength of 2 cylinders at 7 days under ASTM C 39
3. The average compressive strength for each test must be at least 530 psi

If you submitted a notice to produce LCB qualifying for a transverse contraction joint waiver, manufacture additional specimens and test LCB for compressive strength at 3 days. Prepare compressive strength cylinders under ASTM C 31 at the same time using the same material and procedures as the 7-day compressive strength cylinders except do not submit 6 additional test cylinders. The average 3-day compressive strength for each test must be not more than 500 psi.
28-2.01D(4) Quality Control Testing

Provide a testing laboratory to perform quality control tests. Maintain sampling and testing equipment in proper working condition. Perform sampling under California Test 125.

Testing laboratories and testing equipment must comply with the Department’s Independent Assurance Program.

Perform quality control sampling, testing, and inspection throughout LCB production and placement. LCB must comply with the requirements for the quality characteristics shown in the following table:

<table>
<thead>
<tr>
<th>Quality Control Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality characteristic</td>
</tr>
<tr>
<td>Sand equivalent (min)</td>
</tr>
<tr>
<td>Aggregate gradation</td>
</tr>
<tr>
<td>Air content (max, percent)</td>
</tr>
<tr>
<td>Penetration (inches)</td>
</tr>
<tr>
<td>Slump (inches)</td>
</tr>
<tr>
<td>Compressive strength (min, psi at 7 days)</td>
</tr>
<tr>
<td>Compressive strength (max, psi at 3 days)</td>
</tr>
</tbody>
</table>

a Comply with the table titled “Aggregate Grading” in section 28-2.02C.
b If no single test in the first 5 air content tests exceeds 1-1/2 percent, no further air content tests are required.
c Maximum penetration must not exceed 2 inches and maximum slump must not exceed 4 inches.
d Test for either penetration or slump.
e Prepare cylinders under ASTM C 31.
f Only applicable if you (1) submitted a notice stating intent to produce LCB qualifying for a transverse contraction joint waiver and (2) successfully field qualified the LCB for 3-day compressive strength. Make cylinders at the same time using the same material and procedures as QC testing for 7-day compressive strength.

28-2.01D(5) Acceptance Criteria

For acceptance, properties of LCB must comply with values shown in the following table:

<table>
<thead>
<tr>
<th>Acceptance Criteria Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property</td>
</tr>
<tr>
<td>Compressive strength (min, psi at 7 days)</td>
</tr>
</tbody>
</table>

a Cylinders prepared under ASTM C 31.
b A compressive strength test represents up to (1) 1,000 cu yd or (2) 1 day's production if less than 1,000 cu yd.

28-2.02 MATERIALS

28-2.02A General

Water must comply with section 90-1.02D.

The air content in LCB must not exceed 4 percent. If the aggregate used for LCB is produced from processed reclaimed asphalt concrete or other material that may cause the air content to exceed 4 percent, reduce the air content with an admixture.

A water-reducing chemical admixture may be used. Water-reducing chemical admixture must comply with ASTM C 494, Type A or Type F.

Air-entraining admixtures must comply with section 90-1.02E.
28-2.02B Cementitious Material

Portland cement must comply with section 90-1.02B. Portland cement content must not exceed 300 lb/cu yd.

SCM must comply with section 90-1.02B except the equations for SCM content under 90-1.02B(3) do not apply.

For aggregate qualification testing, use Type II portland cement under section 90-1.02B(2) without SCM.

28-2.02C Aggregate

Aggregate must be clean and free from decomposed material, organic material, and other deleterious substances. Aggregate samples must not be treated with lime, cement, or chemicals before testing for sand equivalent.

Use either 1-1/2 inch or 1 inch grading. Do not change your selected aggregate grading without authorization.

When tested under ASTM C 136, the percentage composition by weight of the aggregate must comply with the grading requirements for the sieve sizes shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Grading</th>
<th>Percentage passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve sizes</td>
<td>1-1/2&quot; maximum</td>
</tr>
<tr>
<td></td>
<td>Operating range</td>
</tr>
<tr>
<td>2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>90-100</td>
</tr>
<tr>
<td>1&quot;</td>
<td>--</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>50-85</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>40-75</td>
</tr>
<tr>
<td>No. 4</td>
<td>25-60</td>
</tr>
<tr>
<td>No. 30</td>
<td>10-30</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-12</td>
</tr>
</tbody>
</table>

Aggregate must comply with the quality requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Quality</th>
<th>Property</th>
<th>Test Method</th>
<th>Operating range</th>
<th>Contract compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sand equivalent (min)</td>
<td>ASTM D 2419</td>
<td>21</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Compressive strength (min, psi at 7 days)</td>
<td>ASTM C 192, ASTM C 39</td>
<td>--</td>
<td>610 at 300 lb/cu yd cement content</td>
</tr>
</tbody>
</table>

Note: Cement must be Type II portland cement under section 90-1.02B(2).

If the aggregate grading or the sand equivalent test results, or both comply with contract compliance requirements but not operating range requirements, you may continue placing LCB for the remainder of the work day. Do not place additional LCB until you demonstrate the LCB to be placed complies with the operating range requirements.

28-2.03 CONSTRUCTION

28-2.03A General

Do not allow traffic or equipment on the LCB for at least 72 hours after the 1st application of the curing compound and completion of contraction joints. Limit traffic and equipment on the LCB to that is required for placing additional layers of LCB or paving.

28-2.03B Subgrade

Immediately before spreading LCB, the subgrade must:
1. Comply with the specified compaction and elevation tolerance for the material involved
2. Be free from loose or extraneous material
3. Be uniformly moist

Areas of subgrade lower than the grade established by the Engineer must be filled with LCB. The Department does not pay for filling low areas of subgrade.

**28-2.03C  Proportioning, Mixing, and Transporting**

Proportion LCB under section 90-1.02F except aggregate does not have to be separated into sizes.

Mix and transport LCB under section 90-1.02G except the 5th and 7th paragraphs in section 90-1.02G(6) do not apply.

**28-2.03D  Placing**

Place LCB under section 40-1.03H(1) except the 3rd paragraph does not apply.

Unless otherwise described, construct LCB in minimum widths of 12 feet separated by construction joints. For LCB constructed monolithically in widths greater than 26 feet, construct a longitudinal contraction joint offset no more than 3 feet from the centerline of the width being constructed.

Contraction joints must comply with section 40-1.03D(3).

Construct transverse contraction joints in intervals that result in LCB areas where the lengths and widths are within 20 percent of each other. Measure the widths from any longitudinal construction or longitudinal contraction joints.

The Engineer waives the requirement for transverse contraction joints if you:
1. Submitted a notice under 28-2.01C(1)
2. Successfully field qualified LCB for 3-day compressive strength testing
3. Submit QC test results for 3-day compressive strength under section 28-2.01D(4).

If concrete pavement will be placed on LCB, construct longitudinal construction and longitudinal contraction joints in the LCB. Provide at least 1 foot horizontal clearance from planned longitudinal construction and longitudinal contraction joints in the concrete pavement.

Do not mix or place LCB when the atmospheric temperature is below 35 degrees F. Do not place LCB on frozen ground.

**28-2.03E  Finishing**

Place LCB under section 40-1.03H(4) or under section 40-1.03H(5) except where there are confined work areas and when authorized:

1. Spread and shape LCB using suitable powered finishing machines and supplement with hand work as necessary
2. Consolidate LCB using high-frequency internal vibrators within 15 minutes after LCB is deposited on the subgrade
3. Vibrate with care such that adequate consolidation occurs across the full paving width and do not use vibrators for extensive weight shifting of the LCB

For LCB to be paved with HMA, before curing operation texture the LCB finished surface by dragging a broom, burlap, or a spring steel tine device. If using a spring steel tine device, the device must produce a scored surface with scores parallel or transverse to the pavement centerline. Texture at a time and in a manner that produces the coarsest texture for the method used.

For LCB to be paved with HMA, the finished surface must not vary more than 0.05 foot from the grade established by the Engineer.

Do not texture LCB that will be covered with concrete pavement. Before applying curing compound, finish LCB to a smooth surface free from mortar ridges and other projections.
For LCB to be paved with concrete pavement, the finished surface must not be above the grade, or more than 0.05 foot below the grade established by the Engineer.

The finished surface must be free from porous areas.

**28-2.03F Curing**

After finishing LCB, cure LCB with pigmented curing compound under section 90-1.03B(3) and 40-1.03K except for LCB to be paved with concrete pavement, comply with section 36-2. Apply curing compound to the area to be paved with concrete pavement:

1. In 2 separate applications
2. Before the atmospheric temperature falls below 40 degrees F
3. At a rate of 1 gal/150 sq ft for the first application
4. At a rate of 1 gal/200 sq ft for the second application. Within 4 days after the first application, clean the surface and apply the second application.

Immediately repair damage to the curing compound or LCB.

**28-2.03G Surfaces Not Within Tolerance**

Where LCB will be paved with concrete pavement, remove the base wherever the surface is higher than the grade established by the Engineer and replace it with LCB. Where LCB will not be paved with concrete pavement, remove the base wherever the surface is higher than 0.05 foot above the grade established by the Engineer and replace it with LCB. If authorized, grind the surface with either a diamond or carborundum blade to within tolerance. After grinding LCB to be paved with concrete pavement and after all free water has left the surface, clean foreign material and grinding residue from the surface. Apply curing compound to the ground area at a rate of approximately 1 gal/150 sq ft.

Where the surface of LCB is lower than 0.05 foot from the grade established by the Engineer, remove the base and replace it with LCB or, if authorized, fill low areas according to the pavement material as follows:

1. For HMA pavement, fill low areas with HMA that complies with the specifications for the lowest layer of pavement. Do not fill low areas concurrently with the paving operation.
2. For concrete pavement, fill low areas with pavement concrete concurrent with the paving operation.

**28-2.04 PAYMENT**

LCB is measured from the dimensions shown.

Replace section 28-3 with:

**28-3 RAPID STRENGTH CONCRETE BASE**

Reserved

Replace section 28-4 with:

**28-4 LEAN CONCRETE BASE RAPID SETTING**

Reserved

Replace section 28-5 with:

**28-5 CONCRETE BASE**

Reserved

OCTOBER 2015
Add to section 28:

28-6–28-14 RESERVED
28-15 REPLACE BASE

DIVISION IV  SUBBASES AND BASES
29  TREATED PERMEABLE BASES

Replace "section 68-4.02C" in the 6th paragraph of section 29-1.03A with:

section 64-4.03

Replace the 1st paragraph of section 29-1.03B with:

Produce ATPB under section 39-1.02H, except a JMF is not required. Do not use RAP.

The temperature of the aggregate before adding the asphalt binder must be from 275 to 325 degrees F.

Do not store ATPB longer than 2 hours.

Combine aggregate with 2.5 percent asphalt binder by weight of dry aggregate. An increase or decrease in the asphalt content may be ordered after your proposed aggregate supply has been tested. If an ordered increase or decrease exceeds the specified amount of asphalt content by more than 0.1 percent by weight of dry aggregate, compensation for ATPB is determined by the total increase or decrease in asphalt.

The Engineer determines the asphalt content of the asphalt mixture under California Test 382. The bitumen ratio (pounds of asphalt per 100 lb of dry aggregate) must not vary more than 0.5 lb of asphalt above or below the amount designated by the Engineer. Samples used to determine the bitumen ratio are obtained from trucks at the plant or from the mat behind the paver before rolling. If the sample is taken from the mat behind the paver, the bitumen ratio must not be less than the amount designated by the Engineer, less 0.7 lb of asphalt per 100 lb of dry aggregate.

Replace the introductory clause of the 2nd paragraph of section 29-1.03B with:

Equipment for spreading and compacting ATPB must comply with section 39-1.03B. Compact ATPB in 1 layer using one of the following methods:

Replace "3rd" in the 4th paragraph of section 29-1.03C with:

4th
Replace section 30 with:

30 RECLAIMED PAVEMENTS
04-20-12
30-1 GENERAL

30-1.01 GENERAL
Section 30 includes specifications for reclaiming the pavement section and constructing a base.

30-2 FULL DEPTH RECLAIMED—FOAMED ASPHALT
Reserved

30-3–30-6 RESERVED

DIVISION V SURFACINGS AND PAVEMENTS
Replace section 36 with:

36 GENERAL
07-19-13
36-1 GENERAL
Section 36 includes general specifications for constructing surfacings and pavements.

36-2 BASE BOND BREAKER
Reserved

36-3–36-15 RESERVED

37 BITUMINOUS SEALS
03-21-14
Replace section 37-1.01 with:

37-1.01 GENERAL
37-1.01A Summary
Section 37-1 includes general specifications for applying bituminous seals.

37-1.01B Definitions
Reserved

37-1.01C Submittals
Reserved

37-1.01D Quality Control and Assurance
37-1.01D(1) General
Reserved
37-1.01D(2) **Prepaving Conference**

For seal coats and micro-surfacing, schedule a prepaving conference at a mutually agreed upon time and place to meet with the Engineer.

Prepaving conference attendees must sign an attendance sheet provided by the Engineer. The prepaving conference must be attended by your:

1. Project superintendent
2. Paving construction foreman
3. Traffic control foreman

Be prepared to discuss:

1. Quality control
2. Acceptance testing
3. Placement
4. Training on placement methods
5. Checklist of items for proper placement
6. Unique issues specific to the project, including:
   6.1. Weather
   6.2. Alignment and geometrics
   6.3. Traffic control issues
   6.4. Haul distances
   6.5. Presence and absence of shaded areas
   6.6. Any other local issues

37-1.02 **MATERIALS**

Not Used

37-1.03 **CONSTRUCTION**

Not Used

37-1.04 **PAYMENT**

Not Used

Replace section 37-2 with:

37-2 **SEAL COATS**

07-19-13

37-2.01 **GENERAL**

37-2.01A General

37-2.01A(1) Summary

Section 37-2 includes specifications for applying seal coats.

37-2.01A(2) **Definitions**

Reserved

37-2.01A(3) **Submittals**

Reserved

37-2.01A(4) **Quality Control and Assurance**

The following personnel must attend the prepaving conference:

1. Aggregate suppliers
2. Chip spreader operators
3. Emulsion and binder distributor
4. Coated chips producer if coated chips are used
37-2.01B Materials
Screenings must be broken stone, crushed gravel, or both. At least 90 percent of screenings by weight must be crushed particles as determined under California Test 205.

Screenings for seal coats must have the properties specified in the following table:

<table>
<thead>
<tr>
<th>Seal Coat Screenings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Properties</td>
</tr>
<tr>
<td>Los Angeles Rattler, %, max</td>
</tr>
<tr>
<td>Loss at 100 revolutions.</td>
</tr>
<tr>
<td>Loss at 500 revolutions.</td>
</tr>
<tr>
<td>Film stripping, %, max</td>
</tr>
</tbody>
</table>

37-2.01C Construction
37-2.01C(1) General
Wherever final sweeping or brooming of the seal coat surface is complete, place permanent traffic stripes and pavement markings within 10 days.

If you fail to place the permanent traffic stripes and pavement markings within the specified time, the Department withholds 50 percent of the estimated value of the seal coat work completed that has not received permanent traffic stripes and pavement markings.

37-2.01C(2) Equipment
Equipment for seal coats must include and comply with the following:

1. Screenings haul trucks. Haul trucks must have:
   1.1. Tailgates that discharge screenings
   1.2. Devices to lock onto the rear screenings spreader hitch
   1.3. Dump beds that will not push down on the spreader when fully raised
   1.4. Dump beds that will not spill screenings on the roadway when transferred to the spreader hopper
   1.5. Tarpaulins to cover precoated screenings when haul distance exceeds 30 minutes or ambient temperature is less than 65 degrees F

2. Self-propelled screenings spreader. The spreader must have:
   2.1. Screenings hopper in the rear
   2.2. Belt conveyors that carry the screenings to the front
   2.3. Spreading hopper capable of providing a uniform screening spread rate over the entire width of the traffic lane in 1 application.

3. Self-propelled power brooms. Do not use gutter brooms or steel-tined brooms. Brooms must be capable of removing loose screenings adjacent to barriers that prevent screenings from being swept off the roadway, including curbs, gutters, dikes, berms, and railings.

4. Pneumatic-tired rollers. Pneumatic-tired rollers must be an oscillating type at least 4 feet wide. Each roller must be self-propelled and reversible. Pneumatic tires must be of equal size, diameter, type, and ply. The roller must carry at least 3,000 lb of load on each wheel and each tire must have an air pressure of 100 ± 5 psi.

37-2.01C(3) Surface Preparation
Before applying seal coat, cover manholes, valve and monument covers, grates, or other exposed facilities located within the area of application, using a plastic or oil resistant construction paper secured by tape or adhesive to the facility being covered. Reference the covered facilities with a sufficient number of control points to relocate the facilities after the application of the seal coat.

After completion of the seal coat operation, remove covers from the facilities.

Immediately before applying seal coat, clean the surface to receive seal coat by removing extraneous material and drying. Cleaning the existing pavement includes the use of brooms.
37-2.01C(4) Applying Emulsion and Asphalt Binder

Prevent spray on existing pavement not intended for seal coat or on previously applied seal coat using a material such as building paper. Remove the material after use.

Align longitudinal joints between seal coat applications with designated traffic lanes.

For emulsion, overlap longitudinal joints by not more than 4 inches. You may overlap longitudinal joints up to 8 inches if authorized.

For areas not accessible to a truck distributor bar, apply the emulsion with a squeegee or other authorized means. For asphalt binder, hand spray nonaccessible areas. You may overlap the emulsion or asphalt binder applications before the application of screenings at longitudinal joints.

Do not apply the emulsion or asphalt binder unless there are sufficient screenings at the job site to cover the emulsion or asphalt binder.

Discontinue application of emulsion or asphalt binder early enough to comply with lane closure specifications and darkness. Apply to 1 lane at a time and cover the lane entirely in 1 operation.

37-2.01C(5) Spreading Screenings

Prevent vehicles from driving on asphaltic emulsion or asphalt binder before spreading screenings.

Spread screenings at a uniform rate over the full lane width in 1 application.

Broom excess screenings at joints before spreading adjacent screenings.

Operate the spreader at speeds slow enough to prevent screenings from rolling over after dropping.

If the spreader is not moving, screenings must not drop. If you stop spreading and screenings drop, remove the excess screenings before resuming activities.

37-2.01C(6) Finishing

Remove piles, ridges, or unevenly distributed screenings. Repair permanent ridges, bumps, or depressions in the finished surface. Spread additional screenings and roll if screenings are picked up by rollers or vehicles.

Seal coat joints between adjacent applications of seal coat must be smooth, straight, uniform, and completely covered. Longitudinal joints must be at lane lines and not overlap by more than 4 inches. Blend the adjacent applications by brooming.

A coverage is the number of passes a roller needs to cover the width. A pass is 1 roller movement parallel to the seal coat application in either direction. Overlapping passes are part of the coverage being made and are not part of a subsequent coverage. Do not start a coverage until completing the previous coverage.

Before opening to traffic, finish seal coat in the following sequence:

1. Perform initial rolling consisting of 1 coverage with a pneumatic-tired roller
2. Perform final rolling consisting of 3 coverages with a pneumatic-tired roller
3. Broom excess screenings from the roadway and adjacent abutting areas
4. Apply flush coat if specified

The Engineer may order salvaging of excess screenings.

Dispose of excess screenings the Engineer determines are not salvageable. Dispose of screenings in any of the following ways or locations:

1. Under section 14-10
2. On embankment slopes
3. In authorized areas

Salvaging and stockpiling excess screenings is change order work.
37-2.01C(7) Seal Coat Maintenance
Seal coats must be maintained for 4 consecutive days from the day screenings are applied. Maintenance must include brooming to maintain a surface free of loose screenings, to distribute screenings over the surface so as to absorb any free asphaltic material, to cover any areas deficient in cover coat material, and to prevent formation of corrugations.

After 4 consecutive days, excess screenings must be removed from the paved areas. Brooming must not displace screenings set in asphaltic material.

The exact time of brooming will be determined by the Engineer. As a minimum, brooming will be required at the following times:

1. On 2-lane 2-way roadways, from 2 to 4 hours after traffic, controlled with pilot cars, has been routed on the seal coat.
2. On multilane roadways, from 2 to 4 hours after screenings have been placed.
3. In addition to previous brooming, immediately before opening any lane to public traffic, not controlled with pilot cars.
4. On the morning following the application of screenings on any lane that has been open to public traffic not controlled with pilot cars and before starting any other activities.

For 2-lane 2-way roadways under 1-way traffic control, upon completion of secondary rolling, public traffic must be controlled with pilot cars and routed over the new seal coat for a period of 2 to 4 hours. The Engineer will determine the exact period of time.

Schedule the operations so that seal coat is placed on both lanes of the traveled way each work shift and so that 1-way traffic control is discontinued 1 hour before darkness. At the end of the work shift, the end of the seal coat on both lanes must generally match.

On multilane roadways, initial brooming must begin after the screenings have been in place for a period of 2 to 4 hours. If the initial brooming is not completed during the work shift in which the screenings were placed, the initial brooming must be completed at the beginning of the next work shift.

Public traffic must be controlled with pilot cars and be routed on the new seal coat surface of the lane for a minimum of 2 hours after completion of the initial brooming and before opening the lane to traffic not controlled with pilot cars. When traffic is controlled with pilot cars, a maximum of 1 lane in the direction of travel must be open to public traffic. Once traffic controlled with pilot cars is routed over the seal coat at a particular location, continuous control must be maintained at that location until the seal coat placement and brooming on adjacent lanes to receive seal coat is completed.

37-2.01D Payment
If there is no bid item for a traffic control system, furnishing and using a pilot car is included in the various items of the work involved in applying the seal coat.

If test results for the screenings grading do not comply with specifications, you may remove the seal coat represented by these tests or request that it remain in place with a payment deduction. The deduction is $1.75 per ton for the screenings represented by the test results.

37-2.02 FOG SEAL
37-2.02A General
37-2.02A(1) Summary
Fog seal coat includes applying a slow-setting asphaltic emulsion.

37-2.02A(2) Definitions
Reserved

37-2.02A(3) Submittals
Submit a 1/2-gallon sample of the asphaltic emulsion in a plastic container. Take the sample from the distributor truck spray bar at mid-load.
37-2.02A(4) Quality Control and Assurance

37-2.02B Material
The Engineer selects the grade of slow-setting asphalritic emulsion to be used.

If additional water is added to the asphalthic emulsion, the resultant mixture must not be more than 1 part asphalthic emulsion to 1 part water. The Engineer determines the exact amount of additional water.

37-2.02C Construction
Apply asphalthic emulsion for fog seal coat at a residual asphalt rate from 0.02 to 0.06 gal/sq yd. The Engineer determines the exact rate.

Apply fog seal coat when the ambient air temperature is above 40 degrees F.

Sprinkle water on fog seal coat that becomes tacky in an amount determined by the Engineer.

If fog seal coat and seal coat with screenings are specified on the same project, apply fog seal coat at least 4 days before applying the adjoining seal coat with screenings. The joint between the seal coats must be neat and uniform.

37-2.02D Payment
The Department does not adjust the unit price for an increase or decrease in the asphalthic emulsion (fog seal coat) quantity.

37-2.03 FLUSH COATS
37-2.03A General
Flush coat includes applying a fog seal coat to the surface, followed by sand.

37-2.03B Material
The Engineer selects the grade of slow-setting or quick-setting asphalthic emulsion to be used.

Sand for flush coat must comply with the material specifications for fine aggregate grading in section 90-1.02C(3). Sand must not include organic material or clay.

37-2.03C Construction
Apply asphalthic emulsion for flush coat at a residual asphalt rate from 0.02 to 0.06 gal/sq yd. The Engineer determines the exact rate.

During flush coat activities, close adjacent lanes to traffic. Do not track asphalthic emulsion on existing pavement surfaces.

Apply sand immediately after the asphalthic emulsion application.

Spread sand with a self-propelled screenings spreader equipped with a mechanical device that spreads sand at a uniform rate over the full width of a traffic lane in a single application. Spread sand at a rate from 2 to 6 lb/sq yd. The Engineer determines the exact rate.

37-2.03D Payment
The Department does not adjust the unit price for an increase or decrease in the sand cover for the flush coat quantity.
37-2.04 ASPHALTIC EMULSION SEAL COAT

37-2.04A General

37-2.04A(1) General

Section 37-2.04 includes specifications for applying asphaltic emulsion seal coat. Asphaltic emulsion seal coat includes applying asphaltic emulsion, followed by screenings, and then a flush coat.

Asphaltic emulsion seal coat includes one or more of the following types:

1. Nonpolymer asphaltic emulsion seal coat
2. Polymer asphaltic emulsion seal coat

A double asphaltic emulsion seal coat is the application of asphaltic emulsion, followed by screenings applied twice in sequence.

37-2.04A(1)(a) Summary

37-2.04A(1)(b) Definitions

Reserved

37-2.04A(1)(c) Submittals

At least 10 days before starting asphaltic emulsion seal coat application, submit the name of an authorized laboratory that will be performing asphaltic emulsion QC testing.

Submit a sample of asphaltic emulsion in a 1/2-gallon plastic container to the Engineer and to the authorized laboratory. Each sample must be submitted in an insulated shipping container within 24 hours of sampling.

Within 7 days after taking samples, submit the authorized laboratory's test results for asphaltic emulsion.

37-2.04A(1)(d) Quality Control and Assurance

Samples for the screenings grading and cleanliness value must be taken from the spreader conveyor belt.

Within 3 business days of sampling, the authorized laboratory must test the asphaltic emulsion for:

1. Viscosity under AASHTO T 59
2. Sieve test under AASHTO T 59
3. Demulsibility under AASHTO T 59
4. Torsional recovery under California Test 332 for polymer asphaltic emulsion
5. Elastic recovery under AASHTO T 301 for polymer asphaltic emulsion

Circulate asphaltic emulsion in the distributor truck before sampling. Take samples from the distributor truck at mid load or from a sampling tap or thief. Before taking samples, draw and dispose of 1 gallon. In the presence of the Engineer take two 1/2-gallon samples every 55 tons or at least 1 day's production.

37-2.04A(2) Materials

Not Used

37-2.04A(3) Construction

The Engineer determines the exact application rate.

At the time of application, the temperature of the asphaltic emulsion must be from 130 to 180 degrees F.

When tested under California Test 339, the application rate for asphaltic emulsion must not vary from the average by more than:

1. 15 percent in the transverse direction
2. 10 percent in the longitudinal direction
37-2.04A(4) Payment
Not Used

37-2.04B Nonpolymer Asphalactic Emulsion Seal Coat

37-2.04B(1) General

37-2.04B(1)(a) Summary
Section 37-2.04B includes specifications for applying a nonpolymer asphalactic emulsion seal coat.

37-2.04B(1)(b) Definitions
Reserved

37-2.04B(1)(c) Submittals
Reserved

37-2.04B(1)(d) Quality Control and Assurance
For nonpolymer asphalactic emulsion seal coat, if a test result for the screenings cleanness value is from 75 to 80, you may request that the asphalactic emulsion seal coat represented by the test remain in place. A payment deduction is made as specified in section 37-2.04D. If the screenings cleanness value is less than 75, remove the asphalactic emulsion seal coat.

37-2.04B(2) Materials
Screenings for nonpolymer asphalactic emulsion seal coat must have the gradation as determined under California Test 202 in the following table.

<table>
<thead>
<tr>
<th>Nonpolymer Asphalactic Emulsion Seal Coat Screenings</th>
<th>Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve sizes</td>
<td>Percentage passing</td>
</tr>
<tr>
<td></td>
<td>Coarse 1/2&quot; max</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>100</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>95–100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>50–80</td>
</tr>
<tr>
<td>No. 4</td>
<td>0–15</td>
</tr>
<tr>
<td>No. 8</td>
<td>0–5</td>
</tr>
<tr>
<td>No. 16</td>
<td>--</td>
</tr>
<tr>
<td>No. 30</td>
<td>--</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–2</td>
</tr>
</tbody>
</table>

The cleanness value determined under California Test 227 must be 80 or greater.

37-2.04B(3) Construction
Asphalactic emulsion must be applied within the application rate ranges shown in the following table:

<table>
<thead>
<tr>
<th>Asphalactic Emulsion Application Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screenings</td>
</tr>
<tr>
<td>Fine</td>
</tr>
<tr>
<td>Medium fine</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Coarse</td>
</tr>
</tbody>
</table>
Apply asphaltic emulsion when the ambient air temperature is from 65 to 110 degrees F and the pavement surface temperature is at least 80 degrees F.

Do not apply asphaltic emulsion when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

For double asphaltic emulsion seal coat, the asphaltic emulsion must be applied within the application rates shown in the following table:

<table>
<thead>
<tr>
<th>Asphalitic Emulsion Application Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screenings</td>
</tr>
<tr>
<td>Application rate range (gal/sq yd)</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Double</td>
</tr>
<tr>
<td>1st application</td>
</tr>
<tr>
<td>2nd application</td>
</tr>
</tbody>
</table>

You may stockpile screenings for asphaltic emulsion seal coat if you prevent contamination. Screenings must have damp surfaces at spreading. If water visibly separates from the screenings, do not spread. You may redampen them in the delivery vehicle.

Spread screenings before the asphaltic emulsion sets or breaks.

Spread screenings within 10 percent of the rate determined by the Engineer. Screenings must have a spread rate within the ranges shown in the following table:

<table>
<thead>
<tr>
<th>Screening Spread Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal coat type</td>
</tr>
<tr>
<td>Fine</td>
</tr>
<tr>
<td>Medium fine</td>
</tr>
<tr>
<td>Medium</td>
</tr>
<tr>
<td>Coarse</td>
</tr>
</tbody>
</table>

Do not spread screenings more than 2,500 feet ahead of the completed initial rolling.

For double asphaltic emulsion seal coat, screenings must have a spread rate within the ranges shown in the following table:

<table>
<thead>
<tr>
<th>Screening Spread Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seal coat type</td>
</tr>
<tr>
<td>Double</td>
</tr>
<tr>
<td>1st application</td>
</tr>
<tr>
<td>2nd application</td>
</tr>
</tbody>
</table>

Remove excess screenings on the 1st application before the 2nd application of asphaltic emulsion.

**37-2.04B(4) Payment**

If asphaltic emulsion seal coat with screenings does not comply with the cleanness value specifications, you may request that the seal coat remain in place with a pay deduction corresponding to the cleanness value shown in the following table:

<table>
<thead>
<tr>
<th>Asphalitic Emulsion Seal Coat Cleanness Value Deductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanness value</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>80 or over</td>
</tr>
<tr>
<td>79</td>
</tr>
<tr>
<td>77–78</td>
</tr>
<tr>
<td>75–76</td>
</tr>
</tbody>
</table>
37-2.04C Polymer Asphaltic Emulsion Seal Coat

37-2.04C(1) General

37-2.04C(1)(a) Summary
Section 37-2.04C includes specifications for applying a polymer asphaltic emulsion seal coat.

37-2.04C(1)(b) Definitions
Reserved

37-2.04C(1)(c) Submittals
At least 10 days before starting polymer asphaltic emulsion seal coat application, submit a signed copy of the test result report of the Vialit test method for aggregate retention in chip seals (french chip) to the Engineer and to:

DEPARTMENT OF TRANSPORTATION
Division of Maintenance, Roadway Maintenance Office
1120 N Street, MS 31
Sacramento, CA  95814

37-2.04C(1)(d) Quality Control and Assurance
The authorized laboratory must test screenings for retention under the Vialit test method for aggregate in chip seals (french chip). The Vialit test results are not used for acceptance. The Vialit test is available at the METS Web site.

If the test results for polymer asphaltic emulsion do not comply with the specifications, the Engineer assesses a pay factor value for the following properties and increments:
Polymer Asphaltic Emulsion Pay Factor Table

<table>
<thead>
<tr>
<th>Test method and property</th>
<th>Increment</th>
<th>Pay factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO T 59 (Viscosity, sec Saybolt Furol, at 50 °C)</td>
<td>Each 10 seconds above max or below min</td>
<td>1</td>
</tr>
<tr>
<td>AASHTO T 59 (settlement, 5 days, percent)</td>
<td>Each 1.5 percent above max</td>
<td>1</td>
</tr>
<tr>
<td>AASHTO T 59 (sieve test, percent max)</td>
<td>Each 0.2 percent above max</td>
<td>1</td>
</tr>
<tr>
<td>AASHTO T 59 (demulsibility percent)</td>
<td>Each 2 percent below min</td>
<td>1</td>
</tr>
<tr>
<td>Test on residue from evaporation test</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AASHTO T 49 (penetration, 25 °C)</td>
<td>Each 2 dm above max or below min</td>
<td>1</td>
</tr>
<tr>
<td>ASTM D 36 (field softening point °C)</td>
<td>2 °C below min</td>
<td>1</td>
</tr>
<tr>
<td>California Test 332 (torsional recovery a)</td>
<td>For each 1 increment below the min value of 18</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>For each 2 increments below the min value of 18</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>For each 3 or more increments below the min value of 18</td>
<td>10</td>
</tr>
<tr>
<td>ASTM T 301 (elastic recovery b)</td>
<td>For each 1 increment below the min value of 60</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>For each 2 increment below the min value of 60</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>For each 3 increment below the min value of 60</td>
<td>10</td>
</tr>
</tbody>
</table>

*The highest pay factor applies

The Engineer assesses a pay factor of 1 for sampling not performed in compliance with the specifications, including shipping and sampling containers.

For polymer asphaltic emulsion seal coat, if a test result for the screenings cleanness value is from 75 to 86, you may request that the asphaltic emulsion seal coat represented by the test remain in place. A payment deduction is made as specified in section 37-2.04D. If the screenings cleanness value is less than 75, remove the asphaltic emulsion seal coat.

37-2.04C(2) Materials
Polymer asphaltic emulsion must include elastomeric polymer.

Polymer asphaltic emulsion must comply with section 94, Table 3, under the test on residue from evaporation test for Grades PMRS2, PMRS2h, PMCRS2, and PMCRS2h and the following:

1. The penetration at 39.2 degrees F (200g for 60 seconds) determined under AASHTO T 49 must be at least 6.
2. Elastic recovery determined under AASHTO T 301 must be at least 60 percent.
3. Polymer content in percent by weight does not apply.
4. The ring and ball softening point temperature determined under AASHTO T 53 for Test on Residue from Evaporation Test must comply with the following minimum temperature requirement:
   4.1. 126 degrees F for a geographical ambient temperature from 32 to 104 degrees F
   4.2. 129 degrees F for a geographical ambient temperature from 18 to 104 degrees F
   4.3. 135 degrees F for a geographical ambient temperature from 18 to greater than 104 degrees F
Screenings for polymer asphaltic emulsion seal coat must have the gradation as determined under California Test 202 in the following table:

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Coarse 1/2&quot; max</th>
<th>Medium 3/8&quot; max</th>
<th>Medium fine 5/16&quot; max</th>
<th>Fine 1/4&quot; max</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>85–100</td>
<td>100</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>0–30</td>
<td>85–100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>0–5</td>
<td>0–15</td>
<td>0–50</td>
<td>60–85</td>
</tr>
<tr>
<td>No. 8</td>
<td>--</td>
<td>0–5</td>
<td>0–15</td>
<td>0–25</td>
</tr>
<tr>
<td>No. 16</td>
<td>--</td>
<td>--</td>
<td>0–5</td>
<td>0–5</td>
</tr>
<tr>
<td>No. 30</td>
<td>--</td>
<td>--</td>
<td>0–3</td>
<td>0–3</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–2</td>
<td>0–2</td>
<td>0–2</td>
<td>0–2</td>
</tr>
</tbody>
</table>

The cleanliness value determined under California Test 227 must be 86 or greater.

37-2.04C(3) Construction

Polymer asphaltic emulsion must be applied within the application rate ranges shown in the following table:

<table>
<thead>
<tr>
<th>Screenings</th>
<th>Application rate range (gallons per square yard)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine</td>
<td>0.15–0.30</td>
</tr>
<tr>
<td>Medium fine</td>
<td>0.25–0.35</td>
</tr>
<tr>
<td>Medium</td>
<td>0.25–0.40</td>
</tr>
<tr>
<td>Coarse</td>
<td>0.30–0.40</td>
</tr>
</tbody>
</table>

Apply polymer asphaltic emulsion when the ambient air temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply polymer asphaltic emulsion when weather forecasts predict the ambient air temperature will fall below 39 degrees F within 24 hours after application.

For double asphaltic emulsion seal coat, polymer asphaltic emulsion must be applied within the application rates shown in the following table:

<table>
<thead>
<tr>
<th>Screenings</th>
<th>Application rate range (gal/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double</td>
<td></td>
</tr>
<tr>
<td>1st application</td>
<td>0.20–0.35</td>
</tr>
<tr>
<td>2nd application</td>
<td>0.20–0.30</td>
</tr>
</tbody>
</table>

You may stockpile screenings for polymer emulsion seal coat if you prevent contamination. Screenings must have damp surfaces at spreading. If water visibly separates from the screenings, do not spread. You may redampen them in the delivery vehicle.

Spread screenings before the polymer emulsion sets or breaks.
Spread screenings within 10 percent of the rate determined by the Engineer. Screenings must have a spread rate within the ranges shown in the following table:

<table>
<thead>
<tr>
<th>Screening Spread Rates</th>
<th>Seal coat type</th>
<th>Range (lb/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine</td>
<td>12–20</td>
<td></td>
</tr>
<tr>
<td>Medium fine</td>
<td>16–25</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>20–30</td>
<td></td>
</tr>
<tr>
<td>Coarse</td>
<td>23–30</td>
<td></td>
</tr>
</tbody>
</table>

Do not spread screenings more than 2,500 feet ahead of the completed initial rolling.

For double seal coat, screenings must have a spread rate within the ranges shown in the following table:

<table>
<thead>
<tr>
<th>Screening Spread Rates</th>
<th>Seal coat type</th>
<th>Range (lb/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double 1st application</td>
<td>23–30</td>
<td></td>
</tr>
<tr>
<td>Double 2nd application</td>
<td>12–20</td>
<td></td>
</tr>
</tbody>
</table>

Remove excess screenings on the 1st application before the 2nd application of asphaltic emulsion.

37-2.04C(4) Payment

If polymer asphaltic emulsion seal coat with screenings does not comply with the specifications for cleanness value you may request that the seal coat remain in place with a pay deduction corresponding by the cleanness value shown in the following table:

<table>
<thead>
<tr>
<th>Polymer Asphaltic Emulsion Seal Coat Cleanness Value Deductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanness value</td>
</tr>
<tr>
<td>86 or over</td>
</tr>
<tr>
<td>81–85</td>
</tr>
<tr>
<td>77–80</td>
</tr>
<tr>
<td>75–76</td>
</tr>
</tbody>
</table>

If test results for polymer asphaltic emulsion aggregate grading and cleanness value test results do not comply with the specifications, all deductions are made. A test for polymer asphaltic emulsion represents the smaller of 55 tons or 1 day’s production. A test for the screenings grading or cleanness value represents the smaller of 300 tons or 1 day’s production.

The payment deduction for noncompliant polymer asphaltic emulsion is based on the total pay factor value determined from the table titled, "Polymer Asphaltic Emulsion Pay Factor Deduction." You must remove polymer asphaltic emulsion seal coat with a pay factor value greater than 20. You may request seal coat with noncompliant polymer asphaltic emulsion to remain in place with a pay deduction for the total pay factor value shown in the following table:
Polymer Asphalitic Emulsion Pay Factor Deductions

<table>
<thead>
<tr>
<th>Total pay factor value</th>
<th>Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>none</td>
</tr>
<tr>
<td>1–2</td>
<td>$5.00/ton</td>
</tr>
<tr>
<td>3–5</td>
<td>$10.00/ton</td>
</tr>
<tr>
<td>6–9</td>
<td>$15.00/ton</td>
</tr>
<tr>
<td>10–14</td>
<td>$25.00/ton</td>
</tr>
<tr>
<td>15–20</td>
<td>$50.00/ton</td>
</tr>
</tbody>
</table>

37-2.05 ASPHALT BINDER SEAL COATS
37-2.05A General
Reserved

37-2.05B Asphalt Rubber Binder Seal Coats
37-2.05B(1) General

37-2.05B(1)(a) Summary
Section 37-2.05B includes specifications for applying asphalt rubber binder seal coat. Asphalt rubber seal coat includes applying heated asphalt rubber binder, followed by heated screenings precoated with asphalt binder, followed by a flush coat.

37-2.05B(1)(b) Definitions

crumb rubber modifier: Ground or granulated high natural crumb rubber or scrap tire crumb rubber.

descending viscosity reading: Subsequent viscosity reading at least 5 percent lower than the previous viscosity reading.

high natural crumb rubber: Material containing 40 to 48 percent natural rubber.

scrap tire crumb rubber: Any combination of:

1. Automobile tires
2. Truck tires
3. Tire buffing

37-2.05B(1)(c) Submittals
For each delivery of asphalt rubber binder ingredients and asphalt rubber binder to the job site, submit a certificate of compliance and a copy of the specified test results.

Submit MSDS for each asphalt rubber binder ingredient and the asphalt rubber binder.

At least 15 days before use, submit:

1. Four 1-quart cans of mixed asphalt rubber binder
2. Samples of each asphalt rubber binder ingredient
3. Asphalt rubber binder formulation and data as follows:
   3.1. For asphalt binder and asphalt modifier submit:
       3.1.1. Source and grade of asphalt binder
       3.1.2. Source and type of asphalt modifier
       3.1.3. Percentage of asphalt modifier by weight of asphalt binder
       3.1.4. Percentage of combined asphalt binder and asphalt modifier by weight of asphalt rubber binder
       3.1.5. Test results for the specified quality characteristics
   3.2. For crumb rubber modifier submit:
       3.2.1. Each source and type of scrap tire crumb rubber and high natural rubber
3.2.2. Percentage of scrap tire crumb rubber and high natural rubber by total weight of asphalt rubber binder

3.2.3. Test results for the specified quality characteristics

3.3. For asphalt rubber binder submit:
   3.3.1. Test results for the specified quality characteristics
   3.3.2. Minimum reaction time and temperature

At least 5 business days before use, submit the permit issued by the local air quality agency for asphalt rubber binder:

1. Field blending equipment
2. Application equipment

If an air quality permit is not required by the local air quality agency for producing asphalt rubber binder or spray applying asphalt rubber binder, submit verification from the local air quality agency that an air quality permit is not required for this Contract.

Submit a certified volume or weight slip for each delivery of asphalt rubber binder ingredients and asphalt rubber binder.

Submit a certificate of compliance and accuracy verification of test results for viscometers.

When determined by the Engineer, submit notification 15 minutes before each viscosity test or submit a schedule of testing times.

Submit the log of asphalt rubber binder viscosity test results each day of asphalt rubber seal coat work.

**37-2.05B(1)(d) Quality Control and Assurance**

Equipment used in producing asphalt rubber binder must be permitted for use by the local air quality agency. Equipment used in spreading asphalt rubber binder must be permitted for use by the local air quality agency.

Each asphalt rubber binder ingredient must be sampled and tested for compliance with the specifications by the manufacturer.

Test and submit results at least once per project or the following, whichever frequency is greater:

1. For crumb rubber modifier except for grading, at least once per 250 tons. Samples of scrap tire crumb rubber and high natural crumb rubber must be sampled and tested separately. Test each delivery of crumb rubber modifier for grading.
2. For asphalt binder, test and submit at least once per 200 tons of asphalt binder production.
3. For asphalt modifier, test and submit at least once per 25 tons of asphalt modifier production.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber production site in separate bags.

Take viscosity readings of asphalt rubber binder under ASTM D7741 during asphalt rubber binder production. Start taking viscosity readings of samples taken from the reaction vessel at least 45 minutes after adding crumb rubber modifier and continue taking viscosity readings every 30 minutes until 2 consecutive descending viscosity readings have been obtained and the final viscosity meets the specification requirement. After meeting the 2 descending viscosity readings requirement, continue to take viscosity readings hourly and within 15 minutes before use. Log the test results, including time of testing and temperature of the asphalt rubber binder.

**37-2.05B(2) Material**

**37-2.05B(2)(a) General**

Reserved
37-2.05B(2)(b) Asphalt Binder
Asphalt binder must comply with the specifications for asphalt binder. Do not modify asphalt binder with polymer.

37-2.05B(2)(c) Asphalt Modifier
Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon. Asphalt modifier must have the values for the quality characteristics shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity, m²/s (x 10⁻⁶) at 100 °C</td>
<td>ASTM D 445</td>
<td>X ± 3⁴a</td>
</tr>
<tr>
<td>Flash point, CL.O.C., °C</td>
<td>ASTM D 92</td>
<td>207 min</td>
</tr>
<tr>
<td>Molecular analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphaltenes, percent by mass</td>
<td>ASTM D 2007</td>
<td>0.1 max</td>
</tr>
<tr>
<td>Aromatics, percent by mass</td>
<td>ASTM D 2007</td>
<td>55 min</td>
</tr>
</tbody>
</table>

⁴a “X” denotes the proposed asphalt modifier viscosity from 19 to 36. A change in “X” requires a new asphalt rubber binder submittal.

37-2.05B(2)(d) Crumb Rubber Modifier
Crumb rubber modifier must be ground or granulated at ambient temperature.

Scrap tire crumb rubber and high natural crumb rubber must be delivered to the asphalt rubber binder production site in separate bags.

Steel and fiber must be separated. If steel and fiber are cryogenically separated, it must occur before grinding and granulating. Cryogenically-produced crumb rubber modifier particles must be large enough to be ground or granulated.

Wire must not be more than 0.01 percent by weight of crumb rubber modifier. Crumb rubber modifier must be free of contaminants except fabric, which must not exceed 0.05 percent by weight of crumb rubber modifier. Method for determining the percent weight of wire and fabric is available under Laboratory Procedure 10 at the following METS Web site:

http://www.dot.ca.gov/hq/esc/Translab/ofpm/fpmlab.htm

The length of an individual crumb rubber modifier particle must not exceed 3/16 inch.

Crumb rubber modifier must be dry, free-flowing particles that do not stick together. A maximum of 3 percent calcium carbonate or talc by weight of crumb rubber modifier may be added. Crumb rubber modifier must not cause foaming when combined with the asphalt binder and asphalt modifier.

Specific gravity of crumb rubber modifier must be from 1.1 to 1.2 determined under California Test 208.

When tested under ASTM D 297, crumb rubber modifier must comply with the requirements shown in the following table:
Crumb Rubber Modifier

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Scrap tire crumb rubber (percent)</th>
<th>High natural rubber (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Acetone extract</td>
<td>6.0</td>
<td>16.0</td>
</tr>
<tr>
<td>Rubber hydrocarbon</td>
<td>42.0</td>
<td>65.0</td>
</tr>
<tr>
<td>Natural rubber content</td>
<td>22.0</td>
<td>39.0</td>
</tr>
<tr>
<td>Carbon black content</td>
<td>28.0</td>
<td>38.0</td>
</tr>
<tr>
<td>Ash content</td>
<td>--</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Scrap tire crumb rubber must have the gradation shown in the following table:

**Scrap Tire Crumb Rubber Gradation**

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Gradation limit</th>
<th>Operating range</th>
<th>Contract compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 8</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>No. 10</td>
<td>98–100</td>
<td>95–100</td>
<td>90–100</td>
</tr>
<tr>
<td>No. 16</td>
<td>45–75</td>
<td>35–85</td>
<td>32–88</td>
</tr>
<tr>
<td>No. 30</td>
<td>2–20</td>
<td>2–25</td>
<td>1–30</td>
</tr>
<tr>
<td>No. 50</td>
<td>0–6</td>
<td>0–10</td>
<td>0–15</td>
</tr>
<tr>
<td>No. 100</td>
<td>0–2</td>
<td>0–5</td>
<td>0–10</td>
</tr>
<tr>
<td>No. 200</td>
<td>0</td>
<td>0–2</td>
<td>0–5</td>
</tr>
</tbody>
</table>

High natural crumb rubber must have the gradation shown in the following table:

**High Natural Crumb Rubber Gradation**

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Gradation limit</th>
<th>Operating range</th>
<th>Contract compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 10</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>No. 16</td>
<td>95–100</td>
<td>92–100</td>
<td>85–100</td>
</tr>
<tr>
<td>No. 30</td>
<td>35–85</td>
<td>25–95</td>
<td>20–98</td>
</tr>
<tr>
<td>No. 50</td>
<td>10–30</td>
<td>6–35</td>
<td>2–40</td>
</tr>
<tr>
<td>No. 100</td>
<td>0–4</td>
<td>0–7</td>
<td>0–10</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–1</td>
<td>0–3</td>
<td>0–5</td>
</tr>
</tbody>
</table>

Test the crumb rubber modifier gradation under ASTM C 136 except

1. Split or quarter 100 ± 5 g from the crumb rubber modifier sample and dry to a constant mass at a temperature from 57 to 63 degrees C and record the dry sample mass. Place the crumb rubber modifier sample and 5 g of talc in a 1/2-liter jar. Seal the jar, then shake the jar by hand for at least 1 minute to mix the crumb rubber modifier and the talc. Continue shaking or open the jar and stir until the particle agglomerates and clumps are broken and the talc is uniformly mixed.

2. Place 1 rubber ball on each sieve. Each ball must weigh 8.5 ± 0.5 g, measure 24.5 ± 0.5 mm in diameter, and have a Shore Durometer “A” hardness of 50 ± 5 determined under ASTM D 2240. After sieving the combined material for 10 ± 1 minutes, disassemble the sieves. Brush material adhering to the bottom of a sieve into the next finer sieve. Weigh and record the mass of the material retained on the 2.36-millimeter sieve and leave this material (do not discard) on the scale or balance. Fabric balls must remain on the scale or balance and be placed together on the side to prevent them from being...
covered or disturbed when the material from finer sieves is placed onto the scale or balance. The material retained on the 2.00-milimeter sieve must be added to the scale or balance. Weigh and record that mass as the accumulative mass retained on the 2.00-milimeter sieve. Continue weighing and recording the accumulated masses retained on the remaining sieves until the accumulated mass retained in the pan has been determined. Before discarding the crumb rubber modifier sample, separately weigh and record the total mass of fabric balls in the sample.

3. Determine the mass of material passing the 75-micrometer sieve by subtracting the accumulated mass retained on the 75-micrometer sieve from the accumulated mass retained in the pan. If the material passing the 75-micrometer sieve has a mass of 5 g or less, cross out the recorded number for the accumulated mass retained in the pan and copy the number recorded for the accumulated mass retained on the 75-micrometer sieve and record that number, next to the crossed out number, as the accumulated mass retained in the pan. If the material passing the 75-micrometer sieve has a mass greater than 5 g, cross out the recorded number for the accumulated mass retained in the pan, subtract 5 g from that number and record the difference next to the crossed out number. The adjustment to the accumulated mass retained in the pan accounts for the 5 g of talc added to the sample. For calculation purposes, the adjusted total sample mass is the same as the adjusted accumulated mass retained in the pan. Determine the percent passing based on the adjusted total sample mass and record to the nearest 0.1 percent.

37-2.05B(2)(e) Asphalt Rubber Binder

Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. Crumb rubber modifier

Asphalt rubber binder blending equipment must be authorized under the Department's material plant quality program.

The blending equipment must allow the determination of weight percentages of each asphalt rubber binder ingredient.

Asphalt rubber binder must be 79 ± 1 percent by weight asphalt binder and 21 ± 1 percent by weight of crumb rubber modifier. The minimum percentage of crumb rubber modifier must be 20.0 percent and lower values may not be rounded up.

Crumb rubber modifier must be 76 ± 2 percent by weight scrap tire crumb rubber and 24 ± 2 percent by weight high natural rubber.

Asphalt modifier and asphalt binder must be blended at the production site. Asphalt modifier must be from 2.5 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder. The asphalt rubber binder supplier determines the exact percentage.

If blended, the asphalt binder must be from 375 to 440 degrees F when asphalt modifier is added and the mixture must circulate for at least 20 minutes. Asphalt binder, asphalt modifier, and crumb rubber modifier may be proportioned and combined simultaneously.

The blend of asphalt binder and asphalt modifier must be combined with crumb rubber modifier at the asphalt rubber binder production site. The asphalt binder and asphalt modifier blend must be from 375 to 440 degrees F when crumb rubber modifier is added. Combined ingredients must be allowed to react at least 45 minutes at temperatures from 375 to 425 degrees F except the temperature must be at least 10 degrees F below the flash point of the asphalt rubber binder.

After reacting, the asphalt rubber binder must have the values for the quality characteristics shown in the following table:
Asphalt Rubber Binder

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
<td>Max</td>
</tr>
<tr>
<td>Cone penetration @ 25 °C, 1/10 mm</td>
<td>ASTM D 217</td>
<td>25</td>
</tr>
<tr>
<td>Resilience @ 25 °C, percent rebound</td>
<td>ASTM D 5329</td>
<td>18</td>
</tr>
<tr>
<td>Field softening point, °C</td>
<td>ASTM D 36</td>
<td>55</td>
</tr>
<tr>
<td>Viscosity @190 °C, Pa • s (x10^{-3})</td>
<td>ASTM D 7741</td>
<td>1500</td>
</tr>
</tbody>
</table>

Maintain asphalt rubber binder at a temperature from 375 to 415 degrees F.

Stop heating unused asphalt rubber binder 4 hours after the 45-minute reaction period. Reheating asphalt rubber binder that cools below 375 degrees F is a reheat cycle. Do not exceed 2 reheat cycles. If reheating, asphalt rubber binder must be from 375 to 415 degrees F before use.

During reheating, you may add scrap tire crumb rubber. Scrap tire crumb rubber must not exceed 10 percent by weight of the asphalt rubber binder. Allow added scrap tire crumb rubber to react for at least 45 minutes. Reheated asphalt rubber binder must comply with the specifications for asphalt rubber binder.

37-2.05B(2)(f) Screenings

Before precoating with asphalt binder and when tested under California Test 202, screenings for asphalt rubber seal coat must have the gradation shown in the following table:

Asphalt Rubber Seal Coat Screenings Gradation

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Coarse 1/2&quot; max</th>
<th>Medium 1/2&quot; max</th>
<th>Fine 3/8&quot; max</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>75–90</td>
<td>85–90</td>
<td>95–100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>0–20</td>
<td>0–30</td>
<td>70–85</td>
</tr>
<tr>
<td>No. 4</td>
<td>0–2</td>
<td>0–5</td>
<td>0–15</td>
</tr>
<tr>
<td>No. 8</td>
<td>--</td>
<td>--</td>
<td>0–5</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–1</td>
<td>0–1</td>
<td>0–1</td>
</tr>
</tbody>
</table>

Screenings must have the values for the properties shown in the following table:

Seal Coat Screenings

<table>
<thead>
<tr>
<th>Properties</th>
<th>Test method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanness value, min</td>
<td>California Test 227</td>
<td>80</td>
</tr>
<tr>
<td>Durability, min</td>
<td>California Test 229</td>
<td>52</td>
</tr>
</tbody>
</table>

37-2.05B(3) Construction
37-2.05B(3)(a) General
Reserved

37-2.05B(3)(b) Equipment

Self-propelled distributor truck for applying asphalt rubber binder must have the following features:

1. Heating unit
2. Internal mixing unit
3. Pumps that spray asphalt rubber binder within 0.05 gal/sq yd of the specified rate
4. Fully circulating spray bar that applies asphalt rubber binder uniformly
5. Tachometer
6. Pressure gages
7. Volume measuring devices
8. Thermometer
9. Observation platform on the rear of the truck for an observer on the platform to see the nozzles and unplug them if needed

37-2.05B(3)(c) Precoating Screenings
For asphalt rubber seal coat, do not recombine fine materials collected in dust control systems except cyclone collectors or knock-out boxes with any other aggregate used in the production of screenings.

For asphalt rubber seal coat, screenings must be preheated from 260 to 325 degrees F. Coat with any of the asphalts specified in the table titled “Performance Graded Asphalt Binder” in section 92. Coat at a central mixing plant. The asphalt must be from 0.5 to 1.0 percent by weight of dry screenings. The Engineer determines the exact rate.

Plant must be authorized under the Department's material plant quality program.

Do not stockpile preheated or precoated screenings.

37-2.05B(3)(d) Asphalt Rubber Binder Application
Apply asphalt rubber binder immediately after the reaction period. At the time of application, the temperature of asphalt rubber binder must be from 385 to 415 degrees F.

Apply asphalt rubber binder at a rate from 0.55 to 0.65 gal/sq yd. The Engineer determines the exact rate.

Apply asphalt rubber binder when the atmospheric temperature is from 60 to 105 degrees F and the pavement surface temperature is at least 55 degrees F.

Do not apply asphalt rubber binder unless there are sufficient screenings available to cover the asphalt rubber binder within 2 minutes. Intersections, turn lanes, gore points, and irregular areas must be covered within 15 minutes.

Do not apply asphalt rubber binder when weather or road conditions are unsuitable, including high wind or when the pavement is damp. In windy conditions you may adjust the distributor bar height and distribution speed, and use shielding equipment, if the Engineer authorizes your request.

37-2.05B(3)(e) Screenings Application
During transit, cover precoated screenings for asphalt rubber seal coat with tarpaulins if the ambient air temperature is below 65 degrees F or the haul time exceeds 30 minutes.

At the time of application, screenings for asphalt rubber seal coat must be from 225 to 325 degrees F.

Spread screenings at a rate from 28 to 40 lb/sq yd. The exact rate is determined by the Engineer. Spread to within 10 percent of the determined rate.

37-2.05B(3)(f) Rolling and Sweeping
Perform initial rolling within 90 seconds of spreading screenings. Do not spread screenings more than 200 feet ahead of the initial rolling.

For final rolling, you may request use of a steel-wheeled roller weighing from 8 to 10 tons, static mode only.

Perform a final sweeping before Contract acceptance. The final sweeping must not dislodge screenings.

Dispose of swept screenings at least 150 feet from any waterway.

37-2.05B(4) Payment
Screenings for asphalt rubber seal coat are measured by coated weight after they are preheated and precoated with asphalt binder. The weight of screenings must be the coated weight.
If recorded batch weights are printed automatically, the bid item for screenings for asphalt-rubber seal coat are measured using the printed batch weights, provided:

1. Total aggregate weight for screenings per batch is printed
2. Total asphalt binder weight per batch is printed
3. Each truckload’s zero tolerance weight is printed before weighing the first batch and after weighing the last batch
4. Time, date, mix number, load number and truck identification are correlated with a load slip
5. A copy of the recorded batch weights is certified by a licensed weighmaster and submitted to the Engineer

Screenings for asphalt rubber seal coat is paid for as precoated screenings.

Asphalt-rubber binder is measured under the specifications for asphalts.

If test results for gradation tests do not comply with the specifications, deductions are taken.

Each gradation test for scrap tire crumb rubber represents 10,000 lbs or the amount used in that day’s production, whichever is less.

Each gradation test for high natural rubber represents 3,400 lbs or the amount used in that day’s production, whichever is less.

For each gradation test, the following pay deductions will be taken from the asphalt rubber bid item:

<table>
<thead>
<tr>
<th>Gradation Test</th>
<th>Material</th>
<th>Test result</th>
<th>Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scrap tire crumb rubber</td>
<td>Operating range &lt; TR &lt; Contract compliance</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>Scrap tire crumb rubber</td>
<td>TR &gt; Contract compliance</td>
<td>$1,100</td>
</tr>
<tr>
<td></td>
<td>High natural crumb rubber</td>
<td>Operating range &lt; TR &lt; Contract compliance</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td>High natural crumb rubber</td>
<td>TR &gt; Contract compliance</td>
<td>$600</td>
</tr>
</tbody>
</table>

a Test Result = TR

37-2.05C Modified Asphalt Binder Seal Coat
Reserved

37-2.06 STRESS ABSORBING MEMBRANE INTERLAYER

37-2.06A General
Section 37-2.06 applies where a stress absorbing membrane interlayer (SAMI) is shown.

Comply with section 37-2.05B except a flush coat is not required.

37-2.06B Materials
For SAMI, screenings must comply with the 3/8-inch maximum gradation.

37-2.06C Construction
For SAMI, section 37-2.01C(7) does not apply.

Final rolling and sweeping are not required for SAMI.

37-2.06D Payment
Not Used
39 HOT MIX ASPHALT

10-17-14

Replace the headings and paragraphs in section 39 with:

39-1 GENERAL

39-1.01 GENERAL
39-1.01A Summary
Section 39-1 includes general specifications for producing and placing hot mix asphalt.

HMA includes one or more of the following types:

1. Type A HMA
2. RHMA-G
3. OGFC
4. BWC
5. Minor HMA

If a warm mix asphalt technology is specified, the warm mix asphalt technology to be used must be authorized. For Department-authorized warm mix asphalt technologies, go to the METS website.

39-1.01B Definitions

binder replacement: Binder from RAP expressed as a percent of the total binder in the mix.

coarse aggregate: Aggregate retained on a no. 4 sieve.

fine aggregate: Aggregate passing the no. 4 sieve.

leveling course: Thin layer of HMA used to correct minor variations in the longitudinal and transverse profile of the pavement before placement of other pavement layers.

lower course: Layer of HMA below 0.2 feet from finished grade exclusive of OGFC.

miscellaneous areas: Areas outside the traveled way such as:

1. Median areas not including inside shoulders
2. Island areas
3. Sidewalks
4. Gutters
5. Ditches
6. Overside drains
7. Aprons at ends of drainage structures

processed RAP: RAP that has been fractionated.

substitution rate: Percent of RAP by dry weight of aggregate substituted for virgin aggregate.
supplemental fine aggregate: Aggregate passing the no. 30 sieve, including hydrated lime, portland cement, and fines from dust collectors.
	surface course: Upper 0.2 feet of HMA exclusive of OGFC.

top layer: Final riding surface.

39-1.01C Submittals
39-1.01C(1) General
Reserved

39-1.01C(2) Job Mix Formula
39-1.01C(2)(a) General
Except for the HMA to be used in miscellaneous areas and dikes, submit your proposed JMF for each type of HMA to be used. The JMF must be submitted on the Contractor Job Mix Formula Proposal form along with:

1. Mix design documentation on Contractor Hot Mix Asphalt Design Data form dated within 12 months of submittal
2. JMF verification on a Caltrans Hot Mix Asphalt Verification form, if applicable
3. JMF renewal on a Caltrans Job Mix Formula Renewal form, if applicable
4. MSDS for:
   4.1. Asphalt binder
   4.2. Supplemental fine aggregate except fines from dust collectors
   4.3. Antistrip additives

The Contractor Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

If you cannot submit a Department-verified JMF on a Caltrans Hot Mix Asphalt Verification form dated within 12 months before HMA production, the Engineer verifies the JMF.

Submit a new JMF if you change any of the following:

1. Target asphalt binder percentage greater than ±0.2 percent
2. Asphalt binder supplier
3. Combined aggregate gradation
4. Aggregate sources
5. Liquid antistrip producer or dosage
6. Average binder content in a new fractionated RAP stockpile by more than ±2.0 percent from the average RAP binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form
7. Average maximum specific gravity in a new fractionated RAP stockpile by more than ±0.060 from the average maximum specific gravity value reported on page 4 of your Contractor Hot Mix Asphalt Design Data form
8. Any material in the JMF

Allow the Engineer 5 business days from a complete JMF submittal for document review of the aggregate qualities, mix design, and JMF. The Engineer notifies you if the proposed JMF submittal is accepted.

If your JMF fails verification testing, submit an adjusted JMF based on your testing. An adjusted JMF requires a new Contractor Job Mix Formula Proposal form and Contractor Hot Mix Asphalt Design Data form and verification of a plant-produced sample.

You may submit an adjusted aggregate gradation TV on a Contractor Job Mix Formula Proposal form before verification testing. Aggregate gradation TV must be within the TV limits specified.

39-1.01C(2)(b) Job Mix Formula Renewal
You may request a JMF renewal by submitting:

1. Proposed JMF on a Contractor Job Mix Formula Proposal form

OCTOBER 2015
2. Previously verified JMF documented on a Caltrans Hot Mix Asphalt Verification form dated within 12 months
3. Mix design documentation on a Contractor Hot Mix Asphalt Design Data form used for the previously verified JMF

39-1.01C(2)(c) Job Mix Formula Modification

For an authorized JMF, submit a modified JMF if you change any of the following:

1. Asphalt binder supplier
2. Liquid antistrip producer
3. Liquid antistrip dosage

You may change any of the above items only once during the Contract.

Submit your modified JMF request a minimum of 15 days before production. Each modified JMF submittal must consist of:

1. Proposed modified JMF on Contractor Job Mix Formula Proposal form, marked Modified.
2. Mix design records on Contractor Hot Mix Asphalt Design Data form for the authorized JMF to be modified.
3. JMF verification on Hot Mix Asphalt Verification form for the authorized JMF to be modified.
4. Test results for the modified JMF in compliance with the mix design specifications. Perform tests at the mix design OBC as shown on the Contractor Asphalt Mix Design Data form.

With an accepted modified JMF submittal, the Engineer verifies each modified JMF within 10 days of receiving all verification samples.

39-1.01C(3) Quality Control Plan

With your proposed JMF submittal, submit a QC plan for HMA.

The QC plan must describe the organization and procedures for:

1. Controlling HMA quality characteristics
2. Taking samples, including sampling locations
3. Establishing, implementing, and maintaining QC
4. Determining when corrective actions are needed
5. Implementing corrective actions
6. Methods and materials for backfilling core locations

The QC plan must address the elements affecting HMA quality including:

1. Aggregate
2. Asphalt binder
3. Additives
4. Production
5. Paving

The QC plan must include aggregate QC sampling and testing during lime treatment.

The Engineer reviews the QC plan within 5 business days from the submittal. Do not start HMA production until the Engineer authorizes the plan.

If QC procedures, personnel, tester qualifications, sample testing locations, or lab accreditation status change, submit a QC plan supplement at least 3 business days before implementing the proposed change. Do not implement the change without authorization.

39-1.01C(4) Test Results

For mix design, JMF verification, production start-up, and each 10,000 tons, submit AASHTO T 283 and AASHTO T 324 (Modified) test results to the Engineer and electronically to:
Submit all QC test results, except AASHTO T 283 and AASHTO T 324 (Modified), within 3 business days of a request. Submit AASHTO T 283 QC tests within 15 days of sampling.

For tests performed under AASHTO T 324 (Modified), submit test data and 1 tested sample set within 5 business days of sampling.

If coarse and fine durability index tests are required, submit test results within 2 business days of testing.

If tapered notched wedge is used, submit test result values within 24 hours of testing.

39-1.01C(5) Reserved

39-1.01C(6) Liquid Antistrip Treatment

If liquid antistrip treatment is used, submit the following with your proposed JMF submittal:

1. One 1-pint sample
2. Infrared analysis including copy of absorption spectra
3. Certified copy of test results
4. Certificate of compliance for each liquid antistrip shipment. On each certificate of compliance, include:
   4.1. Your signature and printed name
   4.2. Shipment number
   4.3. Material type
   4.4. Material specific gravity
   4.5. Refinery
   4.6. Consignee
   4.7. Destination
   4.8. Quantity
   4.9. Contact or purchase order number
   4.10. Shipment date
5. Proposed proportions for liquid antistrip

For each delivery of liquid antistrip to the HMA production plant, submit a 1-pint sample to METS. Submit shipping documents. Label each liquid antistrip sampling container with:

1. Liquid antistrip type
2. Application rate
3. Sample date
4. Contract number

At the end of each day's production shift, submit production data in electronic and printed media. Present data on electronic media in tab delimited format. Use line feed carriage return with 1 separate record per line for each production data set. Allow sufficient fields for the specified data. Include data titles at least once per report. For each HMA mixing plant type, submit the following information in the order specified:

1. For batch plant mixing:
   1.1. Production date
   1.2. Time of batch completion
   1.3. Mix size and type
   1.4. Each ingredient's weight
   1.5. Asphalt binder content as a percentage of the total weight of mix
   1.6. Liquid antistrip content as a percentage of the asphalt binder weight
2. For continuous mixing plant:
   2.1. Production date
   2.2. Data capture time
   2.3. Mix size and type
   2.4. Flow rate of wet aggregate collected directly from the aggregate weigh belt
   2.5. Aggregate moisture content as percentage of the dry aggregate weight
   2.6. Flow rate of asphalt binder collected from the asphalt binder meter
2.7. Flow rate of liquid antistrip collected from the liquid antistrip meter
2.8. Asphalt binder content as percentage of the total weight of mix calculated from:
   2.8.1. Aggregate weigh belt output
   2.8.2. Aggregate moisture input
   2.8.3. Asphalt binder meter output
2.9. Liquid antistrip content as percentage of the asphalt binder weight calculated from:
   2.9.1. Asphalt binder meter output
   2.9.2. Liquid antistrip meter output

39-1.01C(7) Lime Treatment
If aggregate lime treatment is used, submit the following with your proposed JMF submittal and each time you produce lime-treated aggregate:

1. Exact lime proportions for fine and coarse virgin aggregate
2. If marination is required, the averaged aggregate quality test results within 24 hours of sampling
3. For dry lime aggregate treatment, a treatment data log from the dry lime and aggregate proportioning device in the following order:
   3.1. Treatment date
   3.2. Time of day the data is captured
   3.3. Aggregate size being treated
   3.4. HMA type and mix aggregate size
   3.5. Wet aggregate flow rate collected directly from the aggregate weigh belt
   3.6. Aggregate moisture content, expressed as a percent of the dry aggregate weight
   3.7. Flow rate of dry aggregate calculated from the flow rate of wet aggregate
   3.8. Dry lime flow rate
   3.9. Lime ratio from the authorized JMF for each aggregate size being treated
   3.10. Lime ratio from the authorized JMF for the combined aggregate
   3.11. Actual lime ratio calculated from the aggregate weigh belt output, the aggregate moisture input, and the dry lime meter output, expressed as a percent of the dry aggregate weight
   3.12. Calculated difference between the authorized lime ratio and the actual lime ratio
4. For lime slurry aggregate treatment, a treatment data log from the slurry proportioning device in the following order:
   4.1. Treatment date
   4.2. Time of day the data is captured
   4.3. Aggregate size being treated
   4.4. Wet aggregate flow rate collected directly from the aggregate weigh belt
   4.5. Moisture content of the aggregate just before treatment, expressed as a percent of the dry aggregate weight
   4.6. Dry aggregate flow rate calculated from the wet aggregate flow rate
   4.7. Lime slurry flow rate measured by the slurry meter
   4.8. Dry lime flow rate calculated from the slurry meter output
   4.9. Authorized lime ratio for each aggregate size being treated
   4.10. Actual lime ratio calculated from the aggregate weigh belt and the slurry meter output, expressed as a percent of the dry aggregate weight
   4.11. Calculated difference between the authorized lime ratio and the actual lime ratio
   4.12. Dry lime and water proportions at the slurry treatment time

Each day during lime treatment, submit the treatment data log on electronic media in tab delimited format on a removable CD-ROM storage disk. Each continuous treatment data set must be a separate record using a line feed carriage return to present the specified data on 1 line. The reported data must include data titles at least once per report.

39-1.01C(8) Warm Mix Asphalt Technology
If a warm mix asphalt technology is used, submit the following with your proposed JMF submittal:

1. MSDS for warm mix asphalt technology
2. For warm mix asphalt water injection foam technology:
   2.1. Name of technology
   2.2. Proposed foaming water content
   2.3. Proposed HMA production temperature range
   2.4. Certification from binder supplier stating no antifoaming agent is used.

3. For warm mix asphalt additive technology:
   3.1. Name of technology
   3.2. Percent admixture by weight of binder and percent admixture by total weight of HMA as recommended by the manufacturer
   3.3. Methodology for inclusion of admixture in laboratory-produced HMA
   3.4. Proposed HMA production temperature range

Collect and hold data for the duration of the contract and submit the electronic media, daily and upon request. The snapshot of production data must include the following:

1. Date of production
2. Production location
3. Time of day the data is captured
4. HMA mix type being produced and target binder rate
5. HMA additive type, brand, and target rate
6. Temperature of the binder and HMA mixture
7. For a continuous mixing plant, the rate of flow of the dry aggregate calculated from the wet aggregate flow rate as determined by the conveyor scale
8. For a continuous mixing plant, the rate of flow of the asphalt meter
9. For a continuous mixing plant, the rate of flow of HMA additive meter
10. For batch plant mixing, actual batch weights of all ingredients
11. Dry aggregate to binder ratio calculated from metered ingredient output
12. Dry aggregate to HMA additive ratio calculated from metered output

At the end of each day's production shift, submit electronic and printed media from the HMA plant process controller. Present data on electronic media in comma-separated values or tab-separated values format. The captured data for the ingredients represented by production snapshot must have allowances for sufficient fields to satisfy the amount of data required by these specifications and include data titles at least once per report.

39-1.01C(9) Samples
For the samples taken for JMF verification, submit 3 parts to the Engineer and use 1 part for your testing.

At production start-up and within 1000 tons of the halfway point of production of HMA, submit samples split from your HMA production sample for AASHTO T 283 and AASHTO T 324 (Modified) tests to the Engineer.

For production samples taken, submit 3 parts to the Engineer and use 1 part for your testing.

39-1.01C(10)–39-1.01C(11) Reserved
39-1.01C(12) Data Cores
Section 39-1.01C(12) applies if a bid item for data core is shown on the Bid Item List.

Submit a summary of data cores taken and a photograph of each data core to the Engineer and to:

   Coring@dot.ca.gov

For each data core, the summary must include:

1. Project identification number
2. Date cored
3. Core identification number
4. Type of materials recovered
5. Type and approximate thickness of unstabilized material not recovered
6. Total core thickness
7. Thickness of each individual material to within:
   7.1. For recovered material, 1/2 inch
   7.2. For unstabilized material, 1.0 inch
8. Location including:
   8.1. County
   8.2. Route
   8.3. Post mile
   8.4. Lane number
   8.5. Lane direction
   8.6. Station

Each data core digital photograph must include a ruler laid next to the data core. Each photograph must include:

1. Core
2. Project identification number
3. Core identification number
4. Date cored
5. County
6. Route
7. Post mile
8. Lane number
9. Lane direction

39-1.01C(13) Pavement Smoothness

39-1.01C(13)(a) General
Reserved

39-1.01C(13)(b) Straightedge Measurements
Within 2 business days of performing straightedge measurements, submit areas requiring smoothness correction. Identify locations of smoothness correction by:

1. Location Number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a lane:
   4.1. Lane direction as NB, SB, EB, or WB
   4.2. Lane number from left to right in direction of travel
   4.3. Wheel path as "L" for left, "R" for right, or "B" for both
5. For correction areas not within a lane:
   5.1. Identify pavement area (i.e., shoulder, weight station, turnout)
   5.2. Direction and distance from centerline as "L" for left or "R" for right
6. Estimated size of correction area

39-1.01C(13)(c) Inertial Profiler Certification
At least 5 business days before the start of initial profiling or changing profiler or operator, submit:

1. Inertial profiler certification issued by the Department.
2. Operator certification for the inertial profiler issued by the Department.
3. List of manufacturer’s recommended test procedures for the inertial profiler calibration and verification.
Within 2 business days after cross-correlation testing, submit ProVAL profiler certification analysis report for cross-correlation test results performed on test section to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

39-1.01C(13)(d) Inertial Profiler Data

Within 2 business days after each day of inertial profiling, submit profile information to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

The profile information must include:

1. Raw profile data for each lane.
2. ProVAL ride quality analysis report for the International Roughness Index of left and right wheel paths of each lane. Submit this report in pdf file format.
3. ProVAL ride quality analysis report for the Mean Roughness Index of each lane. Submit this report in pdf file format.
4. ProVAL smoothness assurance analysis report for the International Roughness Index of left wheel path. Submit this report in pdf file format.
5. ProVAL smoothness assurance analysis report for the International Roughness Index of right wheel path. Submit this report in pdf file format.
6. ProVAL smoothness assurance analysis report for grinding locations of left wheel path. Submit this report in pdf file format.
7. ProVAL smoothness assurance analysis report for grinding locations of right wheel path. Submit this report in pdf file format.
8. GPS data file for each lane in GPS eXchange. Submit data file in GPS eXchange file format.
9. Manufacturer’s recommended inertial profiler calibration and verification test results.
10. Inertial profiler calibration and verification test results including bounce, block, and distance measurement instrument.

Submit the raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYYMMDD_TTCCRRR_D_L_W_S_E_X_PT.PPF

where:
YYYY = year
MM = Month, leading zero
DD = Day of month, leading zero
TT = District, leading zero
CCC = County, 2 or 3 letter abbreviation as shown in section 1-1.08
RRR = Route number, no leading zeros
D = Traffic direction as NB, SB, WB, or EB
L = Lane number from left to right in direction of travel
W = Wheel path as "L" for left, "R" for right, or "B" for both
S = Beginning station to the nearest foot (i.e., 10+20) or beginning post mile to the nearest hundredth (i.e., 25.06) no leading zero
E = Ending station to the nearest foot (i.e., 14+20) or ending post mile to the nearest hundredth (i.e., 28.06) no leading zero
X = Profile description as "EXIST" for existing pavement, "INTER" for after prepaving smoothness correction, "PAVE" for after paving, and "CORR" for after final surface pavement correction
PT = HMA pavement type
39-1.01C(13)(e) Reserved
39-1.01C(14)–39-1.01C(15) Reserved
39-1.01D Quality Control and Assurance

39-1.01D(1) General
When testing under AASHTO T 324 (Modified), test under AASHTO T 324 with the following parameters:

1. Target air voids must equal 7 ± 1 percent
2. Specimen height must be 60 ± 1 mm
3. Number of test specimens must be 4 (2 test sets)
4. Do not average test sets
5. Test specimen must be a 150 mm gyratory compacted specimen
6. Test temperature must be set at:
   6.1. 113 ± 2 degrees F for PG 58
   6.2. 122 ± 2 degrees F for PG 64
   6.3. 131 ± 2 degrees F for PG 70 and above
7. Measurements for impression must be taken at every 100 passes
8. Inflection point defined as the number of wheel passes at the intersection of the creep slope and the stripping slope
9. Testing shut off must be set at 25,000 passes

Take samples under California Test 125.

HMA samples may be heated a maximum of 2 times for up to 4 hours each.

39-1.01D(2) Job Mix Formula Verification

The Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. The production set point at the plant must be within ±0.2 from the asphalt binder percentage target value shown in your Contractor Job Mix Formula Proposal form. Notify the Engineer at least 2 business days before sampling materials. Samples may be taken from a different project including a non-Department project if you make arrangements for the Engineer to be present during sampling.

In the Engineer's presence and from the same production run, take samples of:

1. Aggregate. Coarse, fine, and supplemental fine aggregate must be taken from the combined cold feed belt, or hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot bin samples, the Department combines these aggregate samples to comply with the TV submitted on a Contractor Job Mix Formula Proposal form.
2. Asphalt binder. Take 2 samples minimum. Each sample must be in a 1-quart cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. RAP samples must be at least 50 lb from each fractionated stockpile used or 100 lb from the belt.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Three parts are for the Department's verification testing and 1 part is for your testing.

After acceptance of the JMF submittal, the Engineer verifies each proposed JMF within 20 days of receiving all verification samples.

For JMF verification, the Engineer tests the following for compliance with the specifications:

1. Aggregate quality
2. Aggregate gradation
3. Voids in mineral aggregate on laboratory-produced HMA must comply with the mix design specifications for voids in mineral aggregate
4. HMA quality characteristics for Department acceptance

To verify the HMA for air voids, voids in mineral aggregate, and dust proportion, the Engineer uses an average of 3 briquettes. The Engineer tests plant-produced material.

If the Engineer verifies the JMF, the Engineer furnishes you a Hot Mix Asphalt Verification form.

If the Engineer's test results on plant-produced samples do not show compliance with the specifications, the Engineer notifies you. Adjust your JMF based on your testing unless the Engineer authorizes reverification without adjustments. JMF adjustments may include a change in:

1. Asphalt binder content target value up to ±0.2 percent from the OBC value submitted on Contractor Hot Mix Asphalt Design Data form
2. Aggregate gradation target values within the target value limits specified in the aggregate gradation table

You may adjust the JMF only once due to a failed verification test.

For each HMA type and aggregate size specified, the Engineer verifies up to 2 proposed JMF submittals including a JMF adjusted after verification failure. If you submit more than 2 JMFs for each type of HMA and aggregate size, the Engineer deducts $3,000 from payments for each verification exceeding this limit. This deduction does not apply to verifications initiated by the Engineer or if a JMF expires while HMA production is stopped longer than 30 days.

A verified JMF is valid for 12 months.

39-1.01D(3) Job Mix Formula Authorization
You may start HMA production if:

1. The Engineer's review of the JMF shows compliance with the specifications
2. The Department has verified the JMF within 12 months before HMA production
3. The Engineer authorizes the verified JMF

39-1.01D(4) Job Mix Formula Renewal
For a JMF renewal and upon request, in the Engineer's presence and from the same production run, take samples of:

1. Aggregate. Coarse, fine, and supplemental fine aggregate must be taken from combined cold-feed belt, or hot bins. If lime treatment is required, samples must be taken from individual stockpiles before lime treatment. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. For hot bins, the Department combines these aggregate samples to comply with the TV submitted on a Contractor Job Mix Formula Proposal form.
2. Asphalt binder. Take 2 samples minimum. Each sample must be in a 1-quart cylindrical-shaped can with an open top and friction lid. If the asphalt binder is modified or rubberized, the asphalt binder must be sampled with the components blended in the proportions to be used.
3. RAP. RAP samples must be at least 50 lb from each fractionated stockpile.
4. Plant-produced HMA. The HMA samples must be at least 250 lb.

Notify the Engineer at least 2 business days before sampling materials. For aggregate, RAP, and HMA, split samples into at least 4 parts. Submit 3 parts to the Engineer and use 1 part for your testing.

Allow the Engineer 5 business days from a complete JMF reverification submittal for document review of the aggregate qualities, mix design, and JMF.

The most recent aggregate quality test results within the past 12 months may be used for verification of JMF renewal or upon request, the Engineer may perform aggregate quality tests for verification of JMF renewal.
The Engineer verifies the JMF for renewal under section 39-1.01D(2) except:

1. The Engineer keeps the samples until you provide test results for your part on a Contractor Job Mix Formula Renewal form.
2. The Department tests samples of materials obtained from the HMA production unit after you submit test results that comply with the mix design specifications.
3. After completion of the JMF verification renewal document review, the Engineer verifies each proposed JMF within 20 days of receiving the verification renewal samples and the complete Contractor Job Mix Formula Renewal form.
4. You may not adjust the JMF due to a failed verification.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at no cost to you 1 proposed JMF renewal within a 12-month period.

If the Engineer verifies the JMF renewal, the Engineer furnishes you a Hot Mix Asphalt Verification form. The Hot Mix Asphalt Verification form is valid for 12 months.

**39-1.01D(5) Job Mix Formula Modification**

The Engineer verifies the modified JMF after the modified JMF HMA is placed on the project and verification samples are taken within the first 750 tons. The Engineer tests verification samples for compliance with:

1. Hamburg wheel track mix design specifications
2. Air void content
3. Voids in mineral aggregate on plant-produced HMA mix design specifications
4. Dust proportion mix design specifications

The Engineer may test for moisture susceptibility for compliance with the mix design specifications.

If the modified JMF is verified, the Engineer revises your Hot Mix Asphalt Verification form to include the new asphalt binder source, new liquid antistrip producer, or new liquid antistrip dosage. Your revised form will have the same expiration date as the original form.

If a modified JMF is not verified, stop production and any HMA placed using the modified JMF is rejected. The Engineer deducts $2,000 from payments for each JMF modification.

**39-1.01D(6) Certifications**

**39-1.01D(6)(a) General**

Laboratories testing aggregate and HMA qualities used to prepare the mix design and JMF must be qualified under AASHTO Materials Reference Laboratory program and the Department's Independent Assurance Program.

**39-1.01D(6)(b) Hot Mix Asphalt Plants**

Before production, the HMA plant must have a current qualification under the Department's Material Plant Quality Program.

**39-1.01D(6)(c) Inertial Profiler Certifications**

The inertial profiler equipment must display a current certification decal with expiration date. The inertial profiler operator and device certifications must be not more than 12 months old. The operator must be certified for each different model of inertial profiler device operated.

**39-1.01D(6)(d)–39-1.01D(6)(e) Reserved**

**39-1.01D(7) Preparing Meeting**

Meet with the Engineer at a preparing meeting at a mutually agreed time and place. Discuss the QC plan and the methods of performing HMA production and paving work.

The following personnel must attend the preparing meeting:
If a warm mix asphalt technology is used, a technical representative for warm mix asphalt technology must attend the prepaving meeting.

39-1.01D(8) Quality Control
39-1.01D(8)(a) General
QC test results must comply with the specifications for Department acceptance.

Prepare 3 briquettes for air voids content and voids in mineral aggregate determination. Report the average of 3 tests.

Except for smoothness, if 2 consecutive QC test results or any 3 QC test results for 1 day's production do not comply with the materials specifications:

1. Stop HMA production
2. Notify the Engineer
3. Take corrective action
4. Demonstrate compliance with the specifications before resuming production and placement

For QC tests performed under AASHTO T 27, results are considered 1 QC test regardless of number of sieves out of compliance.

Do not resume production and placement until the Engineer authorizes your corrective action proposal.

39-1.01D(8)(b) Reserved
39-1.01D(8)(c) Aggregate
39-1.01D(8)(c)(i) General
Reserved

39-1.01D(8)(c)(ii) Aggregate Lime Treatments
If lime treatment is required, sample coarse and fine aggregate from individual stockpiles before lime treatment. Combine aggregate in the JMF proportions. Test the aggregate under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum sampling and testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand equivalent\textsuperscript{a,b}</td>
<td>AASHTO T 176</td>
<td>1 per 750 tons of untreated aggregate</td>
</tr>
<tr>
<td>Percent of crushed particles</td>
<td>AASHTO T 335</td>
<td></td>
</tr>
<tr>
<td>Los Angeles Rattler</td>
<td>AASHTO T 96</td>
<td>1 per 10,000 tons or 2 per project whichever is greater</td>
</tr>
<tr>
<td>Fine aggregate angularity</td>
<td>AASHTO T 304 Method A</td>
<td></td>
</tr>
<tr>
<td>Flat and elongated particles</td>
<td>ASTM D4791</td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{a}Report test results as the average of 3 tests from a single sample.
\textsuperscript{b}Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, and 8.4.3 do not apply.

For lime slurry aggregate treatment, determine the aggregate moisture content at least once every 2 hours of treatment. Calculate moisture content under AASHTO T 329 and report it as a percent of dry...
aggregate weight. Use the moisture content calculations as a set point for the proportioning process controller.

The device controlling lime and aggregate proportioning must produce a treatment data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily treatment. The data must be a treatment activity register and not a summation. The material represented by a data set is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the controller.

If 3 consecutive sets of recorded treatment data indicate a deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and take corrective action.

If a set of recorded treatment data indicates a deviation of more than 0.4 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use the material represented by that set of data in HMA.

If 20 percent or more of the total daily treatment indicates a deviation of more than 0.2 percent above or below the lime ratio in the accepted JMF, stop treatment and do not use that day's treated aggregate in HMA.

The Engineer may order you to stop aggregate treatment activities for any of following:

1. You fail to submit treatment data log
2. You fail to submit aggregate QC data for marinated aggregate
3. You submit incomplete, untimely, or incorrectly formatted data
4. You do not take corrective actions
5. You take late or unsuccessful corrective actions
6. You do not stop treatment when proportioning tolerances are exceeded
7. You use malfunctioning or failed proportioning devices

If you stop treatment for noncompliance, notify the Engineer of any corrective actions taken and conduct a successful 20-minute test run before resuming treatment.

39-1.01D(8)(d) Liquid Antistrip Treatment
For continuous mixing or batch-plant mixing, sample asphalt binder before adding liquid antistrip. For continuous mixing, sample the combined asphalt binder and liquid antistrip after the static mixer.

39-1.01D(8)(e) Production Start-up Evaluation
You and the Engineer evaluate HMA production and placement at production start-up.

Within the first 750 tons produced on the 1st day of HMA production, in the Engineer's presence, and from the same production run, take samples of:

1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

Sample aggregate from the combined cold-feed belt or hot bin. Take RAP samples from the RAP system.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 3 parts to the Engineer and keep 1 part.

You and the Engineer must test the samples and report test results, except for AASHTO T 324 (Modified) and AASHTO T 283 test results, within 5 business days of sampling. For AASHTO T 324 (Modified) and AASHTO T 283 test results, report test results within 15 days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

Take one 4- or 6-inch diameter density core for each 250 tons or portion thereof of HMA placed. For each density core, the Engineer reports the bulk specific gravity determined under AASHTO T 275, Method A, in addition to the percent of theoretical maximum density.

OCTOBER 2015
39-1.01D(8)(f)  Hot Mix Asphalt Density
During HMA placement determine HMA density using a nuclear gauge. On the 1st day of production, develop a correlation factor between cores and nuclear gauge under California Test 375.

Test for in-place density using cores and a nuclear gauge. Test at random locations you select and include the test results in your QC production tests reports.

39-1.01D(8)(g)  Tapered Notched Wedge
Perform QC testing on the completed tapered notched wedge joint as follows:

1. Perform field compaction tests at the rate of 1 test for each 750-foot section along the joint. Select random locations for testing within each 750-foot section.
2. Perform field compaction tests at the centerline of the joint, 6 inches from the upper vertical notch, after the adjacent lane is placed and before opening the pavement to traffic.
3. Determine theoretical maximum density.
4. Determine percent compaction of the longitudinal joint as the ratio of the daily average of the field compaction values and the maximum density test results.

Determine percent compaction values each day the tapered notched wedge joint is completed. If the percent compaction of 1 day's production is less than 91 percent, that day's notched wedge joint is rejected. Discontinue placement of the tapered notched wedge and notify the Engineer of changes you will make to your construction process in order to comply with the specifications.

39-1.01D(8)(h)  Density Cores
To determine density, take 4- or 6-inch diameter density cores at least once every 5 business days. Take 1 density core for every 250 tons of HMA from random locations the Engineer designates. Take density cores in the Engineer's presence and backfill and compact holes with authorized material. Before submitting a density core, mark it with the density core's location and place it in a protective container.

If a density core is damaged, replace it with a density core taken within 1 foot longitudinally from the original density core. Relocate any density core located within 1 foot of a rumble strip to 1 foot transversely away from the rumble strip.

For a tapered notched wedge joint, take 4- or 6-inch diameter density cores 6 inches from the upper vertical notch of the completed longitudinal joint for every 3,000 feet at locations designated by the Engineer. Take cores after the adjacent lane is placed and before opening the pavement to traffic. Cores must be taken in the presence of the Engineer and backfill and compact holes with authorized material. Before submitting a density core, mark it with the core's location and place it in a protective container.

39-1.01D(8)(i)  Reserved
39-1.01D(8)(j)  Pavement Smoothness
39-1.01D(8)(j)(i)  General
Test pavement smoothness using an inertial profiler except use a 12-foot straightedge for the HMA pavement at the following locations:

1. Traffic lanes less than 1,000 feet in length including ramps, turn lanes, and acceleration and deceleration lanes
2. HMA pavement within 3 feet from and parallel to the construction joint formed between curbs, gutters, or existing pavement
3. Areas within 15 feet of manholes
4. Shoulders
5. Weigh-in-motion areas
6. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

Where inertial profiler testing is required, pavement smoothness for each lane must be determined by the International Roughness Index for the left and right wheel paths in an individual lane and then averaging the results. The average of the International Roughness Index values from the left and right wheel paths
for the same lane is the Mean Roughness Index of the lane. The wheel paths are a pair of lines 3 feet from and parallel to the edge of a lane. Left and right wheel paths are based on the direction of travel.

Where inertial profiler testing is required, identify areas of localized roughness. Areas of localized roughness must be identified using the FHWA's engineering software ProVAL smoothness assurance analysis by calculating continuous International Roughness Index values for each wheel path with a 25-foot interval using a 250 mm filter.

Collect profiling data under AASHTO R 56 and analyze data using 250 mm and International Roughness Index filters.

39-1.01D(8)(j)(ii) Inertial Profiler Calibration and Verification Tests
Operate the inertial profiler according to the manufacturer's instructions and AASHTO R 57 at 1-inch recording intervals.

Notify the Engineer 2 business days before performing inertial profiler calibration and verification testing.

Conduct the following inertial profiler calibration and verification tests in the Engineer's presence each day before performing inertial profiling:

1. Block test. Verify the height sensor accuracy under California Test 387.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under California Test 387.
3. Distance measurement instrument test. Calibrate the accuracy of the testing procedure under California Test 387.
4. Manufacturer's recommended tests.

Conduct cross-correlation inertial profiler verification test in the Engineer's presence before performing initial profiling. Verify cross-correlation inertial profiler verification test at least annually. Conduct 5 repeat runs of the inertial profiler on an authorized test section. The test section must be on an existing asphalt concrete pavement surface 0.1 mile long. Calculate a cross-correlation to determine the repeatability of your device under California Test 387 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross-correlation must be a minimum of 0.92.

For each 0.1 mile section, your International Roughness Index values must be within 10 percent of the Department's International Roughness Index values. The Engineer may order you to recalibrate your inertial profiler equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your inertial profiler operator.

39-1.01D(8)(j)(iii) Smoothness Testing
Notify the Engineer of start location by station and start time at least 2 business days before profiling.

Remove foreign objects on the pavement surface before profiling.

Mark the beginning and ending station on the pavement shoulder before profiling. Stationing must be the same when profiling more than one surface.

While collecting the profile data to determine the International Roughness Index values, record the following locations in the raw profile data:

1. Begin and end of all bridge approach slabs
2. Begin and end of all bridges
3. Begin and end of all culverts visible on the roadway surface
4. Begin and end of all at-grade intersections

Determine the Mean Roughness Index for 0.1-mile fixed sections using the ProVAL ride quality analysis with a 250 mm filter. Profile the left and right wheel paths of each lane. Calculate the Mean Roughness Index of each lane. A partial section less than 0.1 mile that is the result of an interruption to continuous pavement surfaces is the Mean Roughness Index of the lane. The wheel paths are a pair of lines 3 feet from and parallel to the edge of a lane. Left and right wheel paths are based on the direction of travel.
pavement surface must comply with the Mean Roughness Index specifications for a full section. Adjust the Mean Roughness Index for a partial section to reflect a full section based on the proportion of a section paved.

Determine the areas of localized roughness using a continuous International Roughness Index for each wheel path with a 25-foot interval using a 250 mm filter.

Pavement smoothness must comply with the specifications in section 39-1.01D(9)(c).

**39-1.01D(9) Department Acceptance**

**39-1.01D(9)(a) General**

The Department tests treated aggregate for acceptance before lime treatment except for gradation.

The Engineer takes HMA samples for AASHTO T 283 and AASHTO T 324 (Modified) from one of the following:

1. At the plant
2. At the truck
3. Windrow

The Engineer takes HMA samples for all other tests from one of the following:

1. At the plant
2. At the truck
3. Windrow
4. Mat behind the paver

The Engineer's sampling and testing is independent of your QC sampling and testing.

If you request, the Engineer splits samples and provides you with a part.

No single test result may represent more than 750 tons or one day's production, whichever is less, excluding AASHTO T 283 and AASHTO T 324 (Modified).

Except for smoothness, if 2 consecutive Department acceptance test results or any 3 Department acceptance test results for 1 day's production do not comply with the specifications:

1. Stop HMA production
2. Take corrective action
3. Demonstrate compliance with the specifications before resuming production and placement

For Department acceptance tests performed under AASHTO T 27, results are considered 1 Department acceptance test regardless of the number of sieves out of compliance.

The Engineer accepts HMA based on:

1. Authorized JMF
2. Authorized QC plan
3. Asphalt binder compliance
4. Asphalt emulsion compliance
5. Visual inspection
6. Pavement smoothness
39-1.01D(9)(b) In-Place Density

Except for HMA pavement placed using method compaction, the Engineer tests the density core you take from each 250 tons of HMA. The Engineer determines the percent of theoretical maximum density for each density core by determining the density core’s density and dividing by the theoretical maximum density.

The Department determines the percent of maximum theoretical density from density cores if any of the following applies:

1. 1/2-inch, 3/8-inch, or no. 4 aggregate gradation is used and the specified total paved thickness is greater than 0.15 foot and any layer is less than 0.15 foot.
2. 3/4-inch aggregate gradation is used and the specified total paved thickness is greater than 0.20 foot and any layer is less than 0.20 foot.

Density cores must be taken from the final layer, cored to the specified total paved thickness.

If the percent of theoretical maximum density does not comply with the specifications, the Engineer may accept the HMA and take a payment deduction.

For acceptance of a completed tapered notched wedge joint, the Engineer determines density from cores based on:

1. Field compaction by measuring the bulk specific gravity of the cores under AASHTO T 275, Method A
2. Percent compaction as the ratio of the average of the bulk specific gravity of the core for each day’s production to the maximum density test value

39-1.01D(9)(c) Pavement Smoothness

For areas that require pavement smoothness determined using an inertial profiler, the pavement surface must:

1. Have no areas of localized roughness with an International Roughness Index greater than 160 in/mi
2. Comply with the Mean Roughness Index requirements shown in the following table for a 0.1 mile section:

<table>
<thead>
<tr>
<th>HMA thickness</th>
<th>Mean Roughness Index requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 0.20 foot</td>
<td>60 in/mi or less</td>
</tr>
<tr>
<td>≤ 0.20 foot</td>
<td>75 in/mi or less</td>
</tr>
</tbody>
</table>

*Except OGFC

The final surface of HMA must comply with the Mean Roughness Index requirements before placing OGFC. Correct pavement to the Mean Roughness Index specifications. Localized roughness greater than 160 in/mi must be corrected regardless of the International Roughness Index values of a 0.1-mile section.

For areas that require pavement smoothness determined using a 12-foot straightedge, the HMA pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

Pavement smoothness may be accepted based on your testing in the absence of the Department’s testing.
39-1.01D(9)(d) Dispute Resolution

You and the Engineer must work together to avoid potential conflicts and to resolve disputes regarding test result discrepancies. Notify the Engineer within 5 business days of receiving a test result if you dispute the test result.

If you or the Engineer dispute each other's test results, submit QC test results and copies of paperwork including worksheets used to determine the disputed test results. An independent third party performs referee testing. Before the third party participates in a dispute resolution, it must be qualified under AASHTO Materials Reference Laboratory program, and the Department's Independent Assurance Program. The independent third party must have no prior direct involvement on this Contract. By mutual agreement, the independent third party is chosen from:

1. Department laboratory in a district or region not in the district or region the project is located
2. Transportation Laboratory
3. Laboratory not currently employed by you or your HMA producer

If split QC or acceptance samples are not available, the independent third party uses any available material representing the disputed HMA for evaluation.

If the independent third party determines the Department's test results are valid, the Engineer deducts the independent third party's testing costs from payments. If the independent third party determines your test results are valid, the Department pays the independent third party's testing costs.

39-1.02 MATERIALS

39-1.02A General

Reserved

39-1.02B Mix Design

39-1.02B(1) General

The HMA mix design must comply with AASHTO R 35 except:

1. Notes 3, 6, and 10 do not apply
2. AASHTO M 323 does not apply on combinations of aggregate gradation and asphalt binder contents to determine the OBC and HMA mixture qualities

The Contractor Hot Mix Asphalt Design Data form must show documentation on aggregate quality.

39-1.02B(2) Hot Mix Asphalt Treatments

If the test results for AASHTO T 283 or AASHTO T 324 (Modified) for untreated plant-produced HMA are less than the minimum requirements for HMA mix design, determine the plasticity index of the aggregate blend under California Test 204.

If the plasticity index is greater than 10, do not use that aggregate blend.

If the plasticity index is from 4 to 10, treat the aggregate with dry lime with marination or lime slurry with marination.

If the plasticity index is less than 4, treat the aggregate with dry lime or lime slurry with marination, or treat the HMA with liquid antistrip.

39-1.02B(3) Warm Mix Asphalt Technology

For HMA with warm mix asphalt additive technology, produce HMA mix samples for your mix design using your methodology for inclusion of warm mix asphalt admixture in laboratory-produced HMA. For warm mix asphalt water injection foam technology, the use of foamed asphalt for mix design is not required.

39-1.02C Asphalt Binder

Asphalt binder must comply with section 92.
For replace asphalt concrete surfacing or hot mix asphalt (leveling) the grade of asphalt binder for the HMA must be PG 64-10 or PG 64-16.

39-1.02D Aggregate

39-1.02D(1) General

Aggregate must be clean and free from deleterious substances.

The aggregate for replace asphalt concrete surfacing and hot mix asphalt (leveling) must comply with thegradation specifications for Type A HMA in section 39-2.02.

39-1.02D(2) Aggregate Gradations

Aggregate gradation must be determined before the addition of asphalt binder and must include supplemental fines. Test for aggregate gradation under AASHTO T 27. Do not wash the coarse aggregate. Use a mechanical sieve shaker. Aggregate shaking time must not exceed 10 minutes for each coarse and fine aggregate portion.

Choose a target value within the target value limits shown in the tables titled "Aggregate Gradations."

Gradations are based on nominal maximum aggregate size.

39-1.02D(3) Aggregate Lime Treatments

39-1.02D(3)(a) General

If aggregate lime treatment is required, virgin aggregate must comply with the aggregate quality specifications.

Lime for treating aggregate must comply with section 24-2.02B.

Water for lime treatment of aggregate with lime slurry must comply with section 24-2.02C.

Notify the Engineer at least 24 hours before the start of aggregate treatment.

Do not treat RAP.

The lime ratio is the pounds of dry lime per 100 lb of dry virgin aggregate expressed as a percentage. Water content of slurry or untreated aggregate must not affect the lime ratio.

Coarse and fine aggregate fractions must have the lime ratio ranges shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate fractions</th>
<th>Lime ratio percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coarse</td>
<td>0.4–1.0</td>
</tr>
<tr>
<td>Fine</td>
<td>1.5–2.0</td>
</tr>
<tr>
<td>Combined</td>
<td>0.8–1.5</td>
</tr>
</tbody>
</table>

The lime ratio for fine and coarse aggregate must be within ±0.2 percent of the lime ratio in the accepted JMF. The lime ratio must be within ±0.2 percent of the authorized lime ratio when you combine the individual aggregate sizes in the JMF proportions. The lime ratio must be determined before the addition of RAP.

If marination is required, marinate treated aggregate in stockpiles from 24 hours to 60 days before using in HMA. Do not use aggregate marinated longer than 60 days.

Treated aggregate must not have lime balls or clods.

39-1.02D(3)(b) Dry Lime

If marination is required:

1. Treat and marinate coarse and fine aggregates separately
2. Treat the aggregate and stockpile for marination only once
3. Treat the aggregate separate from HMA production

Proportion dry lime by weight with an automatic continuous proportioning system.

If you use a batch-type proportioning system for HMA production, control proportioning in compliance with the specifications for continuous mixing plants. Use a separate dry lime aggregate treatment system for HMA batch mixing including:

1. Pugmill mixer
2. Controller
3. Weigh belt for the lime
4. Weigh belt for the aggregate

If using a continuous mixing plant for HMA production without lime marinated aggregates, use a controller that measures the blended aggregate weight after any additional water is added to the mixture. The controller must determine the quantity of lime added to the aggregate from the aggregate weigh belt input in connection with the manually input total aggregate moisture, the manually input target lime content, and the lime proportioning system output. Use a continuous aggregate weigh belt and pugmill mixer for lime treatment in addition to the weigh belt for the aggregate proportioning to asphalt binder in the HMA plant. If you use a water meter for moisture control for lime treatment, the meter must comply with Department's Material Plant Quality Program manual.

At the time of mixing dry lime with aggregate, the aggregate moisture content must ensure complete lime coating. The aggregate moisture content must not cause aggregate to be lost between the point of weighing the combined aggregate continuous stream and the dryer. Add water to the aggregate for mixing and coating before dry lime addition. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate.

Mix aggregate, water, and dry lime with a continuous pugmill mixer with twin shafts. Immediately before mixing lime with aggregate, water must not visibly separate from the aggregate. Store dry lime in a uniform and free-flowing condition. Introduce dry lime to the pugmill in a continuous process. The introduction must occur after the aggregate cold feed and before the point of proportioning across a weigh belt and the aggregate dryer. Prevent loss of dry lime.

The pugmill must be equipped with paddles arranged to provide sufficient mixing action and mixture movement. The pugmill must produce a homogeneous mixture of uniformly coated aggregates at mixer discharge.

If the aggregate treatment process is stopped longer than 1 hour, clean the equipment of partially treated aggregate and lime.

Aggregate must be completely treated before introduction into the mixing drum.

39-1.02D(3)(c) Lime Slurry

For lime slurry aggregate treatment, treat aggregate separate from HMA production. Stockpile and marinate the aggregate.

Proportion lime and water with a continuous or batch mixing system.

Add lime to the aggregate as slurry consisting of mixed dry lime and water at a ratio of 1 part lime to from 2 to 3 parts water by weight. The slurry must completely coat the aggregate.

Immediately before mixing lime slurry with the aggregate, water must not visibly separate from the aggregate.

Proportion lime slurry and aggregate by weight in a continuous process.

39-1.02E Liquid Antistrip Treatment

Liquid antistrip must be from 0.25 to 1.0 percent by weight of asphalt binder. Do not use liquid antistrip as a substitute for asphalt binder.
Liquid antistrip total amine value must be 325 minimum when tested under ASTM D2074.

Use only 1 liquid antistrip type or brand at a time. Do not mix liquid antistrip types or brands.

Store and mix liquid antistrip under the manufacturer’s instructions.

39-1.02F–39-1.02G  Reserved
39-1.02H  Hot Mix Asphalt Production
39-1.02H(1)  General
Do not start HMA production before verification and authorization of JMF.

HMA plants must be Department-qualified. Before production, the HMA plant must have a current qualification under the Department’s Materials Plant Quality Program.

For lime treated aggregate, the HMA plant must be equipped with a bag-house dust system. Material collected in the dust system must be returned to the mix.

Weighing and metering devices used for the production of HMA modified with additives must comply with the requirements of the Department’s Material Plant Quality Program. If a loss-in-weight meter is used for dry HMA additive, the meter must have an automatic and integral material delivery control system for the refill cycle.

Calibrate the loss-in-weight meter by:

1. Including at least 1 complete system refill cycle during each calibration test run
2. Operating the device in a normal run mode for 10 minutes immediately before starting the calibration process
3. Isolating the scale system within the loss-in-weight feeder from surrounding vibration
4. Checking the scale system within the loss-in-weight feeder for accuracy before and after the calibration process
5. Using a 15-minute or 250-pound-minimum test run size for a dry ingredient delivery rate of less than 1 ton per hour.
6. Complying with the limits of Table B, “Conveyor Scale Testing Extremes,” in the Department’s Material Plant Quality Program

Proportion aggregate by hot or cold-feed control.

Aggregate temperature must not be more than 375 degrees F when mixed with the asphalt binder.

Asphalt binder temperature must be from 275 to 375 degrees F when mixed with aggregate.

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

HMA with or without RAP must not be more than 325 degrees F.

For HMA produced using warm mix asphalt technology, HMA must be at a temperature between 240 and 325 degrees F.

If method compaction is used, HMA must be produced at a temperature between 305 and 325 degrees F.

If you stop production for longer than 30 days, a production start-up evaluation is required.

39-1.02H(2)  Liquid Antistrip
If 3 consecutive sets of recorded production data show actual delivered liquid antistrip weight is more than ±1 percent of the authorized mix design liquid antistrip weight, stop production and take corrective action.
If a set of recorded production data shows actual delivered liquid antistrip weight is more than ±2 percent of the authorized mix design liquid antistrip weight, stop production. If the liquid antistrip weight exceeds 1.2 percent of the asphalt binder weight, do not use the HMA represented by that data.

The continuous mixing plant controller proportioning the HMA must produce a production data log. The log consists of a series of data sets captured at 10-minute intervals throughout daily production. The data must be a production activity register and not a summation. The material represented by the data is the quantity produced 5 minutes before and 5 minutes after the capture time. For the duration of the Contract, collected data must be stored by the plant controller or a computer's memory at the plant.

The Engineer orders proportioning activities stopped for any of the following:

1. You do not submit data
2. You submit incomplete, untimely, or incorrectly formatted data
3. You do not take corrective actions
4. You take late or unsuccessful corrective actions
5. You do not stop production when proportioning tolerances are exceeded
6. You use malfunctioning or failed proportioning devices

If you stop production, notify the Engineer of any corrective actions taken before resuming.

**39-1.02H(3) Warm Mix Asphalt Technology**

Proportion all ingredients by weight. The HMA plant process controller must be the sole source of ingredient proportioning control and be fully interfaced with all scales and meters used in the production process. The addition of the HMA additive must be controlled by the plant process controller.

Liquid ingredient additive, including a normally dry ingredient made liquid, must be proportioned with a mass flow meter at continuous mixing plants. Use a mass flow meter or a container scale to proportion liquid additives at batch mixing plants.

Continuous mixing plants using HMA additives must comply with the following:

1. Dry ingredient additives for continuous production must be proportioned with a conveyor scale or a loss-in-weight meter.
2. HMA plant process controller and ingredient measuring systems must be capable of varying all ingredient feed rates proportionate with the dry aggregate delivery at all production rates and rate changes.
3. Liquid HMA additive must enter the production stream with the binder. Dry HMA additive must enter the production stream at or before the mixing area.
4. If dry HMA additives are used at continuous mixing HMA plants, baghouse dust systems must return all captured material to the mix.
5. HMA additive must be proportioned to within ±0.3 percent of the target additive rate.

Batch mixing plants using HMA additives must comply with the following:

1. Metered HMA additive must be placed in an intermediate holding vessel before being added to the stream of asphalt binder as it enters the pugmill.
2. If a container scale is used, weigh additive before combining with asphalt binder. Keep the container scale separate from other ingredient proportioning. The container scale capacity must be no more than twice the volume of the maximum additive batch size. The container scale's graduations must be smaller than the proportioning tolerance or 0.001 times the container scale capacity.
3. Dry HMA additive proportioning devices must be separate from metering devices for the aggregates and asphalt binder. Proportion dry HMA additive directly into the pugmill or place in an intermediate holding vessel to be added to the pugmill at the appropriate time in the batch cycle. Dry ingredients for batch production must be proportioned with a hopper scale.
4. Zero tolerance for the HMA additive batch scale is ±0.5 percent of the target additive weight. The indicated HMA additive batch scale weight may vary from the preselected weight setting by up to ±1.0 percent of the target additive weight.
39-1.02I Geosynthetic Pavement Interlayer
Geosynthetic pavement interlayer must comply with the specifications for pavement fabric, paving mat, paving grid, paving geocomposite grid, or geocomposite strip membrane as shown.

The asphalt binder for geosynthetic pavement interlayer must be PG 64-10, PG 64-16, or PG 70-10.

39-1.02J Tack Coat
Tack coat must comply with the specifications for asphaltic emulsion or asphalt binder. Choose the type and grade.

39-1.02K Miscellaneous Areas and Dikes
For miscellaneous areas and dikes:

1. Choose either the 3/8-inch or 1/2-inch aggregate gradation for Type A HMA.
2. Minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate and 6.0 percent for 1/2-inch aggregate. If you request and the Engineer authorizes, you may reduce the minimum asphalt binder content.
3. Choose asphalt binder Grade PG 64-10, PG 64-16 or PG 70-10.

For HMA used in miscellaneous areas and dikes, sections 39-1.01C, 39-1.01D, 39-1.02B, 39-1.02D(3), and 39-1.02E–J do not apply.

39-1.03 CONSTRUCTION
39-1.03A General
Do not place HMA on wet pavement or frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for deposit, pickup, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 degrees F

HMA placed in a windrow on the roadway surface must not extend more than 250 feet in front of the loading equipment or material transfer vehicle.

You may place HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

Where density or data core samples are taken, backfill and compact holes with authorized material.

Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder
3. Below 130 degrees F for HMA with warm mix asphalt technology

39-1.03B Spreading and Compacting Equipment

39-1.03B(1) General
Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

Install and maintain grade and slope references.
The screed must be heated and produce a uniform HMA surface texture without tearing, shoving, or gouging.
The paver must not leave marks such as ridges and indentations unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades, and cross sections
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction

39-1.03B(2) Material Transfer Vehicle
If a material transfer vehicle is specified, the material transfer vehicle must have sufficient capacity to prevent stopping the paver and must be capable of:

1. Either receiving HMA directly from trucks or using a windrow pickup head to load it from a windrow deposited on the roadway surface
2. Remixing the HMA with augers before transferring into the paver's receiving hopper or feed system
3. Transferring HMA directly into the paver's receiving hopper or feed system

39-1.03B(3) Method Compaction Equipment
For method compaction, each paver spreading HMA must be followed by 3 rollers:

1. One vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. One oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible.

39-1.03B(4)–39-1.03B(6) Reserved

39-1.03C Surface Preparation

39-1.03C(1) General
Before placing HMA, remove loose paving particles, dirt, and other extraneous material by any means including flushing and sweeping.
39-1.03C(2) Subgrade
Prepare subgrade to receive HMA under the sections for the material involved. Subgrade must be free of loose and extraneous material.

39-1.03C(3) Reserved

39-1.03C(4) Preparing Inertial Profiler
Section 39-1.03C(4) applies to existing asphalt concrete surfaces receiving an HMA overlay if a bid item for preparing inertial profiler is shown in the Bid Item List.

Before starting paving activities, perform preparing inertial profiler measurements. Preparing inertial profiler includes taking profiles of the existing pavement, analyzing the data with ProVAL to determine existing pavement International Roughness Index, Mean Roughness Index, and areas of localized roughness.

If the Contract includes cold planing, perform preparing inertial profiler measurements before cold planning.

If the Contract includes replace asphalt concrete surfacing, perform preparing inertial profiler measurements after replacing the asphalt concrete surfacing.

39-1.03C(5) Preparing Grinding
Section 39-1.03C(5) applies to all existing asphalt concrete surfaces that will not be cold planned or milled and that will receive an HMA overlay less than or equal to 0.20 foot exclusive of OGFC if a bid item for preparing grinding day is shown in the Bid Item List.

After performing preparing inertial profiling, correct areas of localized roughness greater than 180 in/mi. Preparing grinding day includes correcting areas of localized roughness, taking profiles of the corrected areas, and submitting profile data as specified in section 39-1.01C(13)(d).

Notify the Engineer of those areas of localized roughness that cannot be corrected by preparing grinding according to the ProVAL smoothness assurance analysis grinding report. The Engineer responds to your notification within 5 business days.

For those areas of localized roughness that cannot be corrected by grinding, the Engineer may order you to either (1) not correct the areas of localized roughness or (2) correct areas of localized roughness by a different method and take profiles of the corrected areas with an inertial profiler. Corrective work performed by a different method, including taking profiles of the corrected areas and associated traffic control, is change order work.

If ordered not to correct areas of localized roughness, the smoothness specifications do not apply to the final pavement surface placed in those areas.

Correct preparing areas of localized roughness that you predict will cause the final surface of HMA pavement to be noncompliant with the smoothness specifications. After correcting preparing areas of localized roughness, take profiles of the corrected area and submit profile data as specified in section 39-1.01C(13)(d).

Dispose of grinding residue.

Pave within 7 days of correcting areas.

The final pavement surface must comply with section 39-1.01D(9)(c).

If the Engineer determines more time is required for preparing grinding than the Contract allows for and if preparing grinding is a controlling activity, the Engineer makes a time adjustment.

39-1.03C(6) Tack Coat
Apply tack coat:
1. To existing pavement including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:
   3.1. Curbs
   3.2. Gutters
   3.3. Construction joints

Before placing HMA, apply tack coat in 1 application at the minimum residual rate shown in the following table for the condition of the underlying surface:

### Tack Coat Application Rates for HMA

<table>
<thead>
<tr>
<th>HMA over:</th>
<th>Minimum Residual Rates (gal/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h Asphalitic Emulsion</td>
<td></td>
</tr>
<tr>
<td>CRS1/CRS2, RS1/RS2 and QS1/CQS1 Asphalitic Emulsion</td>
<td></td>
</tr>
<tr>
<td>Asphalt Binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h Asphalitic Emulsion</td>
<td></td>
</tr>
<tr>
<td>New HMA (between layers)</td>
<td>0.02</td>
</tr>
</tbody>
</table>
PCC and existing AC surfacing            | 0.03  | 0.04  | 0.03  |
Planed pavement                          | 0.05  | 0.06  | 0.04  |

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume under section 9-1.02 or you may use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit:
1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

Apply to vertical surfaces with a residual tack coat rate that will thoroughly coat the vertical face without running off.

If you request and the Engineer authorizes, you may:
1. Change tack coat rates
2. Omit tack coat between layers of new HMA during the same work shift if:
   2.1. No dust, dirt, or extraneous material is present
   2.2. Surface is at least 140 degrees F

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not track tack coat onto pavement surfaces beyond the job site.

Asphalt binder tack coat temperature must be from 285 to 350 degrees F when applied.

### 39-1.03C(7) Geosynthetic Pavement Interlayer

If specified, place geosynthetic pavement interlayer over a coat of asphalt binder. Place geosynthetic pavement interlayer in compliance with the manufacturer's instructions.

Before placing the geosynthetic pavement interlayer and asphalt binder:
1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. Repairing cracks is change order work.
2. Clean the pavement of loose and extraneous material.

Immediately before placing the interlayer, apply 0.25 ± 0.03 gallon of asphalt binder per square yard of interlayer or until the fabric is saturated. Apply asphalt binder the width of the geosynthetic pavement interlayer plus 3 inches on each side. At an interlayer overlap, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

Align and place the interlayer with no overlapping wrinkles, except a wrinkle that overlaps may remain if it is less than 1/2 inch thick. If the overlapping wrinkle is more than 1/2 inch thick, cut the wrinkle out and overlap the interlayer no more than 2 inches.

The minimum HMA thickness over the interlayer must be 0.12 foot thick including conform tapers. Do not place the interlayer on a wet or frozen surface.

Overlap the interlayer borders between 2 to 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic except for crossings under traffic control and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift.

39-1.03D Longitudinal Joints

39-1.03D(1) General

Longitudinal joints in the top layer must match lane lines. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the lane line. You may request other longitudinal joint placement patterns.

A vertical longitudinal joint of more than 0.15 foot is not allowed at any time between adjacent lanes open to traffic.

For HMA thickness of 0.15 foot or less, the distance between the ends of the adjacent surfaced lanes at the end of each day's work must not be greater than can be completed in the following day of normal paving.

For HMA thickness greater than 0.15 foot, you must place HMA on adjacent traveled way lanes or shoulder so that at the end of each work shift the distance between the ends of HMA layers on adjacent lanes is from 5 to 10 feet. Place additional HMA along the transverse edge at each lane's end and along the exposed longitudinal edges between adjacent lanes. Hand rake and compact the additional HMA to form temporary conforms. You may place kraft paper or other authorized release agent under the conform tapers to facilitate the taper removal when paving activities resume.

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material.

39-1.03D(2) Tapered Notched Wedge

For divided highways with an HMA lift thickness greater than 0.15 foot, you may construct a 1-foot wide tapered notched wedge joint as a longitudinal joint between adjacent lanes open to traffic. A vertical notch of 0.75 inch maximum must be placed at the top and bottom of the tapered wedge.
The tapered notched wedge must retain its shape while exposed to traffic. Pave the adjacent lane within 1 day.

Construct the tapered portion of the tapered notched wedge with an authorized strike-off device. The strike-off device must provide a uniform slope and must not restrict the main screed of the paver.

You may use a device attached to the screed to construct longitudinal joints that will form a tapered notched wedge in a single pass. The tapered notched wedge must be compacted to a minimum of 91 percent compaction.

39-1.03E Edge Treatments
Construct edge treatment on the HMA pavement as shown.

Where a safety edge is required, use the same type of HMA used for the adjacent lane or shoulder.

The edge of roadway where the safety edge treatment is to be placed must have a solid base, free of debris such as loose material, grass, weeds, or mud. Grade areas to receive the safety edge as required.

The safety edge treatment must be placed monolithic with the adjacent lane or shoulder and shaped and compacted with a device attached to the paver.

The device must be capable of shaping and compacting HMA to the required cross section as shown. Compaction must be by constraining the HMA to reduce the cross sectional area by 10 to 15 percent. The device must produce a uniform surface texture without tearing, shoving, or gouging and must not leave marks such as ridges and indentations. The device must be capable of transition to cross roads, driveways, and obstructions.

For safety edge treatment, the angle of the slope must not deviate by more than ±5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

If paving is done in multiple lifts, the safety edge treatment must be placed with each lift.

Short sections of hand work are allowed to construct transitions for safety edge treatment.

39-1.03F Widening Existing Pavement
If widening existing pavement, construct new pavement structure to match the elevation of the existing pavement's edge before placing HMA over the existing pavement.

39-1.03G Shoulders, Medians, and Other Road Connections
Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

If shoulders or median borders are shown, pave shoulders and median borders adjacent to the lane before opening a lane to traffic.

If shoulder conform tapers are shown, place conform tapers concurrently with the adjacent lane's paving.
If a driveway or a road connection is shown, place additional HMA along the pavement's edge to conform to road connections and driveways. Hand rake, if necessary, and compact the additional HMA to form a smooth conform taper.

39-1.03H Leveling
Section 39-1.03H applies if a bid item for hot mix asphalt (leveling), is shown on the Bid Item List.

Fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as hot mix asphalt (leveling).

39-1.03I Miscellaneous Areas and Dikes
Prepare the area to receive HMA for miscellaneous areas and dikes, including excavation and backfill as needed.

Spread miscellaneous areas in 1 layer and compact to the specified lines and grades.

In median areas adjacent to slotted median drains, each layer of HMA must not exceed 0.20 foot maximum compacted thickness.

The finished surface must be:
1. Textured uniformly
2. Compacted firmly
3. Without depressions, humps, and irregularities

39-1.03J Replace Asphalt Concrete Surfacing
Where replace asphalt concrete surfacing is shown, remove existing asphalt concrete surfacing and replace with HMA. The Engineer determines the exact limits of asphalt concrete surfacing to be replaced.

Replace asphalt concrete in a lane before the lane is specified to be opened to traffic.

Before removing asphalt concrete, outline the replacement area and cut neat lines with a saw or grind to full depth of the existing asphalt concrete. Do not damage asphalt concrete and base remaining in place.

If the base is excavated beyond the specified plane, replace it with HMA. The Department does not pay for this HMA.

Do not use a material transfer vehicle if replace asphalt concrete surfacing is specified.

39-1.03K–39-1.03N Reserved

39-1.03O Compaction
39-1.03O(1) General
Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving.

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not open new HMA pavement to traffic until the surface temperature is below 130 degrees F.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures are taken in the shade.

39-1.03O(2) Method Compaction
Use method compaction for any of the following conditions:

1. HMA pavement thickness shown is less than 0.15 foot
2. Replace asphalt concrete surfacing
3. Leveling courses
4. Areas the Engineer determines conventional compaction and compaction measurement methods are impeded

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller’s movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Method compaction must consist of performing:

1. Breakdown compaction of each layer with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the HMA layer thickness is less than 0.08 foot, turn the vibrator off.
2. Intermediate compaction of each layer of HMA with 3 coverages using a pneumatic-tired roller at a speed not to exceed 5 mph.
3. Finish compaction of HMA with 1 coverage using a steel-tired roller.

Start rolling at the lower edge and progress toward the highest part.

The Engineer may order fewer coverages if the layer thickness of HMA is less than 0.15 foot.

**39-1.03O(3)–39-1.03O(5) Reserved**

**39-1.03P Smoothness Corrections**

If the final surface of the pavement does not comply with the smoothness specifications, grind the pavement to within specified tolerances, remove and replace it, or place an overlay of HMA. Do not start corrective work until your method is authorized.

Do not use equipment with carbide cutting teeth to grind the pavement unless authorized.

Smoothness correction of the final pavement surface must leave at least 75 percent of the specified HMA thickness. If ordered, core the pavement at the locations determined by the Engineer. Coring, including traffic control, is change order work. Remove and replace deficient pavement areas where the overlay thickness is less than 75 percent of the thickness specified as determined by the Engineer.

Corrected HMA pavement areas must be uniform rectangles with edges:

1. Parallel to the nearest HMA pavement edge or lane line
2. Perpendicular to the pavement centerline

On ground areas not to be overlaid with OGFC, apply fog seal coat under section 37-2.

Where corrections are made within areas requiring testing with inertial profiler, reprofile the entire lane length with the inertial profiler device.

Where corrections are made within areas requiring testing with a 12-foot straightedge, retest the corrected area with the straightedge.

**39-1.03Q Data Cores**

Section 39-1.03Q applies if a bid item for data core is shown on the Bid Item List.

Take data cores of the completed HMA pavement, underlying base, and subbase material. Notify the Engineer 3 business days before coring.

Protect data cores and surrounding pavement from damage.

Take 4-inch or 6-inch diameter data cores:

1. At the beginning, end, and every 1/2 mile within the paving limits of each route on the project
2. After all paving is complete
3. From the center of the specified lane
On a 2-lane roadway, take data cores from either lane. On a 4-lane roadway, take data cores from each direction in the outermost lane. On a roadway with more than 4 lanes, take data cores from the median lane and the outermost lane in each direction.

Each core must include the stabilized materials encountered. You may choose not to recover unstabilized material but you must identify the material. Unstabilized material includes:

1. Granular material
2. Crumbled or cracked stabilized material
3. Sandy or clayey soil

After data core summary and photograph submittal, dispose of cores.

39-1.04 PAYMENT

Geosynthetic pavement interlayer is measured by the square yard for the actual pavement area covered.

If tack coat, asphalt binder, and asphaltic emulsion are paid as separate bid items, their bid items are measured under section 92 or section 94.

The Department does not adjust the unit price for an increase or decrease in the tack coat quantity.

HMA of the type shown in the Bid Item List is measured based on the combined mixture weight. If recorded batch weights are printed automatically, the bid item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the first batch and after weighing the last batch.
4. Time, date, mix number, load number and truck identification is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weigh master and submitted.

Place hot mix asphalt dike of the type shown in the Bid Item List is measured along the completed length. Payment for the HMA used to construct the dike is not included in the payment for place hot mix asphalt dike.

Place hot mix asphalt (miscellaneous areas) is measured as the in-place compacted area. Payment for the HMA used for miscellaneous areas is not included in the payment for place hot mix asphalt (miscellaneous areas).

If replace asphalt concrete surfacing is shown, the bid item for replace asphalt concrete is measured based on the specified dimensions and any adjustments ordered.

The Department does not adjust the unit price for an increase or decrease in the prepaving grinding day quantity.

The Department reduces payment for noncompliance of HMA density based on the factors shown in the following table:
### 39-2.01 GENERAL

#### 39-2.01A Summary

Section 39-2 includes specifications for producing and placing Type A hot mix asphalt.

You may produce Type A HMA using an authorized warm mix asphalt technology.

#### 39-2.01B Definitions

Reserved

#### 39-2.01C Submittals

**39-2.01C(1) General**

Reserved

#### 39-2.01C(2) Job Mix Formula

The JMF must be based on an HMA mix design determined as described in the Superpave Mix Design SP-2 Manual by the Asphalt Institute.

#### 39-2.01C(3) Reclaimed Asphalt Pavement

Submit QC test results for RAP gradation with the combined aggregate gradation within 2 business days of taking RAP samples during HMA production.

#### 39-2.01C(4)–39-2.01C(6) Reserved

#### 39-2.01D Quality Control and Assurance

**39-2.01D(1) General**

Reserved

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**Reduced Payment Factors for Percent of Maximum Theoretical Density**

<table>
<thead>
<tr>
<th>HMA percent of maximum theoretical density</th>
<th>Reduced payment factor</th>
<th>HMA percent of maximum theoretical density</th>
<th>Reduced payment factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>91.0</td>
<td>0.0000</td>
<td>97.0</td>
<td>0.0000</td>
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<tr>
<td>90.9</td>
<td>0.0125</td>
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<td>0.0125</td>
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<td>&lt; 89.0</td>
<td>Remove and replace</td>
<td>&gt; 99.0</td>
<td>Remove and replace</td>
</tr>
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</table>

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**OCTOBER 2015**
39-2.01D(2) Quality Control

39-2.01D(2)(a) General

Reserved

39-2.01D(2)(b) Aggregate

Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
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</thead>
<tbody>
<tr>
<td>Gradation</td>
<td>AASHTO T 27</td>
<td>1 per 750 tons and any remaining part</td>
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<tr>
<td>Sand equivalent</td>
<td>AASHTO T 176</td>
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<tr>
<td>Moisture content</td>
<td>AASHTO T 329</td>
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<tr>
<td>Crushed particles</td>
<td>AASHTO T 335</td>
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<tr>
<td>Los Angeles rattler</td>
<td>AASHTO T 96</td>
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<tr>
<td>Flat and elongated</td>
<td>ASTM D4791</td>
<td>1 per 10,000 tons or 2 per project whichever is greater</td>
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<tr>
<td>particles</td>
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<tr>
<td>Fine aggregate angularity</td>
<td>AASHTO T 304 Method A</td>
<td></td>
</tr>
</tbody>
</table>

*If RAP is used, test the combined aggregate gradation under California Test 384.

*Reported value must be the average of 3 tests from a single sample.

*Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

*Test at continuous mixing plants only. If RAP is used, test the RAP moisture content at continuous mixing plant and batch mixing plant.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during HMA production.

39-2.01D(2)(c) Reclaimed Asphalt Pavement

Sample and test processed RAP at a minimum frequency of 1 sample per 1000 tons with a minimum of 6 samples per fractionated stockpile. If the fractionated stockpile has not been augmented, the 3 RAP samples taken and tested for mix design may be part of this minimum sample requirement. If a fractionated RAP stockpile is augmented, sample and test processed RAP quality characteristics at a minimum frequency of 1 sample per 500 tons of augmented RAP.

The combined RAP sample when tested under AASHTO T 164 must be within ±2.0 percent of the average asphalt binder content reported on page 4 of your Contractor Hot Mix Asphalt Design Data form. If new fractionated RAP stockpiles are required, the average binder content of the new fractionated RAP stockpile must be within ±2.0 percent of the average binder reported on page 4 of your Contractor Hot Mix Asphalt Design Data form.

The combined RAP sample when tested under AASHTO T 209 must be within ±0.06 of the average maximum specific gravity reported on page 4 of your Contractor Hot Mix Asphalt Design Data form.

During HMA production, sample RAP twice daily and perform QC testing for:

1. Aggregate gradation at least once a day under California Test 384
2. Moisture content at least twice a day

OCTOBER 2015
Test the quality characteristics of HMA under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt binder content</td>
<td>AASHTO T 308 Method A</td>
<td>1 per 750 tons and any remaining part</td>
</tr>
<tr>
<td>HMA moisture content</td>
<td>AASHTO T 329</td>
<td>1 per 2,500 tons but not less than 1 per paving day</td>
</tr>
<tr>
<td>Air voids content</td>
<td>AASHTO T 269</td>
<td>1 per 4,000 tons or 2 every 5 paving days, whichever is greater</td>
</tr>
<tr>
<td>Voids in mineral aggregate</td>
<td>SP-2 Asphalt Mixture Volumetrics</td>
<td>1 per 10,000 tons or 2 per project whichever is greater</td>
</tr>
<tr>
<td>Dust proportion</td>
<td>SP-2 Asphalt Mixture Volumetrics</td>
<td></td>
</tr>
<tr>
<td>Density of core</td>
<td>California Test 375</td>
<td>2 per paving day</td>
</tr>
<tr>
<td>Nuclear gauge density</td>
<td>California Test 375</td>
<td>3 per 250 tons or 3 per paving day, whichever is greater</td>
</tr>
<tr>
<td>Hamburg wheel track</td>
<td>AASHTO T 324 (Modified)</td>
<td>1 per 10,000 tons or 1 per project, whichever is greater</td>
</tr>
<tr>
<td>Moisture susceptibility</td>
<td>AASHTO T 283</td>
<td></td>
</tr>
</tbody>
</table>

39-2.01D(3)–39-2.01D(4) Reserved

39-2.01D(5) Department Acceptance
The Department accepts Type A HMA based on compliance with:

1. Aggregate quality requirements shown in the following table:
### Aggregate Quality

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate gradation&lt;sup&gt;a&lt;/sup&gt;</td>
<td>AASHTO T 27</td>
<td>JMF ± Tolerance</td>
</tr>
<tr>
<td>Percent of crushed particles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-fractured face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-fractured faces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
<td>AASHTO T 335</td>
<td></td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One fractured face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
<td>AASHTO T 96</td>
<td>12, 40</td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand equivalent (min,)%&lt;sup&gt;b, c&lt;/sup&gt;</td>
<td>AASHTO T 176</td>
<td>47</td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight at 5:1)</td>
<td>ASTM D4791</td>
<td>10</td>
</tr>
<tr>
<td>Fine aggregate angularity (min, %)&lt;sup&gt;d&lt;/sup&gt;</td>
<td>AASHTO T 304 Method A</td>
<td>45</td>
</tr>
</tbody>
</table>

<sup>a</sup>The Engineer determines combined aggregate gradations containing RAP under California Test 384.

<sup>b</sup>Reported value must be the average of 3 tests from a single sample.

<sup>c</sup>Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

<sup>d</sup>The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

2. If RAP is used, RAP quality requirements shown in the following table:

### Reclaimed Asphalt Pavement Quality

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binder content (% within the average value reported)</td>
<td>AASHTO T 164</td>
<td>±2.0</td>
</tr>
<tr>
<td>Specific gravity (within the average value reported)</td>
<td>AASHTO T 209</td>
<td>±0.06</td>
</tr>
</tbody>
</table>

3. In-place HMA quality requirements shown in the following table:
### Type A HMA Acceptance In Place

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt binder content (%)</td>
<td>AASHTO T 308, Method A</td>
<td>JMF -0.3, +0.5</td>
</tr>
<tr>
<td>HMA moisture content (max, %)</td>
<td>AASHTO T 329</td>
<td>1</td>
</tr>
<tr>
<td>Air voids content at (N_{\text{design}}) (%)(^a) (%)(^b)</td>
<td>AASHTO T 269</td>
<td>4 ± 1.5</td>
</tr>
<tr>
<td>Voids in mineral aggregate on plant-produced HMA (min, %)(^a)(^b) Gradation:</td>
<td>SP-2 Asphalt Mixture Volumetrics(^c)</td>
<td></td>
</tr>
<tr>
<td>No. 4</td>
<td></td>
<td>15.5–18.5</td>
</tr>
<tr>
<td>3/8-inch</td>
<td></td>
<td>14.5–17.5</td>
</tr>
<tr>
<td>1/2-inch</td>
<td></td>
<td>13.5–16.5</td>
</tr>
<tr>
<td>3/4-inch</td>
<td></td>
<td>12.5–15.5</td>
</tr>
<tr>
<td>1-inch with NMAS(^g) = 1-inch</td>
<td></td>
<td>12.5–15.5</td>
</tr>
<tr>
<td>with NMAS(^g) = 3/4-inch</td>
<td></td>
<td>13.5–16.5</td>
</tr>
<tr>
<td>Dust proportion</td>
<td>SP-2 Asphalt Mixture Volumetrics</td>
<td>0.6–1.3</td>
</tr>
<tr>
<td>Density of core (% of max theoretical density)(^e)(^f)</td>
<td>California Test 375</td>
<td>91–97</td>
</tr>
<tr>
<td>Hamburg wheel track (min number of passes at 0.5-inch rut depth)Binder grade:</td>
<td>AASHTO T 324, (Modified)</td>
<td></td>
</tr>
<tr>
<td>PG 58</td>
<td></td>
<td>10,000</td>
</tr>
<tr>
<td>PG 64</td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>PG 70</td>
<td></td>
<td>20,000</td>
</tr>
<tr>
<td>PG 76 or higher</td>
<td></td>
<td>25,000</td>
</tr>
<tr>
<td>Hamburg wheel track (min number of passes at inflection point)Binder grade:</td>
<td>AASHTO T 324, (Modified)</td>
<td></td>
</tr>
<tr>
<td>PG 58</td>
<td></td>
<td>10,000</td>
</tr>
<tr>
<td>PG 64</td>
<td></td>
<td>10,000</td>
</tr>
<tr>
<td>PG 70</td>
<td></td>
<td>12,500</td>
</tr>
<tr>
<td>PG 76 or higher</td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>Moisture susceptibility (min, psi, dry strength)</td>
<td>AASHTO T 283</td>
<td>100</td>
</tr>
<tr>
<td>Moisture susceptibility (min, psi, wet strength)</td>
<td>AASHTO T 283</td>
<td>70</td>
</tr>
</tbody>
</table>

\(^a\) Prepare 3 briquettes. Report the average of 3 tests.
\(^b\) The Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.
\(^c\) Determine bulk specific gravity under AASHTO T 275, Method A.
\(^d\) The Engineer determines the laboratory-prepared HMA value for mix design verification only.
\(^e\) The Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:
1. AASHTO T 275 to determine in-place density of each density core
2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density
\(^f\) The Engineer determines theoretical maximum density under AASHTO T 209, Method A, at the frequency specified in California Test 375, Part 5. D.
\(^g\) NMAS means nominal maximum aggregate size.

### 39-2.02 MATERIALS
#### 39-2.02A General
Reserved
### 39-2.02B Mix Design

The mix design must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
</table>
| Air voids content (%)   | AASHTO T 269<sup>a</sup> | \( N_{\text{initial}} > 8.0 \)  
\( N_{\text{design}} = 4.0 \)  
\( (N_{\text{design}} = 5.0 \text{ for 1-inch aggregate}) \)  
\( N_{\text{max}} > 2.0 \) |
| Gyration compaction (no. of gyrations) | AASHTO T 312 | \( N_{\text{initial}} = 8 \)  
\( N_{\text{design}} = 85.0 \)  
\( N_{\text{max}} = 130 \) |
| Voids in mineral aggregate (min, %)<sup>b</sup>  
Gradation:  
No. 4  
3/8-inch  
1/2-inch  
3/4-inch  
1-inch  
with NMAS<sup>e</sup> = 1-inch  
with NMAS<sup>e</sup> = 3/4-inch | SP-2  
Asphalt Mixture Volumetrics | 16.5–19.5  
15.5–18.5  
14.5–17.5  
13.5–16.5  
13.5–16.5  
14.5–17.5 |
| Dust proportion | SP-2  
Asphalt Mixture Volumetrics | 0.6–1.3 |
| Hamburg wheel track (min number of passes at 0.5-inch rut depth)  
Binder grade:  
PG 58  
PG 64  
PG 70  
PG 76 or higher | AASHTO T 324  
(Modified)<sup>c</sup> | 10,000  
15,000  
20,000  
25,000 |
| Hamburg wheel track (min number of passes at the inflection point)  
Binder grade:  
PG 58  
PG 64  
PG 70  
PG 76 or higher | AASHTO T 324  
(Modified)<sup>d</sup> | 10,000  
10,000  
12,500  
15,000 |
| Moisture susceptibility, dry strength (min, psi) | AASHTO T 283<sup>e</sup>  
<sup>c</sup>  
<sup>c</sup>  
<sup>h</sup> | 100 |
| Moisture susceptibility, wet strength (min, psi) | AASHTO T 283<sup>e</sup>  
<sup>c</sup>  
<sup>d</sup> | 70 |

<sup>a</sup>Calculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity. Use AASHTO T 209, Method A, to determine theoretical maximum specific gravity. Use a digital manometer and pycnometer when performing AASHTO T 209.

<sup>b</sup>Measure bulk specific gravity using AASHTO T 275, Method A.

<sup>c</sup>Test plant produced HMA.

<sup>d</sup>Freeze thaw required.

<sup>e</sup>NMAS means nominal maximum aggregate size.
For HMA mixtures using RAP, the maximum binder replacement is 25.0 percent for surface course and 40.0 percent for lower courses.

For HMA with a binder replacement percent less than or equal to 25 percent of your specified OBC, you may request that the performance graded asphalt binder grade with upper and lower temperature classifications be reduced by 6 degrees C from the specified grade.

For HMA with a binder replacement greater than 25 percent of your specified OBC and less than or equal to 40 percent of OBC, you must use a performance graded asphalt binder grade with upper and lower temperature classifications reduced by 6 degrees C from the specified grade.

39-2.02C Asphalt Binder
Reserved

39-2.02D Aggregates
39-2.02D(1) General
Before the addition of asphalt binder and lime treatment, the aggregate must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Quality</th>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of crushed particles</td>
<td>Coarse aggregate (min, %)</td>
<td>AASHTO T 335</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>One-fractured face</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Two-fractured faces</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fine aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
<td>AASHTO T 335</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>One fractured face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
<td>Loss at 100 Rev.</td>
<td>AASHTO T 96</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Loss at 500 Rev.</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Sand equivalent (min)</td>
<td>AASHTO T 176</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight at 5:1)</td>
<td>ASTM D4791</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Fine aggregate angularity (min, %)</td>
<td>AASHTO T 304 Method A</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

*Reported value must be the average of 3 tests from a single sample.

b Use of a Sand Reader Indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

The Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate, except if your JMF fails verification. Manufactured sand is fine aggregate produced by crushing rock or gravel.

39-2.02D(2) Aggregate Gradations
The aggregate gradations for Type A HMA must comply with the requirements shown in the following table:
### Aggregate Gradation Requirements

<table>
<thead>
<tr>
<th>Type A HMA pavement thickness shown</th>
<th>Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.10 foot</td>
<td>3/8 inch</td>
</tr>
<tr>
<td>Greater than 0.10 to less than 0.20 foot</td>
<td>1/2 inch</td>
</tr>
<tr>
<td>0.20 foot to less than 0.25 foot</td>
<td>3/4 inch</td>
</tr>
<tr>
<td>0.25 foot or greater</td>
<td>3/4 inch or 1 inch</td>
</tr>
</tbody>
</table>

Aggregate gradation must be within the target value limits for the specified sieve size shown in the following tables:
### Aggregate Gradations
(Percentage Passing)

#### 1-inch

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Target value limit</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>88–93</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>72–85</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>55–70</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 4</td>
<td>35–52</td>
<td>TV ± 7</td>
</tr>
<tr>
<td>No. 8</td>
<td>22–40</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>8–24</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 50</td>
<td>5–18</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 200</td>
<td>3–7</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

#### 3/4-inch

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Target value limit</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>90–98</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>70–90</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 4</td>
<td>42–58</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 8</td>
<td>29–43</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>10–23</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 200</td>
<td>2–7</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

#### 1/2-inch

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Target value limit</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>95–98</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>72–95</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 4</td>
<td>52–69</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 8</td>
<td>35–55</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>15–30</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 200</td>
<td>2–8</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

#### 3/8-inch

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Target value limits</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>95–98</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 4</td>
<td>55–75</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 8</td>
<td>30–50</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>15–35</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 200</td>
<td>2–9</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

**No. 4**

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Target value limits</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>No. 4</td>
<td>95–98</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 8</td>
<td>70–80</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 30</td>
<td>34–45</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 200</td>
<td>2–12</td>
<td>TV ± 4</td>
</tr>
</tbody>
</table>
39-2.02E  Reclaimed Asphalt Pavement

You may substitute RAP for part of the virgin aggregate in a quantity up to a maximum of 25 percent of the aggregate blend.

Provide enough space for meeting all RAP handling requirements at your facility. Provide a clean, graded base, well drained area for stockpiles.

If RAP is from multiple sources, blend the RAP thoroughly and completely before fractionating.

For RAP substitution of 15 percent or less, fractionation is not required.

For RAP substitution greater than 15 percent, fractionate RAP stockpiles into 2 sizes, a coarse fraction RAP retained on 3/8-inch sieve, and a fine fraction RAP passing 3/8-inch sieve.

The RAP fractionation must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>RAP Stockpile Fractionation Gradation Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality characteristic</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Coarse (% passing the 1-inch sieve)</td>
</tr>
<tr>
<td>Fine (% passing the 3/8-inch sieve)</td>
</tr>
</tbody>
</table>

*Maximum mechanical shaking time is 10 minutes

You may use the coarse fractionated stockpile, the fine fractionated stockpile, or a combination of the coarse and fine fractionated stockpiles.

Isolate the processed RAP stockpiles from other materials. Store processed RAP in conical or longitudinal stockpiles. Processed RAP must not be agglomerated or be allowed to congeal in large stockpiles.

39-2.02F  Hot Mix Asphalt Production

If RAP is used, the asphalt plant must automatically adjust the virgin asphalt binder to account for RAP percentage and RAP binder.

During production, you may adjust hot or cold-feed proportion controls for virgin aggregate and RAP. RAP must be within ±3 of RAP percentage shown in your Contractor Job Mix Formula Proposal form without exceeding 25 percent.

The aggregate temperature requirements do not apply to RAP.

39-2.03  CONSTRUCTION

Spread Type A HMA at the atmospheric and surface temperatures shown in the following table:

<table>
<thead>
<tr>
<th>Minimum Atmospheric and Surface Temperatures for Type A HMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compacted layer thickness, feet</td>
</tr>
<tr>
<td>--------------------------------</td>
</tr>
<tr>
<td>Unmodified asphalt binder</td>
</tr>
<tr>
<td>&lt; 0.15</td>
</tr>
<tr>
<td>≥ 0.15</td>
</tr>
</tbody>
</table>

For method compaction, the maximum compacted layer thickness must be 0.25 foot.

For Type A HMA placed under method compaction, if the asphalt binder is:

1. Unmodified, complete:
   1.1. 1st coverage of breakdown compaction before the surface temperature drops below 250 degrees F
   1.2. Breakdown and intermediate compaction before the surface temperature drops below 190...
1. Finish compaction before the surface temperature drops below 150 degrees F
2. Modified, complete:  
   2.1.1 1st coverage of breakdown compaction before the surface temperature drops below 240 degrees F  
   2.2. Breakdown and intermediate compaction before the surface temperature drops below 180 degrees F  
   2.3. Finish compaction before the surface temperature drops below 140 degrees F

If you request and the Engineer authorizes, you may cool Type A HMA with water when rolling activities are complete. Apply water under section 17.

39-2.04 PAYMENT  
Not Used

39-3 RUBBERIZED HOT MIX ASPHALT–GAP GRADED

39-3.01 GENERAL

39-3.01A Summary  
Section 39-3 includes specifications for producing and placing rubberized hot mix asphalt–gap graded.

You may produce RHMA-G using a warm mix asphalt technology.

39-3.01B Definitions  
Reserved

39-3.01C Submittals

39-3.01C(1) General

At least 5 business days before use, submit the permit issued by the local air district for asphalt rubber binder blending equipment. If an air quality permit is not required by the local air district for producing asphalt rubber binder, submit verification from the local air district that an air quality permit is not required.

At least 10 days before RHMA-G production, submit the name of an authorized laboratory to perform QC testing for asphalt rubber binder. The authorized laboratory must comply with the Caltrans Independent Assurance Program.

39-3.01C(2) Job Mix Formula

With your proposed JMF include MSDS for:

1. Base asphalt binder  
2. CRM and asphalt modifier  
3. Blended asphalt rubber binder components

The JMF must be based on an HMA mix design determined as described in the Superpave Mix Design SP-2 Manual by the Asphalt Institute.

39-3.01C(3) Asphalt Rubber Binder

Submit a proposal for asphalt rubber binder design and profile. In the design, include the asphalt binder, asphalt modifier, and CRM and their proportions.

If you change asphalt rubber binder supplier or any component material used in asphalt rubber binder or its percentage, submit a new JMF.

For the asphalt rubber binder used, submit:

1. Log of production daily.
2. Certificate of compliance with test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. The certificate of compliance for asphalt modifier must represent no more than 5,000 lb.

3. Submit certified weight slips for the CRM and asphalt modifier furnished.

4. QC test results on viscosity within 2 business days after sampling.

5. QC test results on cone penetration, resilience, and softening point within 3 business days after sampling.

Submit a certificate of compliance for the CRM and asphalt modifier. With the certificate of compliance, submit test results for CRM and asphalt modifier with each truckload delivered to the HMA plant.

Submit a certificate of compliance for the asphalt rubber binder. With the certificate of compliance, submit test results for CRM and asphalt modifier with each truckload delivered to the HMA plant. A certificate of compliance for asphalt modifier must not represent more than 5,000 lb.

39-3.01D Quality Control and Assurance
39-3.01D(1) General
Reserved

39-3.01D(2) Job Mix Formula Verification
If you request, the Engineer verifies RHMA-G quality requirements within 7 days of receiving all verification samples and after the JMF document submittal has been accepted.

39-3.01D(3) Quality Control
39-3.01D(3)(a) General
Reserved

39-3.01D(3)(b) Asphalt Rubber Binder
39-3.01D(3)(b)(i) General
The asphalt rubber binder blending plant must be authorized under the Department's Material Plant Quality Program.

Take asphalt rubber binder samples from the feed line connecting the asphalt rubber binder tank to the HMA plant.

39-3.01D(3)(b)(ii) Asphalt Modifier
Test asphalt modifier under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity</td>
<td>ASTM D445</td>
<td>1 per shipment</td>
</tr>
<tr>
<td>Flash point</td>
<td>ASTM D92</td>
<td></td>
</tr>
<tr>
<td>Molecular Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphaltenes</td>
<td>ASTM D2007</td>
<td>1 per shipment</td>
</tr>
<tr>
<td>Aromatics</td>
<td>ASTM D2007</td>
<td></td>
</tr>
</tbody>
</table>

39-3.01D(3)(b)(iii) Crumb Rubber Modifier
Sample and test scrap tire CRM and high natural CRM separately. Test CRM under the test methods and frequencies shown in the following table:
### Crumb Rubber Modifier for Asphalt Rubber Binder

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap tire CRM gradation</td>
<td>California Test 385</td>
<td>1 per 10,000 lb</td>
</tr>
<tr>
<td>High natural CRM gradation</td>
<td>California Test 385</td>
<td>1 per 3,400 lb</td>
</tr>
<tr>
<td>Wire in CRM</td>
<td>California Test 385</td>
<td></td>
</tr>
<tr>
<td>Fabric in CRM</td>
<td>California Test 385</td>
<td>1 per 10,000 lb</td>
</tr>
<tr>
<td>CRM particle length</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>CRM specific gravity</td>
<td>California Test 208</td>
<td></td>
</tr>
<tr>
<td>Natural rubber content in high natural CRM</td>
<td>ASTM D297</td>
<td>1 per 3,400 lb</td>
</tr>
</tbody>
</table>

Sample and test scrap tire CRM and high natural CRM separately.

#### 39-3.01D(3)(b)(iv) Asphalt Rubber Binder

Test asphalt rubber binder under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone penetration</td>
<td>ASTM D217</td>
<td>1 per lot</td>
</tr>
<tr>
<td>Resilience</td>
<td>ASTM D5329</td>
<td></td>
</tr>
<tr>
<td>Softening point</td>
<td>ASTM D36</td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>ASTM D7741</td>
<td>15 minutes before use per lot</td>
</tr>
</tbody>
</table>

Retain the sample from each lot. Test for cone penetration, resilience, and softening point for the first 3 lots and, if all 3 lots pass, the testing frequency may be reduced to once for every 3 lots.

If QC test results indicate that the asphalt rubber binder does not meet the specifications, take corrective action and notify the Engineer.

#### 39-3.01D(3)(c) Aggregate

Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradation</td>
<td>AASHTO T 27</td>
<td>1 per 750 tons and any remaining part</td>
</tr>
<tr>
<td>Sand equivalent</td>
<td>AASHTO T 176</td>
<td></td>
</tr>
<tr>
<td>Moisture content</td>
<td>AASHTO T 329</td>
<td></td>
</tr>
<tr>
<td>Crushed particles</td>
<td>AASHTO T 335</td>
<td></td>
</tr>
<tr>
<td>Los Angeles rattler</td>
<td>AASHTO T 96</td>
<td></td>
</tr>
<tr>
<td>Flat and elongated particles</td>
<td>ASTM D4791</td>
<td>1 per 10,000 tons or 2 per project, whichever is greater</td>
</tr>
<tr>
<td>Fine aggregate angularity</td>
<td>AASHTO T 304, Method A</td>
<td></td>
</tr>
</tbody>
</table>

*Reported value must be the average of 3 tests from a single sample.

bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1.

Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

cTest at continuous mixing plants only

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during RHMA-G production.
39-3.01D(3)(d) Hot Mix Asphalt Production
Test the quality characteristics of RHMA-G under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt binder content</td>
<td>AASHTO T 308 Method A</td>
<td>1 per 750 tons and any remaining part</td>
</tr>
<tr>
<td>HMA moisture content</td>
<td>AASHTO T 329</td>
<td>1 per 2,500 tons but not less than 1 per paving day</td>
</tr>
<tr>
<td>Air voids content</td>
<td>AASHTO T 269</td>
<td>1 per 4,000 tons or 2 every 5 paving days, whichever is greater</td>
</tr>
<tr>
<td>Voids in mineral aggregate</td>
<td>SP-2 Asphalt Mixture Volumetrics</td>
<td>1 per 10,000 tons or 2 per project whichever is greater</td>
</tr>
<tr>
<td>Dust proportion</td>
<td>SP-2 Asphalt Mixture Volumetrics</td>
<td></td>
</tr>
<tr>
<td>Density of core</td>
<td>California Test 375</td>
<td>2 per paving day</td>
</tr>
<tr>
<td>Nuclear gauge density</td>
<td>California Test 375</td>
<td>3 per 250 tons or 3 per paving day, whichever is greater</td>
</tr>
<tr>
<td>Hamburg wheel track</td>
<td>AASHTO T 324 (Modified)</td>
<td>1 per 10,000 tons or 1 per project, whichever is greater</td>
</tr>
<tr>
<td>Moisture susceptibility</td>
<td>AASHTO T 283</td>
<td></td>
</tr>
</tbody>
</table>

39-3.01D(4) Reserved
39-3.01D(5) Department Acceptance
39-3.01D(5)(a) General
The Department accepts RHMA-G based on compliance with:

1. Aggregate quality requirements shown in the following table:
<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate gradation</td>
<td>AASHTO T 27</td>
<td>JMF ± Tolerance</td>
</tr>
<tr>
<td>Percent of crushed particles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-fractured face</td>
<td>AASHTO T 335</td>
<td>--</td>
</tr>
<tr>
<td>Two-fractured faces</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
<td>AASHTO T 335</td>
<td></td>
</tr>
<tr>
<td>One fractured face</td>
<td></td>
<td>70</td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
<td>AASHTO T 96</td>
<td>12</td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Sand equivalent (min)

aReported value must be the average of 3 tests from a single sample.

bUse of a sand reading Indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

cThe Engineer waives this specification if RHMA-G contains 10 percent or less of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

2. In-place RHMA-G quality requirements shown in the following table:
## RHMA In-Place Acceptance

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt binder content (%)</td>
<td>AASHTO T 308 Method A</td>
<td>JMF -0.4, +0.5</td>
</tr>
<tr>
<td>HMA moisture content (max, %)</td>
<td>AASHTO T 329</td>
<td>1</td>
</tr>
<tr>
<td>Air voids content @ ( N_{\text{design}} ) (%)</td>
<td>AASHTO T 269</td>
<td>4.0 ± 1.5</td>
</tr>
<tr>
<td>Voids in mineral aggregate on laboratory-produced HMA (min, %)</td>
<td>SP-2 Asphalt Mixture Volumetrics&lt;sup&gt;c&lt;/sup&gt;</td>
<td>18.0–23.0</td>
</tr>
<tr>
<td>Gradation: 1/2-inch and 3/4-inch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voids in mineral aggregate on plant-produced HMA (min, %)&lt;sup&gt;a&lt;/sup&gt;</td>
<td>SP-2 Asphalt Mixture Volumetrics&lt;sup&gt;c&lt;/sup&gt;</td>
<td>18.0–23.0</td>
</tr>
<tr>
<td>Gradation: 1/2-inch and 3/4-inch</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dust proportion&lt;sup&gt;b&lt;/sup&gt;</td>
<td>SP-2 Asphalt Mixture Volumetrics</td>
<td>Report only</td>
</tr>
<tr>
<td>Density of core (% of max theoretical density)</td>
<td>California Test 375</td>
<td>91–97</td>
</tr>
<tr>
<td>Hamburg wheel track (min number of passes at 0.5-inch rut depth)</td>
<td>AASHTO T 324 (Modified)</td>
<td></td>
</tr>
<tr>
<td>Binder grade: PG 58</td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>PG 64</td>
<td></td>
<td>20,000</td>
</tr>
<tr>
<td>PG 70</td>
<td></td>
<td>25,000</td>
</tr>
<tr>
<td>Hamburg wheel track (min number of passes at inflection point)</td>
<td>AASHTO T 324 (Modified)</td>
<td></td>
</tr>
<tr>
<td>Binder grade: PG 58</td>
<td></td>
<td>10,000</td>
</tr>
<tr>
<td>PG 64</td>
<td></td>
<td>12,500</td>
</tr>
<tr>
<td>PG 70</td>
<td></td>
<td>15,000</td>
</tr>
<tr>
<td>Moisture susceptibility (min, psi, dry strength)</td>
<td>AASHTO T 283</td>
<td>100</td>
</tr>
<tr>
<td>Moisture susceptibility (min, psi, wet strength)</td>
<td>AASHTO T 283</td>
<td>70</td>
</tr>
</tbody>
</table>

<sup>a</sup>Prepare 3 briquettes. Report the average of 3 tests.
<sup>b</sup>The Engineer determines the bulk specific gravity of each lab-compacted briquette under AASHTO T 275, Method A, and theoretical maximum specific gravity under AASHTO T 209, Method A.
<sup>c</sup>Determine bulk specific gravity under AASHTO T 275, Method A.
<sup>d</sup>The Engineer determines the laboratory-prepared RHMA-G value for mix design verification only.
<sup>e</sup>The Engineer determines percent of theoretical maximum density under California Test 375 except the Engineer uses:
  1. AASHTO T 275, Method A, to determine in-place density of each density core instead of using the nuclear gauge
  2. AASHTO T 209, Method A to determine theoretical maximum density instead of calculating test maximum density.
<sup>f</sup>The Engineer determines theoretical maximum density under AASHTO T 209, Method A, at the frequency specified in California Test 375, Part 5. D.

### 39-3.01D(5)(b) Asphalt Rubber Binder

### 39-3.01D(5)(b)(l) General

The Department does not use asphalt rubber binder design profile for production acceptance.
39-3.01D(5)(b)(ii) Asphalt Modifier
The Department accepts asphalt modifier based on compliance with the requirements shown in the following table:

### Asphalt Modifier for Asphalt Rubber Binder

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity at 100 °C (m²/s x 10⁻⁶)</td>
<td>ASTM D445</td>
<td>X ± 3³</td>
</tr>
<tr>
<td>Flash point (min, °C)</td>
<td>ASTM D92</td>
<td>207</td>
</tr>
<tr>
<td>Molecular Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphaltene (max, % by mass (max))</td>
<td>ASTM D2007</td>
<td>0.1</td>
</tr>
<tr>
<td>Aromatics (min % by mass)</td>
<td>ASTM D2007</td>
<td>55</td>
</tr>
</tbody>
</table>

³The symbol "X" is the asphalt modifier viscosity.

39-3.01D(5)(b)(iii) Crumb Rubber Modifier
The Department accepts scrap tire CRM and high natural CRM based on compliance with the requirements shown in the following table:

### Crumb Rubber Modifier for Asphalt Rubber Binder

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap tire CRM gradation (% passing No. 8 sieve)</td>
<td>California Test 385</td>
<td>100</td>
</tr>
<tr>
<td>High natural CRM gradation (% passing No. 10 sieve)</td>
<td>California Test 385</td>
<td>100</td>
</tr>
<tr>
<td>Wire in CRM (max, %)</td>
<td>California Test 385</td>
<td>0.01</td>
</tr>
<tr>
<td>Fabric in CRM (max, %)</td>
<td>California Test 385</td>
<td>0.05</td>
</tr>
<tr>
<td>CRM particle length (max, in)</td>
<td>--</td>
<td>3/16</td>
</tr>
<tr>
<td>CRM specific gravity</td>
<td>California Test 208</td>
<td>1.1–1.2</td>
</tr>
</tbody>
</table>

Scrap tire CRM and high natural CRM are sampled and tested separately.

39-3.01D(5)(b)(iv) Asphalt Rubber Binder
For Department acceptance testing, take samples in the Engineer's presence of asphalt rubber binder in 6 qt cans with open tops and friction lids. Take samples once per day or every 5 lots, whichever is greater.

The Department accepts asphalt rubber binder based on compliance with the requirements shown in the following table:

### Quality characteristic

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone penetration at 25 °C (0.10 mm)</td>
<td>ASTM D217</td>
<td>25–70</td>
</tr>
<tr>
<td>Resilience at 25 °C (min, % rebound)</td>
<td>ASTM D5329</td>
<td>18</td>
</tr>
<tr>
<td>Softening point (°C)</td>
<td>ASTM D36</td>
<td>52–74</td>
</tr>
<tr>
<td>Viscosity at 190 °C (centipoises)³</td>
<td>ASTM D7741</td>
<td>1,500–4,000</td>
</tr>
</tbody>
</table>

³Prepare sample for viscosity test under California Test 388.
39-3.02B Mix Design

For RHMA-G, the mix design must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air voids content (%)</td>
<td>AASHTO T 269&lt;sup&gt;a&lt;/sup&gt;</td>
<td>( N_{\text{design}} = 4.0 )</td>
</tr>
<tr>
<td>Gyration compaction (no. of gyrations)</td>
<td>AASHTO T 312</td>
<td>( N_{\text{design}} = 50–150^o )</td>
</tr>
<tr>
<td>Voids in mineral aggregate (min, %)</td>
<td>SP-2</td>
<td>18.0–23.0</td>
</tr>
<tr>
<td>Dust proportion</td>
<td>SP-2</td>
<td>Report only</td>
</tr>
<tr>
<td>Hamburg wheel track (min number of passes at 0.5-inch rut depth)</td>
<td>AASHTO T 324 (Modified)&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Binder grade:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PG 58</td>
<td>15,000</td>
<td></td>
</tr>
<tr>
<td>PG 64</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td>PG 70</td>
<td>25,000</td>
<td></td>
</tr>
<tr>
<td>Hamburg wheel track (min number of passes at the inflection point)</td>
<td>AASHTO T 324 (Modified)&lt;sup&gt;d&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Binder grade:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PG 58</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>PG 64</td>
<td>10,000</td>
<td></td>
</tr>
<tr>
<td>PG 70</td>
<td>12,500</td>
<td></td>
</tr>
<tr>
<td>Moisture susceptibility, dry strength (min, psi)</td>
<td>AASHTO T 283&lt;sup&gt;f&lt;/sup&gt;</td>
<td>100</td>
</tr>
<tr>
<td>Moisture susceptibility, wet strength (min, psi)</td>
<td>AASHTO T 283&lt;sup&gt;d, e&lt;/sup&gt;</td>
<td>70</td>
</tr>
</tbody>
</table>

<sup>a</sup>Calculate the air voids content of each specimen using AASHTO T 275, Method A, to determine bulk specific gravity and AASHTO T 209, Method A, to determine theoretical maximum specific gravity. Under AASHTO T 209 use a digital manometer and pycnometer when performing AASHTO T 209.

<sup>b</sup>Superpave gyratory compactor ram pressure may be increased to a maximum of 825kPa, and specimens may be held at a constant height for a maximum of 90 minutes.

<sup>c</sup>Measure bulk specific gravity using AASHTO T 275, Method A.

<sup>d</sup>Test plant produced HMA.

<sup>e</sup>Freeze thaw required.

Determine the amount of asphalt rubber binder to be mixed with the aggregate for RHMA-G as follows:

1. Base the calculations on the average of 3 briquettes produced at each asphalt rubber binder content.
2. Plot asphalt rubber binder content versus average air voids content for each set of 3 specimens and connect adjacent points with a best-fit curve.
3. Calculate voids in mineral aggregate for each specimen, average each set, and plot the average versus asphalt rubber binder content.
4. Calculate the dust proportion and plot versus asphalt rubber binder content.
5. From the curve plotted, select the theoretical asphalt rubber binder content at 4 percent air voids.
6. At the selected asphalt rubber binder content, calculate dust proportion.
7. Record the asphalt rubber binder content in the Contractor Hot Mix Asphalt Design Data Form as the OBC.

The OBC must not fall below 7.5 percent by total weight of the mix.
Laboratory mixing and compaction must comply with AASHTO R 35, except the mixing temperature of the aggregate must be between 300 and 325 degrees F. The mixing temperature of the asphalt rubber binder must be between 375 and 425 degrees F. The compaction temperature of the combined mixture must be between 290 and 320 degrees F.

39-3.02C Asphalt Rubber Binder

39-3.02C(1) General

Asphalt rubber binder must be a combination of:

1. Asphalt binder
2. Asphalt modifier
3. CRM

The combined asphalt binder and asphalt modifier must be 80.0 ± 2.0 percent by weight of the asphalt rubber binder.

39-3.02C(2) Asphalt Modifier

Asphalt modifier must be a resinous, high flash point, and aromatic hydrocarbon, and must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity at 100 °C (m²/s x 10⁻⁶)</td>
<td>ASTM D445</td>
<td>X ± 3ᵃ</td>
</tr>
<tr>
<td>Flash point (min, °C)</td>
<td>ASTM D92</td>
<td>207</td>
</tr>
<tr>
<td>Molecular Analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asphaltenes (max, % by mass)</td>
<td>ASTM D2007</td>
<td>0.1</td>
</tr>
<tr>
<td>Aromatics (min, % by mass)</td>
<td>ASTM D2007</td>
<td>55</td>
</tr>
</tbody>
</table>

ᵃThe symbol “X” is the proposed asphalt modifier viscosity. “X” must be between 19 and 36. A change in “X” requires a new asphalt rubber binder design.

Asphalt modifier must be from 2.0 to 6.0 percent by weight of the asphalt binder in the asphalt rubber binder.

39-3.02C(3) Crumb Rubber Modifier

CRM must be a ground or granulated combination of scrap tire CRM and high natural CRM. CRM must be 75.0 ± 2.0 percent scrap tire CRM and 25.0 ± 2.0 percent high natural CRM by total weight of CRM. Scrap tire CRM must be from any combination of automobile tires, truck tires, or tire buffings.

The CRM must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scrap tire CRM gradation (% passing No. 8 sieve)</td>
<td>California Test 385</td>
<td>100</td>
</tr>
<tr>
<td>High natural CRM gradation (% passing No. 10 sieve)</td>
<td>California Test 385</td>
<td>100</td>
</tr>
<tr>
<td>Wire in CRM (max, %)</td>
<td>California Test 385</td>
<td>0.01</td>
</tr>
<tr>
<td>Fabric in CRM (max, %)</td>
<td>California Test 385</td>
<td>0.05</td>
</tr>
<tr>
<td>CRM particle length (max, in)ᵃ</td>
<td>--</td>
<td>3/16</td>
</tr>
<tr>
<td>CRM specific gravity</td>
<td>California Test 208</td>
<td>1.1–1.2</td>
</tr>
<tr>
<td>Natural rubber content in high natural CRM (%)</td>
<td>ASTM D297</td>
<td>40.0–48.0</td>
</tr>
</tbody>
</table>

ᵃTest at mix design and for certificate of compliance.
CRM must be ground or granulated at ambient temperature. If steel and fiber are cryogenically separated, separation must occur before grinding or granulating. Cryogenically produced CRM particles must be ground or granulated and not pass through the grinder or granulator.

CRM must be dry, free-flowing particles that do not stick together. CRM must not cause foaming when combined with the asphalt binder and asphalt modifier. You may add calcium carbonate or talc up to 3 percent by weight of CRM.

39.3.02C(4) Design and Profile

Design the asphalt rubber binder from testing you perform for each quality characteristic and for the reaction temperatures expected during production. The profile must include the same component sources for the asphalt rubber binder used. The 24-hour (1,440-minute) interaction period determines the design profile. At a minimum, mix asphalt rubber binder components, take samples, and perform and record the tests shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test Method</th>
<th>Minutes of reaction</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone penetration at 25 °C (0.10 mm)</td>
<td>ASTM D217</td>
<td>45  60  90  120  240 360 1440</td>
<td>25–70</td>
</tr>
<tr>
<td>Resilience at 25 °C (min, % rebound)</td>
<td>ASTM D5329</td>
<td>X X X X</td>
<td>18</td>
</tr>
<tr>
<td>Field softening point (°C)</td>
<td>ASTM D36</td>
<td>X X X X</td>
<td>52–74</td>
</tr>
<tr>
<td>Viscosity (centipoises)</td>
<td>ASTM D7741</td>
<td>X X X X X X X X</td>
<td>1,500–4,000</td>
</tr>
</tbody>
</table>

*Six hours (360 minutes) after CRM addition, reduce the oven temperature to 275 °F for 16 hours. After the 16-hour (960 minutes) cool down after CRM addition, reheat the binder to the reaction temperature expected during production for sampling and testing at 24 hours (1,440 minutes).

**"X" denotes required testing**

39.3.02C(5) Asphalt Rubber Binder Production

39.3.02C(5)(a) General

Deliver scrap tire CRM and high natural CRM in separate bags.

39.3.02C(5)(b) Mixing

Proportion and mix asphalt binder, asphalt modifier, and CRM simultaneously or premix the asphalt binder and asphalt modifier before adding CRM. If you premix asphalt binder and asphalt modifier, mix them for at least 20 minutes. When you add CRM, the asphalt binder and asphalt modifier must be from 375 to 440 degrees F.

After interacting for at least 45 minutes, the quality characteristics of asphalt rubber binder must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cone penetration at 25 °C (0.10 mm)</td>
<td>ASTM D217</td>
<td>25–70</td>
</tr>
<tr>
<td>Resilience at 25 °C (min, % rebound)</td>
<td>ASTM D5329</td>
<td>18</td>
</tr>
<tr>
<td>Softening point (°C)</td>
<td>ASTM D36</td>
<td>52–74</td>
</tr>
<tr>
<td>Viscosity at 190 °C (centipoises)*</td>
<td>ASTM D7741</td>
<td>1,500–4,000</td>
</tr>
</tbody>
</table>

*Prepare sample for viscosity test under California Test 388.

04-18-14

Do not use asphalt rubber binder during the first 45 minutes of the reaction period. During this period, the asphalt rubber binder mixture must be between 375 degrees F and the lower of 425 or 25 degrees F below the asphalt binder’s flash point indicated in the MSDS.
If any asphalt rubber binder is not used within 4 hours after the reaction period, discontinue heating. If the asphalt rubber binder drops below 375 degrees F, reheat before use. If you add more scrap tire CRM to the reheated asphalt rubber binder, the binder must undergo a 45-minute reaction period. The added scrap tire CRM must not exceed 10 percent of the total asphalt rubber binder weight. Reheated and reacted asphalt rubber binder must comply with the viscosity specifications. Do not reheat asphalt rubber binder more than twice.

39-3.02D Aggregates

39-3.02D(1) General

For RHMA-G, before the addition of asphalt binder and lime treatment, the aggregate must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality characteristic</td>
</tr>
<tr>
<td>Percent of crushed particles</td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
</tr>
<tr>
<td>One-fractured face</td>
</tr>
<tr>
<td>Two-fractured faces</td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
</tr>
<tr>
<td>One fractured face</td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
</tr>
<tr>
<td>Sand equivalent (min)</td>
</tr>
<tr>
<td>a, b</td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight at 5:1)</td>
</tr>
<tr>
<td>ASTM D4791</td>
</tr>
<tr>
<td>Fine aggregate angularity (min, %)</td>
</tr>
<tr>
<td>c</td>
</tr>
</tbody>
</table>

*aReported value must be the average of 3 tests from a single sample.

*bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

*cThe Engineer waives this specification if HMA contains 10 percent or less of nonmanufactured sand by weight of total aggregate, except if your JMF fails verification. Manufactured sand is fine aggregate produced by crushing rock or gravel.

39-3.02D(2) Aggregate Gradations

The aggregate gradations for RHMA-G must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Gradation Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A HMA pavement thickness shown</td>
</tr>
<tr>
<td>0.10 to less than 0.20 foot</td>
</tr>
<tr>
<td>0.20 foot or greater</td>
</tr>
</tbody>
</table>

For RHMA-G, the aggregate gradations must be within the target value limits for the specified sieve size shown in the following tables:
### Aggregate Gradation (Percentage Passing)

**Rubberized Hot Mix Asphalt - Gap Graded (RHMA-G)**

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>Target Value Limits</th>
<th>Allowable Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>95–98</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>83–87</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>65–70</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 4</td>
<td>28–42</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 8</td>
<td>14–22</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–6</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sieve Sizes</th>
<th>Target Value Limits</th>
<th>Allowable Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>90–98</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>83–87</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 4</td>
<td>28–42</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 8</td>
<td>14–22</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–6</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

#### 39-3.02E Rubberized Hot Mix Asphalt Production

Asphalt rubber binder must be from 375 to 425 degrees F when mixed with aggregate.

If the dry and wet moisture susceptibility test result for treated plant-produced RHMA-G is less than the RHMA-G mix design requirement for dry and wet moisture susceptibility strength, the minimum dry and wet strength requirement is waived, but you must use one of the following treatments:

1. Aggregate lime treatment using the slurry method
2. Aggregate lime treatment using the dry lime method
3. Liquid antistrip treatment of HMA

#### 39-3.03 CONSTRUCTION

Use a material transfer vehicle when placing RHMA-G.

Do not use a pneumatic tired roller to compact RHMA-G.

Spread and compact RHMA-G at an atmospheric temperature of at least 55 degrees F and a surface temperature of at least 60 degrees F.

If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver's hopper or to the pavement surface. Tarps are not required if the time from discharge to truck until transfer to the paver's hopper or the pavement surface is less than 30 minutes.

For RHMA-G placed under method compaction:

1. Complete the 1st coverage of breakdown compaction before the surface temperature drops below 285 degrees F.
2. Complete breakdown and intermediate compaction before the surface temperature drops below 250 degrees F. Use a static steel-tired roller instead of the pneumatic-tired roller for intermediate compaction.
3. Complete finish compaction before the surface temperature drops below 200 degrees F.
Spread sand at a rate between 1 and 2 lb/sq yd on new RHMA-G pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3). Keep traffic off the pavement until spreading sand is complete.

39-3.04 PAYMENT
Not Used

39-4 OPEN GRADED FRICTION COURSES

39-4.01 GENERAL

39-4.01A Summary
Section 39-4 includes specifications for producing and placing open graded friction courses. Open graded friction courses include HMA-O, RHMA-O, and RHMA-O-HB.

You may produce OGFC using a warm mix asphalt technology.

39-4.01B Definitions
Reserved

39-4.01C Submittals
Submit a complete JMF, except do not specify an asphalt binder content.

39-4.01D Quality Control and Assurance

39-4.01D(1) General
Reserved

39-4.01D(2) Quality Control

39-4.01D(2)(a) General
Reserved

39-4.01D(2)(b) Asphalt Rubber Binder
For RHMA-O and RHMA-O-HB, the asphalt rubber binder must comply with the specifications in 39-3.01D(2)(b).

39-4.01D(2)(c) Aggregate
Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Testing Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality characteristic</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>Gradation</td>
</tr>
<tr>
<td>Moisture content*</td>
</tr>
<tr>
<td>Crushed particles</td>
</tr>
<tr>
<td>Los Angeles rattler</td>
</tr>
<tr>
<td>Flat and elongated particles</td>
</tr>
</tbody>
</table>

*Test at continuous mixing plants only

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during OGFC production.

39-4.01D(2)(d) Hot Mix Asphalt Production
Test the quality characteristics of OGFC under the test methods and frequencies shown in the following table:
OGFC Testing Frequencies

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt binder content</td>
<td>AASHTO T 308 Method A</td>
<td>1 per 750 tons and any remaining part</td>
</tr>
<tr>
<td>HMA moisture content</td>
<td>AASHTO T 329</td>
<td>1 per 2,500 tons but not less than 1 per paving day</td>
</tr>
</tbody>
</table>

39-4.01D(3) Department Acceptance

39-4.01D(3)(a) General

The Department accepts OGFC based on compliance with:

1. Aggregate quality requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality characteristic</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Aggregate gradation</td>
</tr>
<tr>
<td>Percent of crushed particles</td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
</tr>
<tr>
<td>One-fractured face</td>
</tr>
<tr>
<td>Two-fractured faces</td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
</tr>
<tr>
<td>One fractured face</td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight @ 5:1)</td>
</tr>
</tbody>
</table>

2. In-place OGFC quality requirements shown in the following table:

<table>
<thead>
<tr>
<th>OGFC Acceptance In Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality characteristic</td>
</tr>
<tr>
<td>--------------------------</td>
</tr>
<tr>
<td>Asphalt binder content (%)</td>
</tr>
<tr>
<td>HMA moisture content (max, %)</td>
</tr>
</tbody>
</table>

39-4.01D(3)(b) Asphalt Rubber Binder

The Department accepts asphalt rubber binder in RHMA-O and RHMA-O-HB under 39-3.01D(5)(b).

39-4.01D(3)(c) Pavement Smoothness

Pavement smoothness of OGFC must comply with the Mean Roughness Index requirements shown in the following table for a 0.1 mile section:
OGFC Pavement Smoothness Acceptance Criteria

<table>
<thead>
<tr>
<th>OGFC placement on</th>
<th>Mean Roughness Index requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>New construction or HMA overlay</td>
<td>60 in/mi or less</td>
</tr>
<tr>
<td>Existing pavement</td>
<td>75 in/mi or less</td>
</tr>
<tr>
<td>Milled surface</td>
<td>75 in/mi or less</td>
</tr>
</tbody>
</table>

39-4.01D(3)(d)–39-4.01D(3)(f) Reserved

39-4.02 MATERIALS

39-4.02A General
When mixed with asphalt binder, aggregate must not be more than 325 degrees F except aggregate for OGFC with unmodified asphalt binder must be not more than 275 degrees F.

39-4.02B Mix Design
The Department determines the asphalt binder content under California Test 368 within 20 days of your complete JMF submittal and provides you a Caltrans Hot Mix Asphalt Verification form.

For OGFC, the 1st paragraph of section 39-1.02B(1) does not apply.

39-4.02C Asphalt Binder
Asphalt rubber binder in RHMA-O and RHMA-O-HB must comply with section 39-3.02B.

39-4.02D Aggregate

39-4.02D(1) General
Aggregate must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Quality</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of crushed particles</td>
<td>Test method</td>
<td>Requirement</td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
<td>Test method</td>
<td>Requirement</td>
</tr>
<tr>
<td>One-fractured face</td>
<td>AASHTO T 335</td>
<td>90</td>
</tr>
<tr>
<td>Two-fractured faces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
<td>Test method</td>
<td>Requirement</td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
<td>AASHTO T 96</td>
<td>12</td>
</tr>
<tr>
<td>One fractured face</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
<td>Test method</td>
<td>Requirement</td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
<td>AASHTO T 96</td>
<td>12</td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight at 5:1)</td>
<td>Test method</td>
<td>Requirement</td>
</tr>
<tr>
<td>ASTM D4791</td>
<td>Report only</td>
<td></td>
</tr>
</tbody>
</table>

39-4.02D(2) Aggregate Gradations

The aggregate gradations for HMA-O must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Gradation Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>HMA-O pavement thickness shown</td>
</tr>
<tr>
<td>0.10 foot or greater to less than 0.15 foot</td>
</tr>
<tr>
<td>0.15 foot or greater</td>
</tr>
</tbody>
</table>
The aggregate gradations for RHMA-O and RHMA-O-HB must comply with the requirements shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Gradation Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHMA-O and RHMA-O-HB pavement thickness shown</td>
</tr>
<tr>
<td>0.10 foot or greater</td>
</tr>
</tbody>
</table>

For RHMA-O and RHMA-O-HB, the 1-inch aggregate gradation is not allowed.

For OGFC, the aggregate gradations must be within the target value limits for the specified sieve size shown in the following tables:

<table>
<thead>
<tr>
<th>Aggregate Gradations</th>
<th>Open Graded Friction Course (OGFC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve size</td>
<td>Target value limit</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>1&quot;</td>
<td>99–100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>85–96</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>55–71</td>
</tr>
<tr>
<td>No. 4</td>
<td>10–25</td>
</tr>
<tr>
<td>No. 8</td>
<td>6–16</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–6</td>
</tr>
</tbody>
</table>

If lime treatment is required, you may reduce the lime ratio for the combined aggregate from 1.0 to 0.5 percent for OGFC.

**39-4.03 CONSTRUCTION**

Use a material transfer vehicle when placing OGFC.

If the atmospheric temperature is below 70 degrees F, cover loads in trucks with tarps. The tarps must completely cover the exposed load until you transfer the mixture to the paver’s hopper or to the pavement surface. Tarps are not required if the time from discharge to truck until transfer to the paver’s hopper or the pavement surface is less than 30 minutes.

Apply a tack coat before placing OGFC. The tack coat application rate must comply with the requirements of the following table:

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Target value limit</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>95–100</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>78–89</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 4</td>
<td>28–37</td>
<td>TV ± 7</td>
</tr>
<tr>
<td>No. 8</td>
<td>7–18</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>0–10</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–3</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>
Compact OGFC with steel-tired, 2-axle tandem rollers. If placing over 300 tons of OGFC per hour, use at least 3 rollers for each paver. If placing less than 300 tons of OGFC per hour, use at least 2 rollers for each paver. Each roller must weigh between 126 to 172 lb per linear inch of drum width. Turn the vibrator off.

Compact OGFC with 2 coverages. The Engineer may order fewer coverages if the layer thickness of OGFC is less than 0.20 foot.

For HMA-O with unmodified asphalt binder:
1. Spread and compact only if the atmospheric temperature is at least 55 degrees F and the surface temperature is at least 60 degrees F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 240 degrees F.
3. Complete all compaction before the surface temperature drops below 200 degrees F.

For HMA-O with modified asphalt binder except asphalt rubber binder:
1. Spread and compact only if the atmospheric temperature is at least 50 degrees F and the surface temperature is at least 50 degrees F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 240 degrees F.
3. Complete all compaction before the surface temperature drops below 180 degrees F.

For RHMA-O and RHMA-O-HB:
1. Spread and compact only if the atmospheric temperature is at least 55 degrees F and surface temperature is at least 60 degrees F.
2. Complete the 1st coverage using 2 rollers before the surface temperature drops below 280 degrees F.
3. Complete compaction before the surface temperature drops below 250 degrees F.

Spread sand at a rate between 1 and 2 lb/sq yd on new RHMA-O and RHMA-O-HB pavement when finish rolling is complete. Sand must be free of clay or organic matter. Sand must comply with section 90-1.02C(3). Keep traffic off the pavement until spreading sand is complete.

If you choose to correct OGFC for smoothness, the Engineer determines if the corrective method causes raveling. OGFC that is raveling must be removed and replaced.

**39-4.04 PAYMENT**
Not Used

<table>
<thead>
<tr>
<th>OGFC over:</th>
<th>Minimum Residual Rates (gal/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CSS1/CSS1h,</td>
</tr>
<tr>
<td></td>
<td>SS1/SS1h and</td>
</tr>
<tr>
<td></td>
<td>QS1h/QS1h and</td>
</tr>
<tr>
<td></td>
<td>Asphaltic Emulsion</td>
</tr>
<tr>
<td>New HMA</td>
<td>0.03</td>
</tr>
<tr>
<td>PCC and existing AC surfacing</td>
<td>0.05</td>
</tr>
<tr>
<td>Planed pavement</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>CRS1/CRS2,</td>
</tr>
<tr>
<td></td>
<td>RS1/RS2 and</td>
</tr>
<tr>
<td></td>
<td>QS1/QS1 and</td>
</tr>
<tr>
<td></td>
<td>Asphaltic Emulsion</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>Asphalt Binder and</td>
</tr>
<tr>
<td></td>
<td>PMRS2/PMCRS2 and</td>
</tr>
<tr>
<td></td>
<td>PMRS2h/PMCRS2h Asphaltic Emulsion</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>0.05</td>
</tr>
</tbody>
</table>
39-5 BONDED WEARING COURSES

39-5.01 GENERAL
39-5.01A General

39-5.01A(1) Summary
Section 39-5 includes specifications for producing and placing bonded wearing courses.

BWC includes placing a polymer modified asphaltic emulsion and the specified HMA in a single pass with an integrated paving machine.

BWC using RHMA-G, RHMA-O, or HMA-O must comply with the specifications for RHMA-G, RHMA-O, or HMA-O.

39-5.01A(2) Definitions
Reserved

39-5.01A(3) Submittals
With your JMF submittal, include:

1. Asphaltic emulsion membrane target residual rate
2. Weight ratio of water to bituminous material in the original asphaltic emulsion

Within 3 business days following the 1st job site delivery, submit test results for asphaltic emulsion properties performed on a sample taken from the asphaltic emulsion delivered.

Within 1 business day of each job site delivery of asphaltic emulsion, submit to METS a 2-quart sample and a certificate of compliance. Ship each sample so that it is received at METS within 48 hours of sampling.

Each day BWC is placed, submit the residual and application rate for the asphaltic emulsion membrane.

During production, submit certified volume or weight slips for the materials supplied.

39-5.01A(4) Quality Control and Assurance
39-5.01A(4)(a) General
For each job site delivery of asphaltic emulsion, take a 2-quart sample in the presence of the Engineer. Take samples from the delivery truck at mid-load from a sampling tap or thief. If the sample is taken from the tap, draw and discard 4 quarts before sampling.

If you unload asphalt binder or asphaltic emulsion into a bulk storage tank, do not use material from the tank until you submit test results for a sample taken from the bulk storage tank. Testing must be performed by an AASHTO-accredited laboratory.

39-5.01A(4)(b) Quality Control
Sample BWC in two 1-gallon metal containers.

The asphaltic emulsion membrane must be tested under ASTM D2995 at least once per paving day at the job site.
The Department accepts asphaltic emulsion membrane based on compliance with the requirements shown in the following tables:

### Asphaltic Emulsion Membrane

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saybolt Furol Viscosity at 25 °C (SFS)</td>
<td>AASHTO T 59</td>
<td>20–100</td>
</tr>
<tr>
<td>Sieve test on original emulsion at time of delivery (max, %)</td>
<td>AASHTO T 59</td>
<td>0.05</td>
</tr>
<tr>
<td>24-hour storage stability (max, %)</td>
<td>AASHTO T 59</td>
<td>1</td>
</tr>
<tr>
<td>Residue by evaporation (min, %)</td>
<td>California Test 331</td>
<td>63</td>
</tr>
<tr>
<td>Tests on residue from evaporation test:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsional recovery, measure entire arc of recovery at 25 °C (min, %)</td>
<td>California Test 332</td>
<td>40</td>
</tr>
<tr>
<td>Penetration at 25 °C (0.01 mm)</td>
<td>AASHTO T 49</td>
<td>70–150</td>
</tr>
</tbody>
</table>

*SFS means Saybolt Furol seconds*

The Department accepts the BWC based on the submitted asphaltic emulsion membrane target residual rate ±0.02 gal/sq yd when tested under ASTM D2995.

### 39-5.01B Materials

#### 39-5.01B(1) General

Reserved

#### 39-5.01B(2) Asphaltic Emulsion Membrane

The asphaltic emulsion membrane must comply with the requirements shown in the following table:

### Asphaltic Emulsion Membrane

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saybolt Furol Viscosity at 25 °C (SFS)</td>
<td>AASHTO T 59</td>
<td>20–100</td>
</tr>
<tr>
<td>Sieve test on original emulsion at time of delivery (max, %)</td>
<td>AASHTO T 59</td>
<td>0.05</td>
</tr>
<tr>
<td>24-hour storage stability (max, %)</td>
<td>AASHTO T 59</td>
<td>1</td>
</tr>
<tr>
<td>Residue by evaporation (min, %)</td>
<td>California Test 331</td>
<td>63</td>
</tr>
<tr>
<td>Tests on residue from evaporation test:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsional recovery, measure entire arc of recovery at 25 °C (min, %)</td>
<td>California Test 332</td>
<td>40</td>
</tr>
<tr>
<td>Penetration at 25 °C (0.01 mm)</td>
<td>AASHTO T 49</td>
<td>70–150</td>
</tr>
</tbody>
</table>

*a SFS means Saybolt Furol seconds*

#### 39-5.01B(3) Reserved

#### 39-5.01C Construction

#### 39-5.01C(1) General

Use method compaction for BWC.

Do not dilute the asphaltic emulsion.

Do not place BWC if rain is forecast for the project area within 24 hours by the National Weather Service.
39-5.01C(2) Spreading and Compacting Equipment

Use a material transfer vehicle when placing BWC.

Use an integrated distributor paver capable of spraying the asphaltic emulsion membrane, spreading the HMA, and leveling the mat surface in 1 pass.

Apply asphaltic emulsion membrane at a uniform rate for the full paving width. The asphaltic emulsion membrane must not be touched by any part of the paver including wheels or tracks.

If the spray bar is adjusted for changing pavement widths, the paver must prevent excess spraying of asphaltic emulsion beyond 2 inches of the HMA edge.

39-5.01C(3) Applying Asphaltic Emulsion

Before spreading HMA, apply asphaltic emulsion membrane on dry or damp pavement with no free water.

Apply emulsion at a temperature from 120 to 180 degrees F and in a single application at the residual rate specified for the condition of the underlying surface. Asphaltic emulsion membrane must have a target residual rate for the surfaces to receive the emulsion as shown in the following table:

<table>
<thead>
<tr>
<th>Surface to receive asphaltic emulsion membrane</th>
<th>Target residual rates (gal/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCC pavement</td>
<td>0.09–0.11</td>
</tr>
<tr>
<td>Dense, compacted, new HMA pavement</td>
<td>0.11–0.14</td>
</tr>
<tr>
<td>Open textured, dry, aged or oxidized existing AC pavement</td>
<td>0.13–0.17</td>
</tr>
</tbody>
</table>

If requested and authorized, you may change the asphaltic emulsion membrane application rates.

39-5.01C(4) Placing and Compacting Hot Mix Asphalt

Construct a transverse joint if the HMA remains in the paver for more than 30 minutes.

Do not reintroduce HMA spread over asphaltic emulsion membrane into the paving process.

Do not overlap or hot lap HMA. Pave through lanes after paving adjacent:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets
10. Ramps

For BWC placed on areas adjacent to through lanes that extend into the through lanes, cut the BWC to a neat, straight vertical line at the lane line.

If you spill asphaltic emulsion into the paver hopper, stop paving and remove the contaminated material.

39-5.01D Payment

Not Used
39-5.02 BONDED WEARING COURSES-GAP GRADED

39-5.02A General

39-5.02A(1) Summary
Section 39-5.02 includes specifications for producing bonded wearing course-gap graded.

39-5.02A(2) Definitions
Reserved

39-5.02A(3) Submittals
Include film thickness and calculations and AASHTO T 305 results with your JMF submittal.

39-5.02A(4) Quality Control and Assurance

39-5.02A(4)(a) General
Reserved

39-5.02A(4)(b) Quality Control

39-5.02A(4)(b)(i) General
Reserved

39-5.02A(4)(b)(ii) Aggregate
Test the quality characteristics of aggregate under the test methods and frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradation</td>
<td>AASHTO T 27</td>
<td>1 per 750 tons and any remaining part</td>
</tr>
<tr>
<td>Sand equivalent</td>
<td>AASHTO T 176</td>
<td></td>
</tr>
<tr>
<td>Moisture content</td>
<td>AASHTO T 329</td>
<td>1 per 1500 tons and any remaining part</td>
</tr>
<tr>
<td>Crushed particles</td>
<td>AASHTO T 335</td>
<td></td>
</tr>
<tr>
<td>Los Angeles rattler</td>
<td>AASHTO T 96</td>
<td></td>
</tr>
<tr>
<td>Flat and elongated particles</td>
<td>ASTM D4791</td>
<td>1 per 10,000 tons or 2 per project, whichever is greater</td>
</tr>
<tr>
<td>Fine aggregate angularity</td>
<td>AASHTO T 304 Method A</td>
<td></td>
</tr>
</tbody>
</table>

*aReported value must be the average of 3 tests from a single sample.
*bUse of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2, and 8.4.3 do not apply.
*cTest at continuous mixing plants only.

For lime treated aggregate, test aggregate before treatment and test for gradation and moisture content during BWC-G production.

39-5.02A(4)(b)(iii) Hot Mix Asphalt Production
Sample BWC in two 1-gallon metal containers.
Test the quality characteristics of BWC-G under the test methods and frequencies shown in the following table:
### BWC-G Testing Frequencies

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt binder content</td>
<td>AASHTO T 308 Method A</td>
<td>1 per 750 tons and any remaining part</td>
</tr>
<tr>
<td>HMA moisture content</td>
<td>AASHTO T 329</td>
<td>1 per 2,500 tons but not less than 1 per paving day</td>
</tr>
</tbody>
</table>

#### 39-5.02A(4)(b)(iv)–39-5.02A(4)(b)(vii) Reserved

#### 39-5.02A(4)(c) Department Acceptance

The Department accepts BWC-G based on compliance with:

1. Asphalt binder content at JMF -0.4, +0.5 percent when tested under AASHTO T 308, Method A.
2. Aggregate quality requirements shown in the following table:

### Aggregate Quality

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate gradation</td>
<td>AASHTO T 27</td>
<td>JMF ± Tolerance</td>
</tr>
<tr>
<td>Percent of crushed particles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-fractured face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two-fractured faces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
<td>AASHTO T 335</td>
<td>90</td>
</tr>
<tr>
<td>One fractured face</td>
<td></td>
<td>85</td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
<td>AASHTO T 96</td>
<td></td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Sand equivalent (min)</td>
<td>AASHTO T 176</td>
<td>47</td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight at 5:1)</td>
<td>ASTM D4791</td>
<td>25</td>
</tr>
<tr>
<td>Fine aggregate angularity (min, %)</td>
<td>AASHTO T 304 Method A</td>
<td>45</td>
</tr>
</tbody>
</table>

*Reported value must be the average of 3 tests from a single sample.

*Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.
The Department accepts asphaltic emulsion membrane based on compliance with the requirements shown in the following tables:

### Asphaltic Emulsion Membrane

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saybolt Furol Viscosity at 25 °C (SFS) a</td>
<td>AASHTO T 59</td>
<td>20–100</td>
</tr>
<tr>
<td>Sieve test on original emulsion at time of delivery (max, %)</td>
<td>AASHTO T 59</td>
<td>0.05</td>
</tr>
<tr>
<td>24-hour storage stability (max, %)</td>
<td>AASHTO T 59</td>
<td>1</td>
</tr>
<tr>
<td>Residue by evaporation (min, %)</td>
<td>California Test 331</td>
<td>63</td>
</tr>
<tr>
<td>Tests on residue from evaporation test:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Torsional recovery, measure entire arc of recovery at 25 °C (min, %)</td>
<td>California Test 332</td>
<td>40</td>
</tr>
<tr>
<td>Penetration at 25 °C (0.01 mm)</td>
<td>AASHTO T 49</td>
<td>50–70</td>
</tr>
<tr>
<td>PG76-22 M</td>
<td></td>
<td>150–200</td>
</tr>
<tr>
<td>PG64-28 M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a SFS means Saybolt Furol seconds

39-5.02B Materials

39-5.02B(1) General

Reserved

39-5.02B(2) Mix Design

For BWC-G, the 1st paragraph of section 39-1.02B(1) does not apply.

Determine the proposed OBC from a mix design that complies with the requirements shown in the following table:

### Hot Mix Asphalt Mix Design Requirements

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Film thickness (min, μm)</td>
<td>Asphalt Institute MS-2 Table 6.1 a</td>
<td>12</td>
</tr>
<tr>
<td>Drain down (max, %)</td>
<td>AASHTO T 305 b</td>
<td>0.1</td>
</tr>
</tbody>
</table>

a Film thickness is calculated based on the effective asphalt content and determined as follows:

$$FT = \left( \frac{P_{be}}{SA \times G_b \times 1000} \right) \times 10^6$$

Where:

- $FT$ = Film thickness in μm
- $P_{be}$ = Effective asphalt content by total weight of mix using SP-2 Asphalt Mixture
- $SA$ = Estimated surface area of the aggregate blend in $m^2/kg$ from Table 6.1 in the Asphalt Institute Manual Series No. 2 (MS-2).
- $G_b$ = Specific gravity of asphalt binder

b Combine aggregate and asphalt at the asphalt binder supplier's instructed mixing temperature. Coated aggregates that fall through the wire basket during loading must be returned to the basket before conditioning at 350 °F for 1 hour.

The OBC must be greater than 4.9 percent by total weight of mix.
The aggregate must comply with the requirements shown in the following table:

### Aggregate Quality

<table>
<thead>
<tr>
<th>Quality characteristic</th>
<th>Test method</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of crushed particles</td>
<td>AASHTO T 335</td>
<td>--</td>
</tr>
<tr>
<td>Coarse aggregate (min, %)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One-fractured face</td>
<td></td>
<td>90</td>
</tr>
<tr>
<td>Two-fractured faces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fine aggregate (min, %)</td>
<td>AASHTO T 96</td>
<td>12</td>
</tr>
<tr>
<td>(Passing No. 4 sieve and retained on No. 8 sieve.)</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>One fractured face</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Los Angeles Rattler (max, %)</td>
<td>AASHTO T 176</td>
<td>47</td>
</tr>
<tr>
<td>Loss at 100 Rev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loss at 500 Rev.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sand equivalent (min)</td>
<td>AASHTO T 176</td>
<td>47</td>
</tr>
<tr>
<td>Flat and elongated particles (max, % by weight @ 5:1)</td>
<td>ASTM D4791</td>
<td>25</td>
</tr>
<tr>
<td>Fine aggregate angularity (min, %)</td>
<td>AASHTO T 304 Method A</td>
<td>45</td>
</tr>
</tbody>
</table>

*Reported value must be the average of 3 tests from a single sample.

Use of a sand reading indicator is required as shown in AASHTO T 176, Figure 1. Sections 4.7, 4.8, 7.1.2, 8.4.2 and 8.4.3 do not apply.

The aggregate gradations for BWC-G must comply with the requirements shown in the following table:

### Aggregate Gradation Requirements

<table>
<thead>
<tr>
<th>BWC-G pavement thickness shown</th>
<th>Gradation</th>
</tr>
</thead>
<tbody>
<tr>
<td>less than 0.08 foot</td>
<td>No. 4 or 3/8 inch</td>
</tr>
<tr>
<td>0.08 foot or greater</td>
<td>1/2 inch</td>
</tr>
</tbody>
</table>

The proposed aggregate gradation must be within the TV limits for the specified sieve sizes shown in the following tables:
### Aggregate Gradation (Percentage Passing)

**Bonded Wearing Course—Gap Graded**

#### 1/2-inch BWC-G

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Target value limits</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>80–100</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>55–80</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 4</td>
<td>25–40</td>
<td>TV ± 7</td>
</tr>
<tr>
<td>No. 8</td>
<td>19–32</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 16</td>
<td>16–22</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>10–18</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 50</td>
<td>8–13</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 100</td>
<td>6–10</td>
<td>TV ± 2</td>
</tr>
<tr>
<td>No. 200</td>
<td>4.0–7.0</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

#### 3/8-inch BWC-G

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Target value limits</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>80–100</td>
<td>TV ± 6</td>
</tr>
<tr>
<td>No. 4</td>
<td>25–40</td>
<td>TV ± 7</td>
</tr>
<tr>
<td>No. 8</td>
<td>19–32</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 16</td>
<td>16–22</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>10–18</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 50</td>
<td>8–13</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 100</td>
<td>7–11</td>
<td>TV ± 2</td>
</tr>
<tr>
<td>No. 200</td>
<td>6.0–10.0</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

#### No. 4 BWC-G

<table>
<thead>
<tr>
<th>Sieve sizes</th>
<th>Target value limits</th>
<th>Allowable tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>95–100</td>
<td>TV ± 2</td>
</tr>
<tr>
<td>No. 4</td>
<td>42–55</td>
<td>TV ± 7</td>
</tr>
<tr>
<td>No. 8</td>
<td>19–32</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 16</td>
<td>16–22</td>
<td>TV ± 5</td>
</tr>
<tr>
<td>No. 30</td>
<td>10–18</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 50</td>
<td>8–13</td>
<td>TV ± 4</td>
</tr>
<tr>
<td>No. 100</td>
<td>7–11</td>
<td>TV ± 2</td>
</tr>
<tr>
<td>No. 200</td>
<td>6.0–10.0</td>
<td>TV ± 2</td>
</tr>
</tbody>
</table>

### 39-5.02C Construction

Apply asphaltic emulsion when the atmospheric and pavement temperatures are above:

1. 50 degrees F if PG 76-22 M is specified
2. 45 degrees F if PG 64-28 M is specified

### 39-5.02D Payment

Not Used
39-6 HOT MIX ASPHALT ON BRIDGE DECKS

39-6.01 GENERAL
Section 39-6 includes specifications for producing and placing hot mix asphalt on bridge decks.

HMA used for bridge decks must comply with the specifications for Type A HMA in section 39-2.

39-6.02 MATERIALS
Do not use the 1-inch or 3/4-inch aggregate gradation for HMA on bridge decks.

The grade of asphalt binder for HMA must be PG 64-10 or PG 64-16.

39-6.03 CONSTRUCTION
Spread and compact HMA on bridge decks using method compaction.

If a concrete expansion dam is to be placed at a bridge deck expansion joint, tape oil-resistant construction paper to the deck over the area to be covered by the dam before placing the tack coat and HMA across the joint.

Apply tack coat at the minimum residual rate specified in section 39-1.03C(5). For HMA placed on a deck seal, use the minimum residual rate specified for PCC.

For HMA placed on a deck seal:
1. Place the HMA within 7 days after installing the deck seal.
2. If a paper mask is placed on the deck under section 54-5.03, place the HMA continuously across the paper mask.
3. Place HMA in at least 2 approximately equal layers.
4. For placement of the 1st HMA layer:
   4.1. Comply with the HMA application temperature recommended by the deck seal manufacturer.
   4.2. Deliver and place HMA using equipment with pneumatic tires or rubber-faced wheels. Do not operate other vehicles or equipment on the bare deck seal.
   4.3. Deposit HMA on the deck seal in such a way that the deck seal is not damaged. Do not use a windrow.
   4.4. Place HMA in a downhill direction on bridge decks with grades over 2 percent.
   4.5. Self-propelled spreading equipment is not required.

39-6.04 PAYMENT
Not Used

39-7 MINOR HOT MIX ASPHALT

39-7.01 GENERAL
39-7.01A Summary
Section 39-7 includes specifications for producing and placing minor hot mix asphalt.

Minor HMA must comply with section 39-2 except as specified in this section 39-7.

39-7.01B Definitions
Reserved

39-7.01C Submittals
The QC plan, test results, and inertial profiler specifications in sections 39-1.01C(3), 39-1.01C(4), 39-1.01C(13)(c)–(d) do not apply.

39-7.01D Quality Control and Assurance
39-7.01D(1) General
For minor HMA, the JMF renewal, inertial profiler certifications and testing, and prepping meeting specifications in sections 39-1.01D(4), 39-1.01D(6)(c), and 39-1.01D(7) do not apply.
Test pavement smoothness with a 12 foot straightedge.

### 39-7.01D(2) Quality Control
For minor HMA, section 39-2.01D(2) applies except testing for compliance with the following quality characteristics is not required:

1. Flat and elongated particles
2. Fine aggregate angularity
3. Hamburg wheel track
4. Moisture susceptibility

### 39-7.01D(3) Department Acceptance
The Department accepts minor HMA under section 39-2.01D(5) except compliance with the following quality characteristics is not required:

1. Flat and elongated particles
2. Fine aggregate angularity
3. Hamburg wheel track
4. Moisture susceptibility

### 39-7.02 MATERIALS
#### 39-7.02A General
Reserved

#### 39-7.02B Mix Design
The mix design for minor HMA must comply with section 39-2.02B except the Hamburg wheel track and moisture susceptibility requirements do not apply.

#### 39-7.02C Asphalt Binder
The grade of asphalt binder for minor HMA must be PG-64-10 or PG-64-16.

#### 39-7.02D Liquid Antistrip Treatment
Treat minor HMA with liquid antistrip. Liquid antistrip treatment is not required if you submit AASHTO T 283 and AASHTO T 324 (Modified) test results showing compliance with section 39-2.02B. The tests must be dated within 12 months of submittal.

### 39-7.03 CONSTRUCTION
Not Used

### 39-7.04 PAYMENT
Not Used

39-8–39-10 RESERVED

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
40-1.01 GENERAL

40-1.01A Summary
Section 40-1 includes general specifications for constructing concrete pavement.

40-1.01B Definitions
concrete raveling: Progressive disintegration of the pavement surface resulting from dislodged aggregate.

full depth crack: Crack that runs from one edge of the slab to the opposite or adjacent side of the slab, except a crack parallel to and within 0.5 foot of either side of a planned contraction joint.

working crack: Crack that extends through the full depth of the slab and is parallel to and within 0.5 foot of either side of a planned contraction joint.

action limit: Value at which corrective actions must be made while production may continue.

suspension limit: Value at which production must be suspended while corrections are made.

40-1.01C Submittals

40-1.01C(1) General
At least 15 days before delivery to the job site, submit manufacturer’s recommendations and instructions for storage and installation of:

1. Threaded tie bar splice couplers
2. Joint filler

As an informational submittal, submit calibration documentation and operational guidelines for frequency measuring devices (tachometer) for concrete consolidation vibrators.

Submit updated quality control charts each paving day.

40-1.01C(2) Certificates of Compliance
Submit a certificate of compliance for:

1. Tie bars
2. Threaded tie bar splice couplers
3. Dowel bars
4. Tie bar baskets
5. Dowel bar baskets
6. Joint filler
7. Epoxy powder coating

40-1.01C(3) Quality Control Plan
Submit a concrete pavement QC plan. Allow 30 days for review.

40-1.01C(4) Mix Design
At least 15 days before testing for mix proportions, submit a copy of the AASHTO accreditation for your laboratory determining the mix proportions. At least 15 days before starting field qualification, submit the proposed concrete mix proportions, the corresponding mix identifications, and laboratory test reports including the modulus of rupture for each trial mixture at 10, 21, 28, and 42 days.

40-1.01C(5) Concrete Field Qualification
Submit field qualification data and test reports including:
1. Mixing date
2. Mixing equipment and procedures used
3. Batch volume in cubic yards. The minimum batch size is 5 cu yd.
4. Type and source of ingredients used
5. Penetration of the concrete
6. Air content of the plastic concrete
7. Age and strength at time of concrete beam testing

Field qualification test reports must be certified with a signature by an official in responsible charge of the laboratory performing the tests.

40-1.01C(6) Cores
Submit for authorization the name of the laboratory you propose to use for testing the cores for air content.
Submit each core in an individual plastic bag marked with a location description.

40-1.01C(7) Profile Data and Straightedge Measurements
At least 5 business days before start of initial profiling or changing profiler or operator, submit:
1. Inertial profiler (IP) certification issued by the Department. The certification must not be more than 12 months old.
2. Operator certification for the IP issued by the Department. The operator must be certified for each different model of IP device operated. The certification must not be more than 12 months old.
3. List of manufacturer's recommended test procedures for IP calibration and verification.

Within 2 business days after cross correlation testing, submit ProVAL profiler certification analysis report for cross correlation test results performed on test section. ProVAL is FHWA’s software. Submit the certification analysis report to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days after each day of inertial profiling, submit profile data to the Engineer and to the electronic mailbox address:

smoothness@dot.ca.gov

Within 2 business days of performing straightedge testing, submit a report of areas requiring smoothness correction.

40-1.01C(8)–40-1.01C(12) Reserved

40-1.01D Quality Control and Assurance
40-1.01D(1) General
If the pavement quantity is at least 2000 cu yd, provide a QC manager.
Core pavement as described for, thickness, bar placement, and air content.

For the Department's modulus of rupture testing, assist the Engineer in fabricating test beams by providing materials and labor.

Allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is scheduled to be opened to traffic. Notify the Engineer when the pavement is ready for testing which is the latter of:
1. Seven days after paving
2. When the pavement has attained a modulus of rupture of at least 550 psi

The Department tests for coefficient of friction within 7 days of receiving notification that the pavement is ready for testing.
40-1.01D(2) Preparing Conference

Schedule a prepping conference at a mutually agreed upon time and place to meet with the Engineer. Make the arrangements for the conference facility. Discuss QC plan and methods of performing each item of the work.

Prepping conference attendees must sign an attendance sheet provided by the Engineer. The prepping conference must be attended by your:

1. Project superintendent
2. Quality Control manager
3. Paving construction foreman
4. Workers and your subcontractor's workers, including:
   4.1. Foremen including subcontractor’s Foremen
   4.2. Concrete plant manager
   4.3. Concrete plant operator

Do not start paving activities including test strips until the listed personnel have attended a prepping conference.

40-1.01D(3) Just-In-Time-Training

Reserved

40-1.01D(4) Quality Control Plan

Establish, implement, and maintain a QC plan for pavement. The QC plan must describe the organization and procedures used to:

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include action and suspension limits and details of corrective action to be taken if any process is out of those limits. Suspension limits must not exceed specified acceptance criteria.

The QC plan must address the elements affecting concrete pavement quality including:

1. Mix proportions
2. Aggregate gradation
3. Materials quality
4. Stockpile management
5. Line and grade control
6. Proportioning
7. Mixing and transportation
8. Placing and consolidation
9. Contraction and construction joints
10. Bar reinforcement placement and alignment
11. Dowel bar placement, alignment, and anchorage
12. Tie bar placement
13. Modulus of rupture
14. Finishing and curing
15. Protecting pavement
16. Surface smoothness

40-1.01D(5) Mix Design

Use a laboratory that complies with ASTM C 1077 to determine the mix proportions for concrete pavement. The laboratory must have a current AASHTO accreditation for:

1. AASHTO T 97 or ASTM C 78
2. ASTM C 192/C 192M

OCTOBER 2015
Make trial mixtures no more than 24 months before field qualification.

Using your trial mixtures, determine the minimum cementitious materials content. Use your value for minimum cementitious material content for $MC$ in equation 1 and equation 2 of section 90-1.02B(3).

To determine the minimum cementitious materials content or maximum water to cementitious materials ratio, use modulus of rupture values of at least 570 psi for 28 days age and at least 650 psi for 42 days age.

If changing an aggregate supply source or the mix proportions, produce a trial batch and field-qualify the new concrete. The Engineer does not adjust contract time for performing sampling, testing, and qualifying new mix proportions or changing an aggregate supply source.

40-1.01D(6) Quality Control Testing

40-1.01D(6)(a) General

Testing laboratories and testing equipment must comply with the Department's Independent Assurance Program.

40-1.01D(6)(b) Concrete Mix

Before placing pavement, your mix design must be field qualified. Use an ACI certified "Concrete Laboratory Technician, Grade I" to perform field qualification tests and calculations. Test for modulus of rupture under California Test 523 at 10, 21, and 28 days of age.

When placing pavement, your quality control must include testing properties at the frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Minimum frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanness value</td>
<td>California Test 227</td>
<td>2 per day</td>
</tr>
<tr>
<td>Sand equivalent</td>
<td>California Test 217</td>
<td>2 per day</td>
</tr>
<tr>
<td>Aggregate gradation</td>
<td>California Test 202</td>
<td>2 per day</td>
</tr>
<tr>
<td>Air content (air entrainment specified)</td>
<td>California Test 504</td>
<td>1 per hour</td>
</tr>
<tr>
<td>Air content (air entrainment not specified)</td>
<td>California Test 504</td>
<td>1 per 4 hours</td>
</tr>
<tr>
<td>Density</td>
<td>California Test 518</td>
<td>1 per 4 hours</td>
</tr>
<tr>
<td>Penetration</td>
<td>California Test 533</td>
<td>1 per 4 hours</td>
</tr>
<tr>
<td>Aggregate moisture meter calibration$</td>
<td>California Test 223 or California Test 226</td>
<td>1 per day</td>
</tr>
</tbody>
</table>

$^a$ Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results.

Maintain control charts to identify potential problems and assignable causes. Post a copy of each control chart at a location determined by the Engineer.

Individual measurement control charts must use the target values in the mix proportions as indicators of central tendency.

Develop linear control charts for:

1. Cleanness value
2. Sand equivalent
3. Fine and coarse aggregate gradation
4. Air content
5. Penetration

Control charts must include:

1. Contract number
2. Mix proportions
3. Test number
4. Each test parameter
5. Action and suspension limits
6. Specification limits
7. Quality control test results

For fine and coarse aggregate gradation control charts, record the running average of the previous 4 consecutive gradation tests for each sieve and superimpose the specification limits.

For air content control charts, the action limit is ±1.0 percent of the specified value. If no value is specified, the action limit is ±1.0 percent of the value used for your approved mix design.

As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
   2.1. One point falls outside the suspension limit line
   2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent material.

Before each day's concrete pavement placement and at intervals not to exceed 4 hours of production, use a tachometer to test and record vibration frequency for concrete consolidation vibrators.

40-1.01D(6)(c) Pavement Smoothness

40-1.01D(6)(c)(i) General

Notify the Engineer 2 business days before performing smoothness testing including IP calibration and verification testing. The notification must include start time and locations by station.

Before testing the pavement smoothness, remove foreign objects from the surface, and mark the beginning and ending station on the pavement shoulder.

Test pavement smoothness using an IP except use a 12-foot straightedge at the following locations:

1. Traffic lanes less than 1,000 feet in length including ramps, turn lanes, and acceleration and deceleration lanes
2. Areas within 15 feet of manholes
3. Shoulders
4. Weigh-in-motion areas
5. Miscellaneous areas such as medians, gore areas, turnouts, and maintenance pullouts

40-1.01D(6)(c)(ii) Straightedge Testing

Identify locations of areas requiring correction by:

1. Location Number
2. District-County-Route
3. Beginning station or post mile to the nearest 0.01 mile
4. For correction areas within a lane:
   4.1. Lane direction as NB, SB, EB, or WB
   4.2. Lane number from left to right in direction of travel
   4.3. Wheel path as "L" for left, "R" for right, or "B" for both
5. For correction areas not within a lane:
   5.1. Identify pavement area (e.g., shoulder, weight station, turnout)
   5.2. Direction and distance from centerline as "L" for left or "R" for right
6. Estimated size of correction area
40-1.01D(6)(c)(iii) Inertial Profile Testing

IP equipment must display a current certification decal with expiration date.

Conduct cross correlation IP verification test in the Engineer's presence before performing initial profiling. Verify cross correlation IP verification test at least annually. Conduct 5 repeat runs of the IP on an authorized test section. The test section must be on an existing concrete pavement surface 0.1 mile long. Calculate a cross correlation to determine the repeatability of your device under Section 8.3.1.2 of AASHTO R 56 using ProVAL profiler certification analysis with a 3 feet maximum offset. The cross correlation must be a minimum of 0.92.

Conduct the following IP calibration and verification tests in the Engineer's presence each day before performing inertial profiling:

1. Block test. Verify the height sensor accuracy under AASHTO R 57, section 5.3.2.3.
2. Bounce test. Verify the combined height sensor and accelerometer accuracy under AASHTO R 57, section 5.3.2.3.2.
3. DMI test. Calibrate the accuracy of the testing procedure under AASHTO R 56, section 8.4.
4. Manufacturer's recommended tests.

Collect IP data using the specified ProVAL analysis with 250 mm and IRI filters. Comply with the requirements for data collection under AASHTO R 56.

For IP testing, wheel paths are 3 feet from and parallel to the edge of a lane. Left and right are relative to the direction of travel. The IRI is the pavement smoothness along a wheel path of a given lane. The MRI is the average of the IRI values for the left and right wheel path from the same lane.

Operate the IP according to the manufacturer's recommendations and AASHTO R 57 at 1-inch recording intervals and a minimum 4 inch line laser sensor.

Collect IP data under AASHTO R 56. IP data must include:

1. Raw profile data for each lane.
2. ProVAL ride quality analysis report for the international roughness index (IRI) of left and right wheel paths of each lane. Submit in pdf file format.
3. ProVAL ride quality analysis report for the mean roughness index (MRI) of each lane. Submit in pdf file format.
4. ProVAL smoothness assurance analysis report for IRIs of left wheel path. Submit in pdf file format.
5. ProVAL smoothness assurance analysis report for IRIs of right wheel path. Submit in pdf file format.
6. GPS data file for each lane in GPS exchange. Submit in GPS eXchange file format.
7. Manufacturer's recommended IP calibration and verification tests results.
8. AASHTO IP calibration and verification test results including bounce, block, and distance measurement instrument (DMI).

Submit the IP raw profile data in unfiltered electronic pavement profile file (PPF) format. Name the PPF file using the following naming convention:

YYYMMDD_TTCCRRR_D_L_W_S_X_PT.PPF

where:
YYYY = year
MM = Month, leading zero
DD = Day of month, leading zero
TT = District, leading zero
CCC = County, 2 or 3 letter abbreviation as shown in section 1-1.08
RRR = Route number, no leading zeros
D = Traffic direction as NB, SB, WB, or EB
L = Lane number from left to right in direction of travel
W = Wheel path as "L" for left, "R" for right, or "B" for both
S = Beginning station to the nearest foot (e.g., 10+20) or beginning post mile to the nearest
hundredth (e.g., .25.06) no leading zero
X = Profile operation as "EXIST" for existing pavement, "PAVE" for after paving, or "CORR" for after final surface pavement correction
PT = Pavement type (e.g., "concrete", etc.)

Determine IRIs using the ProVAL ride quality analysis with a 250 mm and IRI filters. While collecting the profile data to determine IRI, record the following locations in the raw profile data:

1. Begin and end of all bridge approach slabs
2. Begin and end of all bridges
3. Begin and end of all culverts visible on the roadway surface

For each 0.1 mile section, your IRI values must be within 10 percent of the Department's IRI values. The Engineer may order you to recalibrate your IP equipment and reprofile. If your results are inaccurate due to operator error, the Engineer may disqualify your IP operator.

Determine the MRI for 0.1-mile fixed sections. A partial section less than 0.1 mile that is the result of an interruption to continuous pavement surface must comply with the MRI specifications for a full section. Adjust the MRI for a partial section to reflect a full section based on the proportion of a section paved.

Determine the areas of localized roughness. Use the ProVAL smoothness assurance with a continuous IRI for each wheel path, 25-foot interval, and 250 mm and IRI filters.

40-1.01D(6)(c)(iv) Reserved
40-1.01D(6)(d)–40-1.01D(6)(h) Reserved
40-1.01D(7) Pavement Acceptance
40-1.01D(7)(a) Acceptance Testing
40-1.01D(7)(a)(i) General

The Department's acceptance testing includes testing the pavement properties at the minimum frequencies shown in the following table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulus of rupture (28 day)</td>
<td>California Test 523</td>
<td>1,000 cu yd</td>
</tr>
<tr>
<td>Air content*</td>
<td>California Test 504</td>
<td>1 day's paving</td>
</tr>
<tr>
<td>Dowel bar placement</td>
<td>-- Measurement*</td>
<td>700 sq yd</td>
</tr>
<tr>
<td>Tie bar placement</td>
<td>-- Measurement*</td>
<td>4,000 sq yd</td>
</tr>
<tr>
<td>Thickness</td>
<td>California Test 531</td>
<td>1,200 sq yd</td>
</tr>
<tr>
<td>Coefficient of friction</td>
<td>California Test 342</td>
<td>1 day's paving</td>
</tr>
</tbody>
</table>

* A single test represents no more than the frequency specified.
* Test only when air entrainment is specified.

Pavement smoothness may be accepted based on your testing in the absence of the Department's testing.

40-1.01D(7)(a)(ii) Air Content

If air-entraining admixtures are specified, the Engineer uses a t-test to compare your QC test results with the Department's test results. The t-value for test data is determined using the following equation:

$$ t = \frac{|X - \bar{X}|}{S_p} $$

and

$$ S_p^2 = \frac{S_c^2(n_c - 1) + S_v^2(n_v - 1)}{n_c + n_v - 2} $$
where:

\[ n_c = \text{Number of your quality control tests (minimum of 6 required)} \]
\[ n_v = \text{Number of Department's tests (minimum of 2 required)} \]
\[ \bar{X}_c = \text{Mean of your quality control tests} \]
\[ \bar{X}_v = \text{Mean of the Department's tests} \]
\[ S_p = \text{Pooled standard deviation} \]
\[ (\text{When } n_v = 1, S_p = S_c) \]
\[ S_c = \text{Standard deviation of your quality control tests} \]
\[ S_v = \text{Standard deviation of the Department's tests (when } n_v > 1) \]

The Engineer compares your QC test results with the Department's test results at a level of significance of \( \alpha = 0.01 \). The Engineer compares the t-value to \( t_{crit} \), using degrees of freedom showing in the following table:

<table>
<thead>
<tr>
<th>degrees of freedom (nc+nv-2)</th>
<th>tcrit (for ( \alpha = 0.01 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>63.657</td>
</tr>
<tr>
<td>2</td>
<td>9.925</td>
</tr>
<tr>
<td>3</td>
<td>5.841</td>
</tr>
<tr>
<td>4</td>
<td>4.604</td>
</tr>
<tr>
<td>5</td>
<td>4.032</td>
</tr>
<tr>
<td>6</td>
<td>3.707</td>
</tr>
<tr>
<td>7</td>
<td>3.499</td>
</tr>
<tr>
<td>8</td>
<td>3.355</td>
</tr>
<tr>
<td>9</td>
<td>3.250</td>
</tr>
<tr>
<td>10</td>
<td>3.169</td>
</tr>
</tbody>
</table>

If the t-value calculated is less than or equal to \( t_{crit} \), your quality control test results are verified. If the t-value calculated is greater than \( t_{crit} \), quality control test results are not verified.

If your quality control test results are not verified, core at least 3 specimens from concrete pavement under section 40-1.03P. The Engineer selects the core locations. The authorized laboratory must test these specimens for air content under ASTM C 457. The Engineer compares these test results with your quality control test results using the t-test method. If your quality control test results are verified based on this comparison, the Engineer uses the quality control test results for acceptance of concrete pavement for air content. If your quality control test results are not verified based on this comparison, the Engineer uses the air content of core specimens determined by the authorized laboratory under ASTM C 457 for acceptance.

40-1.01D(7)(a)(iii) Dowel and Tie Bar Placement

For JPCP, drill cores under section 40-1.03P for the Department's acceptance testing.

The Engineer identifies which joint and dowel or tie bar are to be tested. Core each day's paving within 2 business days. Each dowel or tie bar test consists of 2 cores, 1 on each bar end to expose both ends and allow measurement.

If the tests indicate dowel or tie bars are not placed within the specified tolerances or if there is unconsolidated concrete around the dowel or tie bars, core additional specimens identified by Engineer to determine the limits of unacceptable work.

40-1.01D(7)(a)(iv) Thickness

Drill cores under section 40-1.03P for the Department's acceptance testing in the primary area, which is the area placed in 1 day for each thickness. Core at locations determined by the Engineer and in the Engineer's presence.
Do not core until any grinding has been completed.

The core specimen diameter must be 4 inches. To identify the limits of concrete pavement deficient in thickness by more than 0.05 foot, you may divide primary areas into secondary areas. The Engineer measures cores under California Test 531 to the nearest 0.01 foot. Core at least 1 foot from existing, contiguous, and parallel concrete pavement not constructed as part of this Contract.

You may request the Engineer make additional thickness measurements and use them to determine the average thickness variation. The Engineer determines the locations with random sampling methods.

If each thickness measurement in a primary area is less than 0.05 foot deficient, the Engineer calculates the average thickness deficiency in that primary area. The Engineer uses 0.02 foot for a thickness difference more than 0.02 foot over the specified thickness.

For each thickness measurement in a primary area deficient by more than 0.05 foot, the Engineer determines a secondary area where the thickness deficiency is more than 0.05 foot. The Engineer determines this secondary area by measuring the thickness of each concrete pavement slab adjacent to the measurement found to be more than 0.05 foot deficient. The Engineer continues to measure the thickness until an area that is bound by slabs with thickness deficient by 0.05 foot or less is determined.

Slabs without bar reinforcement are defined by the areas bound by longitudinal and transverse joints and concrete pavement edges. Slabs with bar reinforcement are defined by the areas bound by longitudinal joints and concrete pavement edges and 15-foot lengths. Secondary area thickness measurements in a slab determine that entire slab's thickness.

The Engineer measures the remaining primary area thickness after removing the secondary areas from consideration for determining the average thickness deficiency.

40-1.01D(7)(a)(v)–40-1.01D(7)(a)(ix) Reserved
40-1.01D(7)(b) Acceptance Criteria
40-1.01D(7)(b)(i) General
Reserved

40-1.01D(7)(b)(ii) Modulus of Rupture
For field qualification, the modulus of rupture at no later than 28 days must be at least:

1. 550 psi for each single beam
2. 570 psi for the average of 5 beams

For production, the modulus of rupture for the average of the individual test results of 2 beams aged for 28 days must be at least 570 psi.

40-1.01D(7)(b)(iii) Air Content
The air content must be within ±1.5 percent of the specified value. If no value is specified, the air content must be within ±1.5 percent of, the value used for your approved mix design.

40-1.01D(7)(b)(iv) Bar Reinforcement
In addition to requirements of Section 52, bar reinforcement must be more than 1/2 inch below the saw cut depth at concrete pavement joints.

40-1.01D(7)(b)(v) Dowel Bar and Tie Bar Placement
Tie bar placement must comply with the tolerances shown in the following table:
### Tie Bar Tolerance

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal and vertical skew</td>
<td>5 1/4 inch, max</td>
</tr>
<tr>
<td>Longitudinal translation</td>
<td>± 2 inch</td>
</tr>
<tr>
<td>Horizontal offset (embedding)</td>
<td>± 2 inch</td>
</tr>
</tbody>
</table>
| Vertical depth                 | 1. At least 1/2 inch below the bottom of the saw cut  
|                                | 2. When measured at any point along the bar, not less than 2 inches clear of the pavement's surface and bottom |

NOTE: Tolerances are measured relative to the completed joint.

Dowel bar placement must comply with the tolerances shown in the following table:

### Dowel Bar Tolerances

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal offset</td>
<td>± 1 inch</td>
</tr>
<tr>
<td>Longitudinal translation</td>
<td>± 2 inch</td>
</tr>
<tr>
<td>Horizontal skew</td>
<td>5/8 inch, max</td>
</tr>
<tr>
<td>Vertical skew</td>
<td>5/8 inch, max</td>
</tr>
</tbody>
</table>
| Vertical depth          | The minimum distance measured from concrete pavement surface to any point along the top of dowel bar must be:  
|                         | DB + 1/2 inch                                |
|                         | where:                                        
|                         | DB = one third of pavement thickness in inches, or the saw cut depth, whichever is greater  
|                         | The maximum distance below the depth shown must be 5/8 inch. |

NOTE: Tolerances are measured relative to the completed joint.

The Engineer determines the limits for removal and replacement.

#### 40-1.01D(7)(b)(vi) Pavement Thickness

Concrete pavement thickness must not be deficient by more than 0.05 foot.

The minimum thickness is not reduced for specifications that may affect concrete pavement thickness such as allowable tolerances for subgrade construction.

The Engineer determines the areas of noncompliant pavement, the thickness deficiencies, and the limits where removal is required.

Pavement with an average thickness deficiency less than 0.01 foot is acceptable. If the thickness deficiency is 0.01 foot or more and less than 0.05 foot, you may request authorization to leave the pavement in place and accept a pay adjustment. If the deficiency is more than 0.05 foot the pavement must be removed and replaced.

#### 40-1.01D(7)(b)(vii) Pavement Smoothness

Where testing with an IP is required, the pavement surface must have:
1. No areas of localized roughness with an IRI greater than 120 in/mi
2. MRI of 60 in/mi or less within a 0.1 mile section

Where testing with a straightedge is required, the pavement surface must not vary from the lower edge of the straightedge by more than:

1. 0.01 foot when the straightedge is laid parallel with the centerline
2. 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

**40-1.01D(7)(b)(viii) Coefficient of Friction**
Initial and final texturing must produce a coefficient of friction of at least 0.30. Do not open the pavement to traffic unless the coefficient of friction is at least 0.30.

**40-1.01D(7)(b)(ix)–40-1.01D(7)(b)(xii) Reserved**

**40-1.02 MATERIALS**

**40-1.02A General**
Water for coring must comply with section 90.

Tack coat must comply with section 39.

**40-1.02B Concrete**

**40-1.02B(1) General**
PCC for pavement must comply with section 90-1 except as otherwise specified.

**40-1.02B(2) Cementitious Material**
Concrete must contain from 505 pounds to 675 pounds cementitious material per cubic yard. The specifications for reducing cementitious material content in section 90-1.02E(2) do not apply.

**40-1.02B(3) Aggregate**
Aggregate must comply with section 90-1.02C except the specifications for reduction in operating range and contract compliance for cleanliness value and sand equivalent specified in section 90-1.02C(2) and section 90-1.02C(3) do not apply.

For coarse aggregate in high desert and high mountain climate regions, the loss must not exceed 25 percent when tested under California Test 211 with 500 revolutions.

For combined aggregate gradings, the difference between the percent passing the 3/8-inch sieve and the percent passing the no. 8 sieve must not be less than 16 percent of the total aggregate.

**40-1.02B(4) Air Entrainment**
The second paragraph of section 90-1.02I(2)(a) does not apply.

For a project shown in the low and south mountain climate regions, add air-entraining admixture to the concrete at the rate required to produce an air content of 4 percent in the freshly mixed concrete.

For a project shown in the high desert and high mountain climate regions, add air-entraining admixture to the concrete at the rate required to produce an air content of 6 percent in the freshly mixed concrete.

**40-1.02B(5)–40-1.02B(8) Reserved**

**40-1.02C Reinforcement, Bars, and Baskets**

**40-1.02C(1) Bar Reinforcement**
Bar reinforcement must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, bar reinforcement must comply with section 52.
If the project is shown to be in high desert or any mountain climate regions, bar reinforcement must be one of the following:

1. Epoxy-coated bar reinforcement under section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60. Bars must be handled under ASTM D 3963/D 3963M and section 52-2.02C.
2. Low carbon, chromium steel bar complying with ASTM A 1035/A 1035M.

**40-1.02C(2) Dowel Bars**

Dowel bars must be plain bars. Fabricate, sample, and handle epoxy-coated dowel bars under ASTM D 3963/D 3963M and section 52-2.03C except each sample must be 18 inches long.

If the project is not shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with either section 52-2.02B or 52-2.03B.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, dowel bars must be one of the following:

1. Epoxy-coated bars. Bars must comply with ASTM A 615/A 615M, Grade 40 or 60. Epoxy coating must comply with section 52-2.03B.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.

**40-1.02C(3) Tie Bars**

Tie bars must be deformed bars.

If the project is not shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with either section 52-2.02B or 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60. Bars must be handled under ASTM D 3963/D 3963M and section 52-2.02C.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.
3. Low carbon, chromium-steel bars under ASTM A 1035/A 1035M.

If the project is shown to be in high desert or any mountain climate region, tie bars must be one of the following:

1. Epoxy-coated bar reinforcement. Bars must comply with section 52-2.03B except bars must comply with either ASTM A 706/A 706M; ASTM A 996/A 996M; or ASTM A 615/A 615M, Grade 40 or 60.
2. Stainless-steel bars. Bars must be descaled solid stainless-steel bars under ASTM A 955/A 955M, UNS Designation S31603 or S31803.

Fabricate, sample, and handle epoxy-coated tie bars under ASTM D 3963/D 3963M, section 52-2.02, or section 52-2.03.

Do not bend tie bars.

**40-1.02C(4) Dowel and Tie Bar Baskets**

For dowel and tie bar baskets, wire must comply with ASTM A 82/A 82M and be welded under ASTM A 185/A 185M, Section 7.4. The minimum wire-size no. is W10. Use either U-frame or A-frame shaped assemblies.
If the project is not shown to be in high desert or any mountain climate region, baskets may be epoxy-coated, and the epoxy coating must comply with either section 52-2.02B or 52-2.03B.

If the project is shown to be in high desert or any mountain climate region, wire for dowel bar and tie bar baskets must be one of the following:

1. Epoxy-coated wire complying with section 52-2.03B
2. Stainless-steel wire. Wire must be descaled solid stainless-steel. Wire must comply with (1) the chemical requirements in ASTM A 276/A 276M, UNS Designation S31603 or S31803 and (2) the tension requirements in ASTM A 1022/ A 1022M.

Handle epoxy-coated tie bar and dowel bar baskets under ASTM D 3963/D 3963M and either section 52-2.02 or 52-2.03.

Fasteners must be driven fasteners under ASTM F 1667. Fasteners on lean concrete base or HMA must have a minimum shank diameter of 3/16 inch and a minimum shank length of 2-1/2 inches. For asphalt treated permeable base or cement treated permeable base, the shank diameter must be at least 3/16 inch and the shank length must be at least 5 inches.

Fasteners, clips, and washers must have a minimum 0.2-mil thick zinc coating applied by either electroplating or galvanizing.

**40-1.02D Dowel Bar Lubricant**
Dowel bar lubricant must be petroleum paraffin based or a curing compound. Paraffin-based lubricant must be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal and must be factory-applied. Curing compound must be curing compound no. 3.

**40-1.02E Joint Filler**
Joint filler for isolation joint must be preformed expansion joint filler for concrete (bituminous type) under ASTM D 994.

**40-1.02F Curing Compound**
Curing compound must be curing compound no. 1 or 2.

**40-1.02G Nonshrink Hydraulic Cement Grout**
Nonshrink hydraulic cement grout must comply with ASTM C 1107/C 1107M. Clean, uniform, rounded aggregate filler may be used to extend the grout. Aggregate filler must not exceed 60 percent of the grout mass or the maximum recommended by the manufacturer, whichever is less. Aggregate filler moisture content must not exceed 0.5 percent when tested under California Test 223 or California Test 226. Aggregate filler tested under California Test 202 must comply with the grading shown in the following table:

<table>
<thead>
<tr>
<th>Aggregate Filler Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve size</td>
</tr>
<tr>
<td>1/2-inch</td>
</tr>
<tr>
<td>3/8-inch</td>
</tr>
<tr>
<td>No. 4</td>
</tr>
<tr>
<td>No. 8</td>
</tr>
<tr>
<td>No. 16</td>
</tr>
</tbody>
</table>

**40-1.02H Temporary Roadway Pavement Structure**
Temporary roadway pavement structure must comply with section 41-1.02E.
40-1.03 CONSTRUCTION

40-1.03A General
Aggregate and bulk cementitious material must be proportioned by weight by means of automatic proportioning devices of approved types.

For widenings and lane reconstruction, construct only the portion of pavement where the work will be completed during the same lane closure. If you fail to complete the construction during the same lane closure, construct a temporary pavement structure under section 41-1.

40-1.03B Water Supply
Before placing concrete pavement, develop enough water supply.

40-1.03C Test Strips
Construct a test strip for each type of pavement with a quantity of more than 2,000 cu yd. Obtain authorization of the test strip before constructing pavement. Test strips must be:

1. 700 to 1,000 feet long
2. Same width as the planned paving, and
3. Constructed using the same equipment proposed for paving

The Engineer selects from 6 to 12 core locations for dowel bars and up to 6 locations for tie bars per test strip. If you use mechanical dowel bar inserters, the test strip must demonstrate they do not leave voids, segregations, or surface irregularities such as depressions, dips, or high areas.

Test strips must comply with the acceptance criteria for:

1. Smoothness, except IP is not required
2. Dowel bars and tie bars placement
3. Pavement thickness
4. Final finishing, except the coefficient of friction is not considered

Allow 3 business days for evaluation. If the test strip is noncompliant, stop paving and submit a plan for changed materials, methods, or equipment. Allow 3 business days for authorization of the plan. Construct another test strip per the authorized plan.

Remove and dispose of noncompliant test strips.

If the test strip is compliant except for smoothness and final finishing, you may grind the surface. After grinding retest the test strip smoothness under section 40-1.01D(6)(c).

If the test strip is compliant for smoothness and thickness, construction of an additional test strip is not required and the test strip may remain in place.

Construct additional test strips if you:

1. Propose different paving equipment including:
   1.1. Paver
   1.2. Dowel bar inserter
   1.3. Tie bar inserter
   1.4. Tining
   1.5. Curing equipment
2. Change concrete mix proportions

You may request authorization to eliminate the test strip if you use paving equipment and personnel from a Department project (1) for the same type of pavement and (2) completed within the past 12 months. Submit supporting documents and previous project information with your request.
40-1.03D Joints

40-1.03D(1) General

Do not bend tie bars or reinforcement in existing concrete pavement joints.

For contraction joints and isolation joints, saw cut a groove with a power-driven saw. After cutting, immediately wash slurry from the joint with water at less than 100 psi pressure.

Keep joints free from foreign material including soil, gravel, concrete, and asphalt. To keep foreign material out of the joint, you may use filler material. Filler material must not react adversely with the concrete or cause concrete pavement damage. After sawing and washing, install filler material that keeps moisture in the adjacent concrete during the 72 hours after paving. If you install filler material, the specifications for spraying the sawed joint with additional curing compound in section 40-1.03K does not apply. If using absorptive filler material, moisten the filler immediately before or after installation.

40-1.03D(2) Construction Joints

Construction joints must be vertical.

Before placing fresh concrete against hardened concrete, existing concrete pavement, or structures, apply curing compound no. 1 or 2 to the vertical surface of the hardened concrete, existing concrete pavement, or structures and allow it to dry.

At joints between concrete pavement and HMA, apply tack coat between the concrete pavement and HMA.

Use a metal or wooden bulkhead to form transverse construction joints. If dowel bars are described, the bulkhead must allow dowel bar installation.

40-1.03D(3) Contraction Joints

Saw contraction joints before cracking occurs and after the concrete is hard enough to saw without spalling, raveling, or tearing.

Saw cut using a power saw with a diamond blade. After cutting, immediately wash slurry from the joint with water at less than 100 psi pressure.

Except for longitudinal joints parallel to a curving centerline, transverse and longitudinal contraction joints must not deviate by more than 0.1 foot from either side of a 12-foot straight line.

Cut transverse contraction joints within 0.5 foot of the spacing described. Adjust spacing if needed such that slabs are at least 10 feet long.

For widenings, do not match transverse contraction joints with existing joint spacing or skew unless otherwise described.

Cut transverse contraction joints straight across the full concrete pavement width, between isolation joints and edges of pavement. In areas of converging and diverging pavements, space transverse contraction joints such that the joint is continuous across the maximum pavement width. Longitudinal contraction joints must be parallel with the concrete pavement centerline, except when lanes converge or diverge.

40-1.03D(4) Isolation Joints

Before placing concrete at isolation joints, prepare the existing concrete face and secure joint filler. Prepare by saw cutting and making a clean flat vertical surface. Make the saw cut the same depth as the depth of the new pavement.

40-1.03E Bar Reinforcement

Place bar reinforcement under section 52.

40-1.03F Dowel Bar Placement

If using curing compound as lubricant, apply the curing compound to dowels in 2 separate applications. Lubricate each dowel bar entirely before placement. The last application must be applied not more than 8
hours before placing the dowel bars. Apply each curing compound application at a rate of 1 gallon per 150 square feet.

Install dowel bars using one of the following methods:

2. Mechanical insertion. Eliminate evidence of the insertion by reworking the concrete over the dowel bars.
3. Dowel bar baskets. Anchor baskets with fasteners. Use at least 1 fastener per foot for basket sections. Baskets must be anchored at least 200 feet in advance of the concrete placement activity unless your waiver request is authorized. If requesting a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before the concrete is placed, cut and remove temporary spacer wires and demonstrate the dowel bars do not move from their specified depth and alignment during concrete placement.

If dowel bars are noncompliant, stop paving activities, demonstrate your correction, and obtain verbal approval from the Engineer.

40-1.03G Tie Bar Placement
Install tie bars at longitudinal joints using one of the following methods:

2. Insert bars. Mechanically insert tie bars into plastic slip-formed concrete before finishing. Inserted tie bars must have full contact between the bar and the concrete. Eliminate evidence of the insertion by reworking the concrete over the tie bars.
3. Threaded couplers. Threaded tie bar splice couplers must be fabricated from deformed bar reinforcement and free of external welding or machining.
4. Tie bar baskets. Anchor baskets at least 200 feet in advance of pavement placement activity. If you request a waiver, describe the construction limitations or restricted access preventing the advanced anchoring. After the baskets are anchored and before paving, demonstrate the tie bars do not move from their specified depth and alignment during paving. Use fasteners to anchor tie bar baskets.

If tie bars are noncompliant, stop paving activities, demonstrate your correction, and obtain verbal approval from the Engineer.

40-1.03H Placing Concrete
40-1.03H(1) General
Immediately prior to placing concrete, the surface to receive concrete must be:

1. In compliance with specified requirements, including compaction and elevation tolerances
2. Free of loose and extraneous material
3. Uniformly moist, but free of standing or flowing water

Place concrete pavement with stationary side forms or slip-form paving equipment.

Place consecutive concrete loads within 30 minutes of each other. Construct a transverse construction joint when concrete placement is interrupted by more than 30 minutes. The transverse construction joint must coincide with the next contraction joint location, or you must remove fresh concrete pavement to the preceding transverse joint location.

Place concrete pavement in full slab widths separated by construction joints or monolithically in multiples of full lane widths with a longitudinal contraction joint at each traffic lane line.

Do not retemper concrete.

If the concrete pavement surface width is constructed as specified, you may construct concrete pavement sides on a batter not flatter than 6:1 (vertical:horizontal).
40-1.03H(2) Paving Adjacent to Existing Concrete Pavement
Where pavement is placed adjacent to existing concrete pavement:

1. Grinding adjacent pavement must be completed before placing the pavement
2. Use paving equipment with padded crawler tracks or rubber-tired wheels with enough offset to prevent damage
3. Match pavement grade with the elevation of existing concrete pavement after grinding.

40-1.03H(3) Concrete Pavement Transition Panel
For concrete pavement placed in a transition panel, texture the surface with a drag strip of burlap, broom, or spring steel tine device that produces scoring in the finished surface. Scoring must be either parallel or transverse to the centerline. Texture at the time that produces the coarsest texture.

40-1.03H(4) Stationary Side Form Construction
Stationary side forms must be straight and without defects including warps, bends, and indentations. Side forms must be metal except at end closures and transverse construction joints where other materials may be used.

You may build up side forms by attaching a section to the top or bottom. If attached to the top of metal forms, the attached section must be metal.

The side form's base width must be at least 80 percent of the specified concrete pavement thickness.

Side forms including interlocking connections with adjoining forms must be rigid enough to prevent springing from subgrading and paving equipment and concrete pressure.

Construct subgrade to final grade before placing side forms. Side forms must bear fully on the foundation throughout their length and base width. Place side forms to the specified grade and alignment of the finished concrete pavement's edge. Support side forms during concrete placing, compacting, and finishing.

After subgrade work is complete and immediately before placing concrete, true side forms and set to line and grade for a distance that avoids delays due to form adjustment.

Clean and oil side forms before each use.

Side forms must remain in place for at least 1 day after placing concrete and until the concrete pavement edge no longer requires protection from the forms.

Spread, screed, shape, and consolidate concrete with 1 or more machines. The machines must uniformly distribute and consolidate the concrete. The machines must operate to place the concrete pavement to the specified cross section with minimal hand work.

Consolidate the concrete without segregation. If vibrators are used:

1. The vibration rate must be at least 3,500 cycles per minute for surface vibrators and 5,000 cycles per minute for internal vibrators
2. Amplitude of vibration must cause perceptible concrete surface movement at least 1 foot from the vibrating element
3. Use a calibrated tachometer for measuring frequency of vibration
4. Vibrators must not rest on side forms or new concrete pavement
5. Power to vibrators must automatically cease when forward or backward motion of the paving machine is stopped
6. Uniformly consolidate the concrete across the paving width including adjacent to forms by using high-frequency internal vibrators within 15 minutes of depositing concrete on the subgrade
7. Do not shift the mass of concrete with vibrators.
40-1.03H Slip-Form Construction

If slip-form construction is used, spread, screed, shape, and consolidate concrete to the specified cross section with slip-form machines and minimal hand work. Slip-form paving machines must be equipped with traveling side forms and must not segregate the concrete.

Do not deviate from the specified concrete pavement alignment by more than 0.1 foot.

Slip-form paving machines must use high frequency internal vibrators to consolidate concrete. You may mount vibrators with their axes parallel or normal to the concrete pavement alignment. If mounted with axes parallel to the concrete pavement alignment, space vibrators no more than 2.5 feet measured center to center. If mounted with axes normal to the concrete pavement alignment, space the vibrators with a maximum 0.5-foot lateral clearance between individual vibrators.

Each vibrator must have a vibration rate from 5,000 to 8,000 cycles per minute. The amplitude of vibration must cause perceptible concrete surface movement at least 1 foot from the vibrating element. Use a calibrated tachometer to measure frequency of vibration.

40-1.03I Edge Treatment

Construct edge treatments as shown. Regrade when required for the preparation of safety edge areas.

Sections 40-1.03J(2) and 40-1.03J(3) do not apply to safety edges.

For safety edges placed after the concrete pavement is complete, concrete may comply with the requirements for minor concrete.

For safety edges placed after the concrete pavement is complete, install connecting bar reinforcement under section 52.

Saw cutting or grinding may be used to construct safety edges.

For safety edges, the angle of the slope must not deviate by more than ±5 degrees from the angle shown. Measure the angle from the plane of the adjacent finished pavement surface.

40-1.03J Finishing
40-1.03J(1) General

Reserved

40-1.03J(2) Preliminary Finishing
40-1.03J(2)(a) General

Preliminary finishing must produce a smooth and true-to-grade finish. After preliminary finishing, mark each day’s paving with a stamp. The stamp must be authorized before paving starts. The stamp must be approximately 1 by 2 feet in size. The stamp must form a uniform mark from 1/8 to 1/4 inch deep. Locate the mark 20 ± 5 feet from the transverse construction joint formed at each day’s start of paving and 1 ± 0.25 foot from the pavement’s outside edge. The stamp mark must show the month, day, and year of placement and the station of the transverse construction joint. Orient the stamp mark so it can be read from the pavement’s outside edge.

Do not apply water to the pavement surface before float finishing.

40-1.03J(2)(b) Stationary Side Form Finishing

If stationary side form construction is used, give the pavement a preliminary finish by the machine float method or the hand method.

If using the machine float method:

1. Use self-propelled machine floats.
2. Determine the number of machine floats required to perform the work at a rate equal to the pavement delivery rate. If the time from paving to machine float finishing exceeds 30 minutes, stop pavement delivery. When machine floats are in proper position, you may resume pavement delivery and paving.
3. Run machine floats on side forms or adjacent pavement lanes. If running on adjacent pavement, protect the adjacent pavement surface under section 40-1.03L. Floats must be hardwood, steel, or steel-shod wood. Floats must be equipped with devices that adjust the underside to a true flat surface.

If using the hand method, finish pavement smooth and true to grade with manually operated floats or powered finishing machines.

40-1.03J(2)(c) Slip-Form Finishing
If slip-form construction is used, the slip-form paver must give the pavement a preliminary finish. You may supplement the slip-form paver with machine floats.

Before the pavement hardens, correct pavement edge slump in excess of 0.02 foot exclusive of edge rounding.

40-1.03J(3) Final Finishing
After completing preliminary finishing, round the edges of the initial paving widths to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Construct longitudinal grooves with a self-propelled machine designed specifically for grooving and texturing pavement. The machine must have tracks to maintain constant speed, provide traction, and maintain accurate tracking along the pavement surface. The machine must have a single row of rectangular spring steel tines. The tines must be from 3/32 to 1/8 inch wide, on 3/4-inch centers, and must have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep. The machine must have horizontal and vertical controls. The machine must apply constant down pressure on the pavement surface during texturing. The machines must not cause raveling.

Construct grooves over the entire pavement width in a single pass except do not construct grooves 3 inches from the pavement edges and longitudinal joints. Final texture must be uniform and smooth. Use a guide to properly align the grooves. Grooves must be parallel and aligned to the pavement edge across the pavement width. Grooves must be from 1/8 to 3/16 inch deep after the pavement has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand-construct grooves using the hand method. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

For ramp termini, use heavy brooming normal to the ramp centerline to produce a coefficient of friction of at least 0.35 determined on the hardened surface under California Test 342.

40-1.03K Curing
Cure the concrete pavement's exposed area under section 90-1.03B using the waterproof membrane method or curing compound method. If using the curing compound method use curing compound no. 1 or 2. When side forms are removed within 72 hours of the start of curing, also cure the concrete pavement edges.

Apply curing compound with mechanical sprayers. Reapply curing compound to saw cuts and disturbed areas.

40-1.03L Protecting Concrete Pavement
Protect concrete pavement under section 90-1.03C.

Maintain the concrete pavement surface temperature at not less than 40 degrees F for the initial 72 hours.
Protect the concrete pavement surface from activities that cause damage and reduce texture and coefficient of friction. Do not allow soil, gravel, petroleum products, concrete, or asphalt mixes on the concrete pavement surface.

Construct crossings for traffic convenience. If authorized, you may use RSC for crossings. Do not open crossings until the Department determines that the pavement's modulus of rupture is at least 550 psi under California Test 523 or California Test 524.

Do not open concrete pavement to traffic or use equipment on the concrete pavement for 10 days after paving nor before the concrete has attained a modulus of rupture of 550 psi based on Department’s testing except:

1. If the equipment is for sawing contraction joints
2. If authorized, one side of paving equipment's tracks may be on the concrete pavement after a modulus of rupture of 350 psi has been attained, provided:
   2.1. Unit pressure exerted on the concrete pavement by the paver does not exceed 20 psi
   2.2. You change the paving equipment tracks to prevent damage or the paving equipment tracks travel on protective material such as planks
   2.3. No part of the track is closer than 1 foot from the concrete pavement's edge

If concrete pavement damage including visible cracking occurs, stop operating paving equipment on the concrete pavement and repair the damage.

40-1.03M Early Use of Concrete Pavement
If requesting early use of concrete pavement:

1. Furnish molds and machines for modulus of rupture testing
2. Sample concrete
3. Fabricate beam specimens
4. Test for modulus of rupture under California Test 523

If you request early use, concrete pavement must have a modulus of rupture of at least 350 psi. Protect concrete pavement under section 40-1.03L.

40-1.03N Reserved
40-1.03O Shoulder Rumble Strip
40-1.03O(1) General
Construct shoulder rumble strips by rolling or grinding indentations in new concrete pavement.

Do not construct shoulder rumble strips on structures or approach slabs.

Construct rumble strips within 2 inches of the specified alignment. Rumble strip equipment must be equipped with a sighting device enabling the operator to maintain the rumble strip alignment.

Indentations must not vary from the specified dimensions by more than 1/16 inch in depth nor more than 10 percent in length and width.

Grind or remove and replace noncompliant rumble strip indentations at locations determined by the Engineer. Ground surface areas must be neat and uniform in appearance.

Remove grinding residue under section 42-1.03B.

40-1.03O(2) Rolled-In Indentations
Construct rolled-in indentations before final concrete set. Indentation construction must not displace adjacent concrete.

40-1.03O(3) Ground-In Indentations
Concrete pavement must be hardened before grinding rumble strips indentations. Do not construct indentations until the following occurs:
1. 10 days elapse after concrete placement
2. Concrete has developed a modulus of rupture of 550 psi determined under California Test 523,

40-1.03P Drilling Cores
Drill concrete pavement cores under ASTM C 42/C 42M. Use diamond impregnated drill bits.

Clean, dry, and fill core holes with hydraulic cement grout (nonshrink) or pavement concrete. Coat the core hole walls with epoxy adhesive for bonding new concrete to old concrete under section 95. Finish the backfill to match the adjacent surface elevation and texture.

40-1.03Q Pavement Repair and Replacement
40-1.03Q(1) General
If surface raveling or full-depth cracks occur within one year of Contract acceptance, repair or replace the pavement under section 6-3.06.

Repair and replace pavement in the following sequence:
1. Replace pavement
2. Repair spall, ravel, and working cracks
3. Correct smoothness and coefficient of friction
4. Treat partial depth cracks
5. Replace damaged joint seals under section 41-5

In addition to removing pavement for other noncompliance, remove and replace JPCP slabs that:
1. Have one or more full depth crack
2. Have raveled surfaces such that either:
   2.1. Combined raveled areas are more than 5 percent of the total slab area
   2.2. Single area is more than 4 sq ft

Remove and replace JPCP 3 feet on both sides of a joint with a rejected dowel bar.

40-1.03Q(2) Spall and Ravel Repair
Repair spalled or raveled areas that are:
1. Deeper than 0.05 foot
2. Wider than 0.10 foot
3. Longer than 0.3 foot

Repairs must comply with section 41-4 and be completed before opening pavement to traffic.

40-1.03Q(3) Crack Repair
Treat partial depth cracks for JPCP under section 41-3.

If the joints are sealed, repair working cracks by routing and sealing. Use a powered rotary router mounted on wheels, with a vertical shaft and a routing spindle that casters as it moves along the crack.
Form a reservoir 3/4 inch deep by 3/8 inch wide in the crack. Equipment must not cause raveling nor spalling.

Treat the contraction joint adjacent to the working crack by either:
1. Epoxy resin under ASTM C 881/C 881M, Type IV, Grade 2
2. Pressure injecting epoxy resin under ASTM C 881/C881M, Type IV, Grade 1

40-1.03Q(4) Smoothness and Friction Correction
Correct pavement that is noncompliant for:
1. Smoothness by grinding under section 42-3
2. Coefficient of friction by grooving or grinding under section 42
Do not start corrective work until:
1. Pavement has cured 10 days
2. Pavement has at least a 550 psi modulus of rupture
3. Your corrective method is authorized

Correct the entire lane width. Begin and end grinding at lines perpendicular to the roadway centerline. The corrected area must have a uniform texture and appearance.

If corrections are made within areas where testing with an IP is required, retest the entire lane length with an IP under sections 40-1.01D(6)(c) and 40-1.01D(7)(b)(vii).

If corrections are made within areas where testing with a 12-foot straightedge is required, retest the corrected area with a straightedge under sections 40-1.01D(6)(c) and 40-1.01D(7)(b)(vii).

Allow 25 days for the Department's coefficient of friction retesting.

40-1.03R–40-1.03U Reserved
40-1.04 PAYMENT
The payment quantity for pavement is based on the dimensions shown.

The deduction for pavement thickness deficiency in each primary area is shown in the following table:

<table>
<thead>
<tr>
<th>Average thickness deficiency (foot)</th>
<th>Deduction($/sq yd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.90</td>
</tr>
<tr>
<td>0.02</td>
<td>2.30</td>
</tr>
<tr>
<td>0.03</td>
<td>4.10</td>
</tr>
<tr>
<td>0.04</td>
<td>6.40</td>
</tr>
<tr>
<td>0.05</td>
<td>9.11</td>
</tr>
</tbody>
</table>

*Values greater than 0.01 are rounded to the nearest 0.01 foot.

Shoulder rumble strips are measured by the station along each shoulder on which the rumble strips are constructed without deductions for gaps between indentations.

If the initial cores show that dowel bars or tie bars are within alignment tolerances and the Engineer orders more dowel or tie bar coring, the additional cores are paid for as change order work.

The Department does not pay for additional coring to check dowel or tie bar alignment which you request.

If the Engineer accepts a test strip and it remains as part of the paving surface, the test strip is paid for as the type of pavement involved.

If the curvature of a slab affects tie bar spacing and additional tie bars are required, no additional payment is made for the additional tie bars.

Payment for grinding existing pavement is not included in the payment for the type of pavement involved.

40-2 CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

40-2.01 GENERAL
40-2.01A Summary
Section 40-2 includes specifications for constructing CRCP.

Terminal joints include saw cutting, dowel bars, drill and bond dowel bars, support slab, support slab reinforcement, tack coat, and temporary hot mix asphalt.
Expansion joints include polystyrene, support slab, support slab reinforcement, dowel bars, drill and bond dowel bars, and bond breaker.

Wide flange beam terminals include polyethylene foam, support slab, and support slab reinforcement.

Pavement anchors include cross drains, anchor reinforcement, filter fabric, and permeable material.

40-2.01B Definitions
Reserved

40-2.01C Submittals
Reserved

40-2.01D Quality Control and Assurance
40-2.01D(1) General
Reserved

40-2.01D(2) Testing for Coefficient of Thermal Expansion
For field qualification, test coefficient of thermal expansion under AASHTO T 336. The coefficient of thermal expansion must not exceed 6.0 microstrain/degree Fahrenheit.

40-2.02 MATERIALS
40-2.02A General
Class 1 permeable material, filter fabric, and slotted plastic pipe cross drain as shown for pavement anchors must comply with section 68-3.

40-2.02B Concrete
Concrete for terminal joints, support slabs, and pavement anchors must comply with section 40-1.02.

40-2.02C Transverse Bar Assembly
Instead of transverse bar and other support devices, you may use transverse bar assemblies to support longitudinal bar. Bar reinforcement and wire must comply with section 40-1.02C.

40-2.02D Wide Flange Beam
Wide flange beams and studs must be either rolled structural steel shapes under ASTM A 36/A 36M or structural steel under ASTM A 572/A 572M.

40-2.02E Joints
Joint seals for wide flange beam terminals must comply with section 51-2.02.

Joint seals for transverse expansion joints must comply with section 51-2.02.

Expanded polystyrene for transverse expansion joints must comply with section 51-2.01B(1).

40-2.03 CONSTRUCTION
40-2.03A General
Reserved

40-2.03B Test Strips
Comply with section 40-1.03C except during the evaluation, the Engineer visually checks reinforcement, dowel and tie bar placement.

40-2.03C Construction Joints
Transverse construction joints must be perpendicular to the lane line. Construct joints to allow for lap splices of the longitudinal bar. Comply with the lap splice lengths shown for CRCP.

Clean construction joint surfaces before placing fresh concrete against the joint surfaces. Remove surface laitance, curing compound, and other foreign materials.
40-2.03D Bar Reinforcement

Place bar reinforcement under section 52-1.03D, except you may request to use plastic chairs. Plastic chairs will only be considered for support directly under the transverse bars. Your request to use plastic chairs must include a sample of the plastic chair, the manufacturer's written recommendations for the applicable use and load capacity, chair spacing, and your calculation for the load on a chair for the area of bar reinforcement sitting on it. Vertical and lateral stability of the bar reinforcement and plastic chairs must be demonstrated during construction of the test strip. Obtain authorization before using the proposed plastic chairs for work after the test strip is accepted.

For transverse bar in a curve with a radius under 2,500 feet, place the reinforcement in a single continuous straight line across the lanes and aligned with the radius point as shown.

40-2.03E Wide Flange Beams

Weld stud ends with an electric arc welder completely fusing the studs to the wide flange beam. Replace studs dislodged in shipping or that can be dislodged with a hammer.

40-2.03F Repair and Replacement

40-2.03F(1) General

Requirements for repair of cracks under section 40-1.03Q do not apply to CRCP. High molecular weight methacrylate is not to be applied to cracks in CRCP.

New CRCP will be monitored for 1 year from contract acceptance or relief from maintenance, whichever is less. CRCP that develops raveling areas of 6 inches by 6 inches or greater will require partial depth repair under section 6-3.06. CRCP that develops one or more full-depth transverse cracks with faulting greater than 0.25 inch or one or more full-depth longitudinal cracks with faulting greater 0.50 inch will require full depth repair.

40-2.03F(2) Partial Depth Repair

Partial depth repair must comply with section 41-4 except:

1. Determine a rectangular boundary which extends 6 inches beyond the damaged area. The limits of saw depth must be between 2 inches from the surface to 1/2 inch above the longitudinal bars.
2. If each length of the repair boundaries is equal to or greater than 3 ft, additional reinforcement is needed for the repair area. Submit a plan for authorization before starting the repair.

40-2.03F(3) Full Depth Repair

40-2.03F(3)(a) General

Removal of CRCP must be full depth except for portion of reinforcement to remain. Provide continuity of reinforcement. Comply with section 52-6. Submit a plan for authorization, before starting the repair. Do not damage the base, concrete and reinforcement to remain. Place concrete in the removal area.

40-2.03F(3)(b) Transverse Cracks

Make initial full-depth transverse saw cuts normal to the lane line a distance of 3 feet on each side of the transverse crack.

40-2.03F(3)(c) Longitudinal Cracks

Remove the cracked area normal to the lane line for the full width of the lane a distance of 1 foot beyond the ends of the crack. You may propose alternate limits with your repair plan for authorization.

40-2.03G Reserved

40-2.04 PAYMENT

Not Used
40-4.01 GENERAL

40-4.01A Summary
Section 40-4 includes specifications for constructing JPCP.

40-4.01B Definitions
Reserved

40-4.01C Submittals
40-4.01C(1) General
Reserved

40-4.01C(2) Early Age Crack Mitigation System
At least 24 hours before each paving shift, submit the following information as an informational submittal:

1. Early age stress and strength predictions
2. Scheduled sawing and curing activities
3. Contingency plan if cracking occurs

40-4.01C(3)–40-4.01C(8) Reserved

40-4.01D Quality Control and Assurance
40-4.01D(1) General
Reserved

40-4.01D(2) Quality Control Plan
The QC plan must include a procedure for identifying transverse contraction joint locations relative to the dowel bars longitudinal center and a procedure for consolidating concrete around the dowel bars.

40-4.01D(3) Early Age Crack Mitigation System
For JPCP, develop and implement a system for predicting stresses and strength during the initial 72 hours after paving. The system must include:

1. Subscription to a weather service to obtain forecasts for wind speed, ambient temperatures, humidity, and cloud cover
2. Portable weather station with an anemometer, temperature and humidity sensors, located at the paving site
3. Early age concrete pavement stress and strength prediction plan
4. Analyzing, monitoring, updating, and reporting the system's predictions

40-4.01D(4)–40-4.01D(9) Reserved

40-4.02 MATERIALS
Not Used

40-4.03 CONSTRUCTION

40-4.03A General
Transverse contraction joints on a curve must be on a single straight line through the curve's radius point. If transverse joints do not align in a curve, drill a full depth 2” diameter hole under ASTM C 42/C 42M where the joint meets the adjacent slab. Fill the hole with joint filler. If joints are not sealed, avoid joint filler material penetration into the joint.

40-4.03B Repair and Replacement
If replacing concrete, saw cut and remove to full depth.
Saw cut full slabs at the longitudinal and transverse joints. Saw cut partial slabs at joints and at locations determined by the Engineer. Saw cut must be vertical.

After lifting the slab, paint the cut ends of dowels and tie bars.

Construct transverse and longitudinal construction joints between the new slab and existing concrete. If slabs are constrained at both longitudinal edges by existing pavement, use dowel bars instead of tie bars. For longitudinal joints, offset dowel bar holes from original tie bars by 3 inches. For transverse joints, offset dowel bar holes from the original dowel bar by 3 inches.

Drill and bond bars to the existing concrete. Comply with section 41-10. Clean the faces of joints and underlying base from loose material and contaminants. Coat the faces with a double application of pigmented curing compound under section 28-2.03F. For partial slab replacements, place preformed sponge rubber expansion joint filler at new transverse joints under ASTM D 1752. Place concrete in the removal area.

40-4.03C–40-4.03G Reserved
40-4.04 PAYMENT
Not Used

40-5 JOINTED PLAIN CONCRETE PAVEMENT WITH RAPID STRENGTH CONCRETE
Reserved

40-6–40-15 RESERVED

41 CONCRETE PAVEMENT REPAIR
04-18-14
Replace the headings and paragraphs in section 41 with:

41-1 GENERAL

41-1.01 GENERAL

41-1.01A Summary
Section 41-1 includes general specifications for repairing concrete pavement.

Dowel bars must comply with section 40-1.

41-1.01B Definitions
Reserved

41-1.01C Submittals
At least 15 days before delivering fast-setting concrete, polyester resin binder, or bonding agent to the job site, submit the manufacturer's recommendations, instructions, and MSDS. Notify the Engineer if polyester resin binder will be stored in containers over 55 gallons.

41-1.01D Quality Control and Assurance
41-1.01D(1) General
Before using polyester concrete, allow 14 days for sampling and testing of the polyester resin binder.

41-1.01D(2) Reserved
41-1.02 MATERIALS
41-1.02A General
Water for washing aggregates, mixing concrete, curing, and coring must comply with section 90-1.02D.
Use the minimum amount of water to produce workable concrete and comply with the manufacturer’s instructions.

41-1.02B Fast-Setting Concrete

Fast-setting concrete must be one of the following:

1. Magnesium phosphate concrete that is either:
   1.1. Single component water activated
   1.2. Dual component with a prepackaged liquid activator
2. Modified high-alumina based concrete
3. Portland cement based concrete

Fast-setting concrete must be stored in a cool and dry environment.

If used, the addition of retarders must comply with the manufacturer’s instructions.

You may use any accelerating chemical admixtures complying with ASTM C494/C494M, Type C and section 90-1.02E.

Fast-setting concrete properties must have the values shown in the following table:

<table>
<thead>
<tr>
<th>Fast-Setting Concrete</th>
<th>Test method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength* (psi, min)</td>
<td>California Test 551</td>
<td>3,000</td>
</tr>
<tr>
<td></td>
<td>California Test 551</td>
<td>5,000</td>
</tr>
<tr>
<td>Flexural strength* (psi, min, at 24 hours)</td>
<td>California Test 551</td>
<td>500</td>
</tr>
<tr>
<td>Bond strength† (psi, min, at 24 hours)</td>
<td>Saturated surface dry concrete</td>
<td>California Test 551</td>
</tr>
<tr>
<td></td>
<td>Dry concrete</td>
<td>California Test 551</td>
</tr>
<tr>
<td>Water absorption (%)</td>
<td>California Test 551</td>
<td>10</td>
</tr>
<tr>
<td>Abrasion resistance (g, max, at 24 hours)</td>
<td>California Test 550</td>
<td>25</td>
</tr>
<tr>
<td>Drying shrinkage (%)</td>
<td>ASTM C596</td>
<td>0.13</td>
</tr>
<tr>
<td>Water soluble chlorides (%)</td>
<td>California Test 422</td>
<td>0.05</td>
</tr>
<tr>
<td>Water soluble sulfates (%)</td>
<td>California Test 417</td>
<td>0.25</td>
</tr>
<tr>
<td>Thermal stability (%)</td>
<td>California Test 553</td>
<td>90</td>
</tr>
</tbody>
</table>

*Perform test with aggregate filler if used.
†Test must be performed on a cube specimen, fabricated under California Test 551, cured at least 14 days, and then pulverized to 100% passing the no. 50 sieve.

Aggregate filler may be used to extend prepackaged concrete. Aggregate filler must:

1. Be clean and uniformly rounded.
2. Have a moisture content of 0.5-percent by weight or less when tested under California Test 226.
3. Comply with sections 90-1.02C(2) and 90-1.02C(3).
4. Not exceed 50 percent of the concrete volume or the maximum recommended by the fast-setting concrete manufacturer, whichever is less.

When tested under California Test 202, aggregate filler must comply with the grading in the following table:

<table>
<thead>
<tr>
<th>Aggregate Filler Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve size</td>
</tr>
<tr>
<td>3/8 inch</td>
</tr>
<tr>
<td>No. 4</td>
</tr>
<tr>
<td>No. 16</td>
</tr>
</tbody>
</table>
41-1.02C Polyester Concrete

Polyester concrete consists of polyester resin binder and dry aggregate. The polyester resin binder must be an unsaturated isophthalic polyester-styrene copolymer.

Polyester resin binder properties must have the values shown in the following table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity(^a) (Pa·s)</td>
<td>ASTM D2196</td>
<td>0.075–0.200</td>
</tr>
<tr>
<td>RVT, No. 1 spindle, 20 RPM at 77 °F</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific gravity(^a) (77 °F)</td>
<td>ASTM D1475</td>
<td>1.05–1.10</td>
</tr>
<tr>
<td>Elongation (%), min</td>
<td>ASTM D638</td>
<td>35</td>
</tr>
<tr>
<td>Type I specimen, 0.25 ± 0.03 inch thick</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed of testing = 0.45 inch/minute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition 18/25/50+5/70: T—23/50</td>
<td>ASTM D618</td>
<td></td>
</tr>
<tr>
<td>Tensile strength (psi, min)</td>
<td>ASTM D638</td>
<td>2,500</td>
</tr>
<tr>
<td>Type I specimen, 0.25 ± 0.03 inch thick</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed of testing = 0.45 inch/minute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition 18/25/50+5/70: T—23/50</td>
<td>ASTM D618</td>
<td></td>
</tr>
<tr>
<td>Styrene content(^a) (% by weight)</td>
<td>ASTM D2369</td>
<td>40–50</td>
</tr>
<tr>
<td>Silane coupler (% by weight of polyester resin binder)</td>
<td>--</td>
<td>1.0</td>
</tr>
<tr>
<td>PCC saturated surface-dry bond strength at 24 hours and 70 ± 2 °F (psi, min)</td>
<td>California Test 551</td>
<td>500</td>
</tr>
<tr>
<td>Static volatile emissions(^a) (g/sq m, max)</td>
<td>South Coast Air Quality Management District, Method 309-91(^b)</td>
<td>60</td>
</tr>
</tbody>
</table>

\(^a\)Perform the test before adding initiator.
\(^b\)For the test method, go to: http://www.aqmd.gov/tao/methods/lab/309-91.pdf

Silane coupler must be an organosilane ester, gamma-methacryloxypropyltrimethoxysilane. Promoter must be compatible with suitable methyl ethyl ketone peroxide (MEKP) and cumene hydroperoxide (CHP) initiators.

Aggregate for polyester concrete must comply with section 90-1.02C(1), 90-1.02C(2), and 90-1.02C(3).

When tested under California Test 202, the combined aggregate grading must comply with one of the gradations in the following table:

<table>
<thead>
<tr>
<th>Sieve size</th>
<th>Percentage passing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>83–100</td>
</tr>
<tr>
<td>No. 4</td>
<td>65–82</td>
</tr>
<tr>
<td>No. 8</td>
<td>45–64</td>
</tr>
<tr>
<td>No. 16</td>
<td>27–48</td>
</tr>
<tr>
<td>No. 30</td>
<td>12–30</td>
</tr>
<tr>
<td>No. 50</td>
<td>6–17</td>
</tr>
<tr>
<td>No. 100</td>
<td>0–7</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–3</td>
</tr>
</tbody>
</table>

OCTOBER 2015
Aggregate retained on the no. 8 sieve must have a maximum of 45 percent crushed particles under California Test 205. Fine aggregate must be natural sand.

The weighted average absorption must not exceed 1 percent when tested under California Tests 206 and 207.

You may submit an alternative grading or request to use manufactured sand as fine aggregate but 100 percent of the combined grading must pass the 3/8 inch sieve. Allow 21 days for authorization.

Polyester concrete must have a minimum compressive strength of 1250 psi at 3 hours and 30 minutes under California Test 551 or ASTM C109.

41-1.02D Bonding Agent
Bonding agent must comply with the concrete manufacturer’s recommendations.

41-1.02E Temporary Pavement Structure
Temporary pavement structure consists of RSC or aggregate base with HMA. RSC not conforming to the specifications may serve as temporary pavement structure if:

1. The modulus of rupture is at least 200 psi before opening to traffic
2. RSC thickness is greater than or equal to the existing concrete pavement surface layer
3. RSC is replaced during the next paving shift

Aggregate base for temporary pavement structure must comply with the 3/4-inch maximum grading specified in section 26-1.02B.

HMA must comply with the specifications for minor HMA in section 39.

41-1.02F Reserved
41-1.03 CONSTRUCTION
41-1.03A General
Repair only the portion of pavement where the work will be completed during the same lane closure. If removal is required, remove only the portion of pavement where the repair will be completed during the same traffic closure. Completion of concrete repair includes curing until the concrete attains the specified minimum properties required before opening the repaired pavement to traffic.

If you fail to complete the concrete pavement repair during the same lane closure, construct temporary pavement before opening the lane to traffic.

Before starting repair work, except saw cutting: the equipment, materials, and personnel for constructing temporary pavement structure must be at the job site or an approved location. If HMA can be delivered to the job site within 1 hour, you may request 1-hour delivery as an alternative to having the HMA at the job site.

Maintain the temporary pavement structure and replace it as a first order of work as soon as you resume concrete pavement repair work.

After removing temporary pavement structure, you may stockpile that aggregate base at the job site and reuse it for temporary pavement structure.

41-1.03B Mixing and Applying Bonding Agent
Mix and apply the bonding agent at the job site under the manufacturer’s instructions and in small quantities.

Apply bonding agent after cleaning the surface and before placing concrete.

Apply a thin, even coat of bonding agent with a stiff bristle brush until the entire repair surface is scrubbed and coated with bonding agent.
41-1.03C Mixing Concrete

41-1.03C(1) General
Mix concrete in compliance with the manufacturer's instructions. For repairing spalls, mix in a small mobile drum or paddle mixer. Comply with the manufacturer’s recommended limits for the quantity of aggregate filler, water, and liquid activator.

Mix the entire contents of prepackaged dual-component magnesium phosphate concrete as supplied by the manufacturer. Use the full amount of each component and do not add water to dual-component magnesium phosphate concrete.

Magnesium phosphate concrete must not be mixed in containers or worked with tools containing zinc, cadmium, aluminum, or copper.

Modified high-alumina based concrete must not be mixed in containers or worked with tools containing aluminum.

41-1.03C(2) Polyester Concrete
When mixing with resin, the moisture content of the combined aggregate must not exceed 1/2 of the average aggregate absorption when tested under California Test 226.

Proportion the polyester resin and aggregate to produce a mixture with suitable workability for the intended work. Only a minimal amount of resin may rise to the surface after finishing.

41-1.03D Placing Concrete
The pavement surface temperature must be at least 40 degrees F before placing concrete. You may propose methods to heat the surfaces.

Place magnesium phosphate concrete on a dry surface.

Place portland cement and modified high-alumina concrete on surfaces treated with a bonding agent recommended by the concrete manufacturer. If no bonding agent is recommended by the manufacturer, place concrete on damp surfaces that are not saturated.

Do not retemper concrete. Use dry finishing tools cleaned with water before working the concrete.

41-1.03E Curing Concrete
Cure concrete under the manufacturer’s instructions. When curing compound is used, comply with section 90-1.03B for curing compound no. 1 or 2.

41-1.03F Reserved

41-1.04 PAYMENT
Not Used

41-2 SUBSEALING AND JACKING

41-2.01 GENERAL

41-2.01A Summary
Section 41-2 includes specifications for filling voids under existing concrete pavement.

41-2.01B Definitions
Reserved

41-2.01C Submittals
Submit shipping invoices with packaged or bulk fly ash and cement.

Before grouting activities begin, submit a proposal for the materials to be used. Include authorized laboratory test data for the grout indicating:

1. Time of initial setting under ASTM C266.
2. Compressive strength results at 1, 3, and 7 days for 10, 12, and 14-second grout efflux times.
If requesting a substitution of grout materials, submit a proposal that includes test data.

41-2.01D Quality Control and Assurance
Reserved

41-2.02 MATERIALS
41-2.02A General
Reserved

41-2.02B Grout
Grout must consist of Type II portland cement, fly ash, and water. Use from 2.4 to 2.7 parts fly ash to 1 part portland cement by weight. Use enough water to produce the following grout efflux times determined under California Test 541, Part D:

1. From 10 to 16 seconds for subsealing
2. From 10 to 26 seconds for jacking

Cement for grout must comply with the specifications for Type II portland cement in section 90-1.02B(2). Fly ash must comply with AASHTO M 295, Class C or Class F. Fly ash sources must be on the Authorized Material List.

You may use chemical admixtures and calcium chloride. Chemical admixtures must comply with section 90-1.02E(2). Calcium chloride must comply with ASTM D98.

Test grout compressive strength under California Test 551, Part 1 at 7 days with 12 seconds efflux time. Follow the procedures for moist cure. The 7-day compressive strength must be at least 750 psi.

41-2.02C Mortar
Mortar must be a prepackaged fast-setting mortar that complies with ASTM C928.

41-2.02D Reserved

41-2.03 CONSTRUCTION
41-2.03A General
Drill holes in the pavement, inject grout, plug the holes, and finish the holes with mortar.

Drill holes through the pavement and underlying base to a depth from 15 to 18 inches below the pavement surface. The hole diameter must match the fitting for the grout injecting equipment.

41-2.03B Injecting Grout
41-2.03B(1) General
Inject grout within 2 days of drilling holes.

Immediately before injecting grout, clean the drilled holes with water at a minimum pressure of 40 psi. The cleaning device must have at least 4 jets that direct water horizontally at the slab-base interface.

Do not inject grout if the atmospheric or subgrade temperature is below 40 degrees F. Do not inject grout in inclement weather. If water is present in the holes, obtain the Engineer's authorization before injecting grout.

Do not inject grout until at least 2 consecutive slabs requiring subsealing are drilled ahead of the grouting activities.

The grout plant must have a positive displacement cement injection pump and a high-speed colloidal mixer capable of operating from 800 to 2,000 rpm. The injection pump must sustain 150 psi if pumping grout with a 12-second efflux time. A pressure gauge must be located immediately adjacent to the supply valve of the grout hose supply valve and positioned for easy monitoring.
Before mixing, weigh dry cement and fly ash if delivered in bulk. If the materials are packaged, each container must weigh the same.

Introduce water to the mixer through a meter or scale.

Inject grout under pressure until the voids under the pavement slab are filled. The injection nozzle must not leak. Do not inject grout if the nozzle is below the bottom of the slab. Inject grout 1 hole at a time.

Stop injecting grout in a hole if either:

1. Grout does not flow under a sustained pump gauge pressure of 150 psi after 7 seconds and there is no indication the slab is moving.
2. Injected grout rises to the surface at any joint or crack, or flows into an adjacent hole.

Dispose of unused grout within 1 hour of mixing.

**41-2.03B(2) Subsealing**

If a slab raises more than 1/16 inch due to grout injection, stop injecting grout in that hole.

**41-2.03B(3) Jacking**

The positive displacement pump used for grout injection must be able to provide a sustained gauge pressure of 200 psi. Gauge pressures may be from 200 to 600 psi for brief periods to start slab movement.

You may add additional water to initiate pressure injection of grout. Do not reduce the grout efflux time below 10 seconds.

Raise the slabs uniformly. Use string lines to monitor the pavement movement.

Do not move adjacent slabs not specified for pavement jacking. If you move adjacent slabs, correct the grade within the tolerances for final pavement elevation.

**41-2.03B(4) Finishing**

Immediately after removing the injection nozzle, plug the hole with a round, tapered wooden plug. Do not remove plugs until adjacent holes are injected with grout and no grout surfaces through previously injected holes.

After grouting, remove grout from drilled holes at least 4 inches below the pavement surface. Clean holes and fill with mortar. Finish filled holes flush with the pavement surface.

**41-2.03B(5) Tolerances**

The final pavement elevation must be within 0.01 foot of the required grade. If the final pavement elevation is between 0.01 and 0.10 foot higher than the required grade, grind the noncompliant pavement surface under section 42 to within 0.01 foot of the required grade.

If the final pavement elevation is higher than 0.10 foot from the required grade, remove and replace the noncompliant pavement under section 41-9.

**41-2.04 PAYMENT**

The payment quantity for subsealing is calculated by adding the dry weight of cement and fly ash used for the placed grout. The payment quantity for jacking is calculated by adding the dry weight of cement and fly ash used for the placed grout.

The Department does not pay for wasted grout.

The Department does not adjust the unit price for an increase or decrease in the subsealing quantity.

The Department does not adjust the unit price for an increase or decrease in the jacking quantity.
41-3 CRACK TREATMENT

41-3.01 GENERAL

41-3.01A Summary
Section 41-3 includes specifications for applying high-molecular-weight methacrylate (HMWM) to concrete pavement surface cracks that do not extend the full slab depth.

41-3.01B Definitions
Reserved

41-3.01C Submittals
41-3.01C(1) General
Submit HMWM samples 20 days before use.

If sealant is to be removed, submit the proposed removal method at least 7 days before sealant removal. Do not remove sealant until the proposed sealant removal method is authorized.

41-3.01C(2) Public Safety and Placement Plans
Before starting crack treatment, submit a public safety plan for HMWM and a placement plan for construction activity as shop drawings.

The public safety and placement plans must identify the materials, equipment, and methods to be used.

In the public safety plan, include the MSDS for each component of HMWM and details for:

1. Shipping
2. Storage
3. Handling
4. Disposal of residual HMWM and containers

If the project is in an urban area adjacent to a school or residence, the public safety plan must also include an airborne emissions monitoring plan prepared by a CIH certified in comprehensive practice by the American Board of Industrial Hygiene. Submit a copy of the CIH's certification. The CIH must monitor the emissions at a minimum of 4 points including the mixing point, the application point, and the point of nearest public contact. At work completion, submit a report by the industrial hygienist with results of the airborne emissions monitoring plan.

The placement plan must include:

1. Crack treatment schedule including coefficient of friction testing
2. Methods and materials including:
   2.1. Description of equipment for applying HMWM
   2.2. Description of equipment for applying sand
   2.3. Gel time range and final cure time for resin

Revise rejected plans and resubmit. With each plan rejection, the Engineer gives revision directions including detailed comments in writing. The Engineer notifies you of a plan’s acceptance or rejection within 2 weeks of receiving that plan.

41-3.01C(3) Reserved

41-3.01D Quality Control and Assurance
41-3.01D(1) General
Use test tiles to evaluate the HMWM cure time. Coat at least one 4 by 4 inch smooth glazed tile for each batch of HMWM. Place the coated tile adjacent to the area being treated. Do not apply sand to the test tiles.

Use the same type of crack treatment equipment for testing and production.
41-3.01D(2) Test Area
Before starting crack treatment, treat a test area of at least 500 square feet within the project limits at a location accepted by the Engineer. Use test areas outside the traveled way if available.

Treat the test area under weather and pavement conditions similar to those expected during crack treatment production.

The Engineer evaluates the test area based on the acceptance criteria. Do not begin crack treatment until the Engineer accepts the test area.

41-3.01D(3) Reserved
41-3.01D(4) Acceptance Criteria
The Engineer accepts a treated area if:

1. Corresponding test tiles are dry to the touch
2. Treated surface is tack-free and not oily
3. Sand cover adheres enough to resist hand brushing
4. Excess sand is removed
5. Coefficient of friction is at least 0.30 when tested under California Test 342

41-3.02 MATERIALS
HMWM consists of compatible resin, promoter, and initiator. HMWM resin may be prepromoted by mixing promoter and resin together before filling containers. Identify prepromoted resin on the container label.

Adjust the gel time to compensate for temperature changes throughout the application.

HMWM resin properties must have the following values:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity a (cP, max, Brookfield RVT with UL adapter, 50 RPM at 77 °F)</td>
<td>ASTM D2196</td>
<td>25</td>
</tr>
<tr>
<td>Specific gravity a (min, at 77 °F)</td>
<td>ASTM D1475</td>
<td>0.90</td>
</tr>
<tr>
<td>Flash point a (°F, min)</td>
<td>ASTM D3278</td>
<td>180</td>
</tr>
<tr>
<td>Vapor pressure a (mm Hg, max, at 77 °F)</td>
<td>ASTM D323</td>
<td>1.0</td>
</tr>
<tr>
<td>Tack-free time (minutes, max, at 77 °F)</td>
<td>Specimen prepared under California Test 551</td>
<td>400</td>
</tr>
<tr>
<td>Volatile content a (% max)</td>
<td>ASTM D2369</td>
<td>30</td>
</tr>
<tr>
<td>PCC saturated surface-dry bond strength (psi, min, at 24 hours and 77 ± 2 °F)</td>
<td>California Test 551</td>
<td>500</td>
</tr>
</tbody>
</table>

a Perform the test before adding initiator.

Sand must be commercial quality dry blast sand. At least 95 percent of the sand must pass the no. 8 sieve and at least 95 percent must be retained on the no. 20 sieve when tested under California Test 202.

41-3.02D Reserved
41-3.03 CONSTRUCTION
41-3.03A General
Before applying HMWM, clean the pavement surface by abrasive blasting and blow loose material from visible cracks with high-pressure air. Remove concrete curing seals from the pavement to be treated. The pavement must be dry when blast cleaning is performed. If the pavement surface becomes contaminated before applying the HMWM, clean the pavement surface by abrasive blasting.
If performing abrasive blasting within 10 feet of a lane occupied by traffic, operate abrasive blasting equipment with a concurrently operating vacuum attachment.

During pavement treatment, protect pavement joints, working cracks, and surfaces not being treated.

The equipment applying HMWM must combine the components by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars must not cause atomization. Do not use compressed air to produce the spray. Use a shroud to enclose the spray bar apparatus.

You may apply HMWM manually to prevent overspray onto adjacent traffic. If applying resin manually, limit the batch quantity of HMWM to 5 gallons.

Apply HMWM at a rate of 90 square feet per gallon. The prepared area must be dry and the surface temperature must be from 50 to 100 degrees F while applying HMWM. Do not apply HMWM if the ambient relative humidity is more than 90 percent.

Protect existing facilities from HMWM. Repair or replace existing facilities contaminated with HMWM at your expense.

Flood the treatment area with HMWM to penetrate the pavement and cracks. Apply HMWM within 5 minutes after complete mixing. Mixed HMWM viscosity must not increase. Redistribute excess material with squeegees or brooms within 10 minutes of application. Remove excess material from tined grooves.

Wait at least 20 minutes after applying HMWM before applying sand. Apply sand at a rate of approximately 2 pounds per square yard or until refusal. Remove excess sand by vacuuming or sweeping.

Do not allow traffic on the treated surface until:

1. Treated surface is tack-free and non-oily
2. Sand cover adheres enough to resist hand brushing
3. Excess sand is removed
4. Coefficient of friction is at least 0.30 determined under California Test 342

41-3.04 PAYMENT
Not Used

41-4 SPALL REPAIR

41-4.01 GENERAL
Section 41-4 includes specifications for repairing spalls in concrete pavement.

41-4.02 MATERIALS
Repair spalls using polyester concrete with a bonding agent. The bonding agent must comply with the requirements for HMWM in section 41-3.02 except tack-free time requirements do not apply and the HMWM must not contain wax.

Form board must be corrugated cardboard with a 6-mil polyethylene covering.

41-4.03 CONSTRUCTION
41-4.03A General
Prepare spall areas by removing concrete and cleaning. Use a form board to provide compression relief at joints and cracks.

After completing spall repairs do not allow traffic on the repairs for at least 2 hours after the time of final setting under ASTM C403/403M.

41-4.03B Remove Pavement
The Engineer determines the rectangular limits of unsound concrete pavement. Before removing pavement, mark the saw cut lines and spall repair area on the pavement surface.
Do not remove pavement until the Engineer verbally authorizes the saw cut area.

Use a power-driven saw with a diamond blade.

Remove pavement as shown and:

1. From the center of the repair area towards the saw cut
2. To the full saw cut depth
3. At least 2 inches beyond the saw cut edge to produce a rough angled surface

Produce a rough surface by chipping or other removal methods that do not damage the pavement remaining in-place. Completely remove any saw overcuts. Pneumatic hammers used for concrete removal must weigh 15 lbs or less.

If you damage concrete pavement outside the removal area, enlarge the area to remove the damaged pavement.

If dowel bars are exposed during removal, remove concrete from the exposed surface and cover with duct tape.

41-4.03C Cleaning
After pavement has been removed, clean the exposed faces of the concrete by:

1. Sand or water blasting. Water blasting equipment must be capable of producing a blast pressure of 3,000 to 6,000 psi.
2. Blowing the exposed concrete area with compressed air free of moisture and oil to remove debris after blasting. Air compressors must deliver air at a minimum of 120 cfm and develop 90 psi of nozzle pressure.

41-4.03D Form Board Installation
After cleaning, place the form board to match the existing joint or crack alignment. Extend the form board at least 3 inches beyond each end of the repair and at least 1 inch deeper than the repair. Remove the form board before sealing joints or cracks.

41-4.03E–41-4.03I Reserved

41-4.04 PAYMENT
Payment is calculated based on the authorized saw cut area.

The Department does not adjust the unit price for an increase or decrease in the spall repair quantity.

41-5 JOINT SEALS

41-5.01 GENERAL

41-5.01A Summary
Section 41-5 includes specifications for sealing concrete pavement joints or replacing existing concrete pavement joint seals. Pavement joints include isolation joints.

41-5.01B Definitions
Reserved

41-5.01C Submittals
At least 15 days before delivery to the job site, submit a certificate of compliance, MSDS, manufacturer's recommendations, and instructions for storage and installation of:

1. Liquid joint sealant.
2. Backer rods. Include the manufacturer data sheet verifying compatibility with the liquid joint sealant.
3. Preformed compression joint seal. Include the manufacturer data sheet used to verify the seal for the joint dimensions shown.
4. Lubricant adhesive.
Asphalt rubber joint sealant containers must comply with ASTM D6690. Upon delivery of asphalt rubber joint sealant to the job site, submit a certified test report for each lot based on testing performed within 12 months.

Submit a work plan for removing pavement and joint materials. Allow 10 days for authorization. Include descriptions of the equipment and methods for removal of existing pavement and joint material.

41-5.01D Quality Control and Assurance

41-5.01D(1) General

Before sealing joints, arrange for a representative from the manufacturer to provide training on cleaning and preparing the joint and installing the liquid joint sealant or preformed compression joint seal. Do not seal joints until your personnel and the Department's personnel have been trained.

The Engineer accepts joint seals based on constructed dimensions and visual inspection of completed seals for voids.

41-5.01D(2) Reserved

41-5.02 MATERIALS

41-5.02A General

Use the type of seal material described.

Silicone or asphalt rubber joint sealant must not bond or react with the backer rod.

41-5.02B Silicone Joint Sealant

Silicone joint sealant must be on the Authorized Material List.

41-5.02C Asphalt Rubber Joint Sealant

Asphalt rubber joint sealant must:

1. Be paving asphalt mixed with not less than 10 percent ground rubber by weight. Ground rubber must be vulcanized or a combination of vulcanized and devulcanized materials that pass a no. 8 sieve.
2. Comply with ASTM D6690 for Type II.
3. Be capable of melting at a temperature below 400 degrees F and applied to cracks and joints.

41-5.02D Backer Rods

Backer rods must:

1. Comply with ASTM D5249:
   1.1. Type 1 for asphalt rubber joint sealant
   1.2. Type 1 or Type 3 for silicone joint sealant
2. Be expanded, closed-cell polyethylene foam
3. Have a diameter at least 25 percent greater than the saw cut joint width

41-5.02E Preformed Compression Joint Seals

Preformed compression joint seals must:

1. Comply with ASTM D2628
2. Have 5 or 6 cells, except seals 1/2 inch wide or less may have 4 cells

Lubricant adhesive used to install seals must comply with ASTM D2835.

41-5.02F–41-5.02K Reserved

41-5.03 CONSTRUCTION

41-5.03A General

If joint sealing is described for new concrete pavement, do not start joint sealing activities until the pavement has been in place for at least 7 days. Seal new concrete pavement joints at least 7 days after concrete pavement placement if shown.
Remove existing pavement and joint material by sawing, rectangular plowing, cutting, or manual labor. Saw cut the reservoir before cleaning the joint. Use a power-driven saw with a diamond blade.

If you damage a portion of the pavement to remain in place, repair the pavement under section 41-4.

41-5.03B Joint Cleaning
41-5.03B(1) General
Clean the joint after removal and any repair is complete before installing joint seal material. Cleaning must be completed no more than 4 hours before installing backer rods, liquid joint seal, or preformed compression seals using the following sequence:

1. Removing debris
2. Drying
3. Sandblasting
4. Air blasting
5. Vacuuming

Clean in 1 direction to minimize contamination of surrounding areas.

41-5.03B(2) Removing Debris
Remove debris including dust, dirt, and visible traces of old sealant from the joint after sawing, plowing, cutting, or manual removal. Do not use chemical solvents to wash the joint.

41-5.03B(3) Drying
After removing debris, allow the reservoir surfaces to dry or remove moisture and dampness at the joint with compressed air that may be moderately hot.

41-5.03B(4) Sandblasting
After the joint is dry, sandblast the reservoir to remove remaining residue using a 1/4-inch diameter nozzle and 90 psi minimum pressure. Do not sandblast straight into the reservoir. Angle the sandblasting nozzle within 1 to 2 inches from the concrete and make at least 1 pass to clean each reservoir face.

41-5.03B(5) Air Blasting
After sandblasting, airblast the reservoir to remove sand, dirt, and dust 1 hour before sealing the joint. Use compressed air free of oil and moisture delivered at a minimum rate of 120 cfm and 90 psi nozzle pressure.

41-5.03B(6) Vacuuming
After air blasting, use a vacuum sweeper to remove debris and contaminants from the pavement surfaces surrounding the joint.

41-5.03B(7) Reserved

41-5.03C Installing Liquid Joint Sealant
Where backer rods are shown, place the rods before installing liquid joint sealant. Place backer rods under the manufacturer’s instructions unless otherwise specified. The pavement and reservoir surfaces must be dry and the ambient air temperature must be at least 40 degrees F and above the dew point. The reservoir surface must be free of residue or film. Do not puncture the backer rod.

Immediately after placing the backer rod, install liquid joint sealant under the manufacturer’s instructions unless otherwise specified. Before installing, demonstrate that fresh liquid sealant is ejected from the nozzle free of cooled or cured material. For asphalt rubber joint sealant, the pavement surface temperature must be at least 50 degrees F before installing.

Pump liquid joint sealant through a nozzle sized for the width of the reservoir so that liquid joint sealant is placed directly onto the backer rod. The installer must draw the nozzle toward his body and extrude liquid joint sealant evenly. Liquid joint sealant must maintain continuous contact with the reservoir walls during extrusion.
After placing liquid joint sealant, recess it to the depth shown within 10 minutes of installation and before a skin begins to form.

After each joint is sealed, remove excess liquid joint sealant on the pavement surface. Do not allow traffic over the sealed joints until the liquid joint sealant is set, tack free, and firm enough to prevent embedment of roadway debris.

41-5.03D Installing Preformed Compression Joint Seals
Install preformed compression joint seals using lubricant adhesive as shown and under the manufacturer's instructions.

Install longitudinal seals before transverse seals. Longitudinal seals must be continuous except splicing is allowed at intersections with transverse seals. Transverse seals must be continuous for the entire transverse length of concrete pavement except splices are allowed for widening and staged construction. With a sharp instrument, cut across the longitudinal seal at the intersection with transverse construction joints. If the longitudinal seal does not relax enough to properly install the transverse seal, trim the longitudinal seal to form a tight seal between the 2 joints.

If splicing is authorized, comply with the manufacturer’s instructions.

Use a machine specifically designed for preformed compression joint seal installation. The machine must install the seal:
1. To the specified depth
2. To make continuous contact with the joint walls
3. Without cutting, nicking, or twisting the seal
4. Without stretching the seal more than 4 percent

Cut preformed compression joint seal material to the exact length of the pavement joint to be sealed. The Engineer measures this length. After you install the preformed compression joint seal, the Engineer measures the excess length of material at the joint end. The Engineer divides the excess length by the measured cut length to determine the stretch percentage.

Seals must be compressed from 30 to 50 percent of the joint width when complete in place.

41-5.03E Reserved
41-5.04 PAYMENT
Not Used

41-6 CRACK AND SEAT

41-6.01 GENERAL
41-6.01A Summary
Section 41-6 includes specifications for cracking, seating, and preparing the surface of existing concrete pavement.

41-6.01B Definitions
Reserved

41-6.01C Submittals
Submit each core in a plastic bag or tube for acceptance at the time of sampling. Mark each core with a location description.

41-6.01D Quality Control and Assurance
41-6.01D(1) General
If cracking is noncompliant:
1. Stop crack and seat work
2. Modify your equipment and procedures and crack the noncompliant pavement again
3. Construct another test section
4. Take additional core samples to verify compliance
5. Construct an inspection strip if the concrete pavement has HMA on the surface

41-6.01D(2) Test Section
The Engineer determines and marks a test section up to 1000 square feet within the crack and seat area shown. Construct the test section and obtain the Engineer's verbal authorization before starting crack and seat work.

Immediately before cracking the test section, apply water to the pavement surface so that cracking can be readily evaluated. Crack the test section and vary impact energy and striking patterns to verify your procedure.

41-6.01D(3) Coring
Drill cores at least 6 inches in diameter under ASTM C42 to verify cracking in the Engineer’s presence. Take at least 2 cores per test section and 1 core per lane mile for each pavement cracking machine used. The Engineer determines the core locations.

41-6.01D(4) Reserved

41-6.02 MATERIALS
41-6.02A General
Use fast-setting or polyester concrete to fill core holes.

41-6.03 CONSTRUCTION
41-6.03A Cracking
Crack existing concrete pavement using the procedures and equipment from the authorized test section.

Do not allow flying debris during cracking operations.

Crack existing concrete pavement into segments that nominally measure 6 feet transversely by 4 feet longitudinally. If the existing pavement is already cracked into segments, crack it into equal-sized square or rectangular pieces that nominally measure not more than 6 feet transversely and from 3 to 5 feet longitudinally. Do not impact the pavement within 1 foot of another break line, pavement joint, or edge of pavement.

Cracks must be vertical, continuous, and penetrate the full depth of pavement. Cracks must be within 6 inches of vertical along the full depth of pavement. Do not cause surface spalling over 0.10-foot deep or excessive shattering of the pavement or base.

Cracking equipment must impact the pavement with a variable force in a controlled location. Do not use unguided free-falling weights such as "headache balls."

If the concrete pavement has no more than 0.10 foot of asphalt concrete on the surface, you may crack the pavement without removing the asphalt concrete. After cracking, construct an inspection strip by removing at least 500 square feet of asphalt concrete at a location determined by the Engineer. Construct additional inspection strips to demonstrate compliance where ordered by the Engineer.

After cracking, allow public traffic on the cracked or initial pavement layer for no more than 15 days.

41-6.03B Seating
Seat cracked concrete by making at least 5 passes over the cracked concrete with either:

1. Oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi. The roller’s gross static weight must be at least 15 tons.

2. Vibratory pad-foot roller exerting a dynamic centrifugal force of at least 10 tons
A pass is 1 movement of a roller in either direction at 5 mph or less.

After all segments have been seated, clean loose debris from joints and cracks using compressed air free of moisture and oil.

Reseat any segment of cracked pavement that has not been overlaid within 24 hours of seating.

41-6.03C Surface Preparation
Before opening cracked and seated pavement to traffic or overlaying:

1. Fill joints, cracks, and spalls wider than 3/4 inch and deeper than 1 inch by applying tack coat and placing minor HMA under section 39. Use the no. 4 gradation.

2. Remove all loose debris and sweep the pavement.

41-6.03D Reserved

41-6.04 PAYMENT
Crack and seat existing concrete pavement is measured from the area of pavement cracked and seated. No deduction is made for existing cracked segments. The Department does not pay for HMA used to fill joints, cracks, and spalls.

41-7 TRANSITION TAPER

41-7.01 GENERAL
Section 41-7 includes specifications for constructing transition tapers in existing pavement.

41-7.02 MATERIALS
Not Used

41-7.03 CONSTRUCTION
Construct transition tapers by either grinding or removing and replacing the existing concrete. Do not allow flying debris during the construction of tapers.

Grinding must comply with section 42.

Replacement concrete must comply with section 41-9 except place concrete to the taper level shown and finish the surface with a coarse broom.

If the transition taper will be overlaid with HMA that is not placed before opening to traffic and there is a grade difference of more than 0.04 foot, construct a temporary taper by placing minor HMA that complies with section 39. Remove the temporary HMA taper before constructing the transition taper.

41-7.04 PAYMENT
Pavement transition tapers are measured using the dimensions shown. The Department does not pay for temporary HMA tapers.

41-8 DOWEL BAR RETROFIT
Reserved

41-9 INDIVIDUAL SLAB REPLACEMENT WITH RAPID STRENGTH CONCRETE

41-9.01 GENERAL

41-9.01A Summary
Section 41-9 includes specifications for removing existing concrete pavement and constructing individual slab replacement with rapid strength concrete (ISR—RSC).

41-9.01B Definitions

cement raveling: Disintegration of the concrete surface layer from aggregate loss.
early age: Any age less than 10 times the time of final setting for concrete determined under ASTM C403/C403M.

dependent crack: Crack that runs from one edge of the concrete slab to the opposite or adjacent side of the slab.

opening age: Age when the minimum modulus of rupture specified for opening to traffic and equipment is attained.

time of final setting: Elapsed time required to develop a concrete penetration resistance that is at least 4,000 psi under ASTM C403/C403M.

41-9.01C Submittals
41-9.01C(1) General
At least 15 days before delivery to the job site, submit manufacturer’s recommendations, MSDS and instructions for storage and installation of joint filler material.

At least 45 days before starting ISR—RSC work submit a sample of cement from each proposed lot and samples of proposed admixtures in the quantities ordered by the Engineer.

During ISR—RSC placement operations, submit uniformity reports for hydraulic cement at least once every 30 days to the Engineer and METS, attention Cement Laboratory. Uniformity reports must comply with ASTM C917 except testing age and water content may be modified to suit the particular material.

Except for modulus of rupture tests, submit QC test result forms within 48 hours of the paving shift. Submit modulus of rupture results within:

1. 15 minutes of opening age test completion
2. 24 hours of 3-day test completion

41-9.01C(2) Quality Control Plan
If the quantity of ISR—RSC is at least 300 cu yd, submit a QC plan at least 20 days before placing trial slabs. If the quantity of ISR—RSC is less than 300 cu yd, submit proposed forms for RSC inspection, sampling, and testing.

41-9.01C(3) Mix Design
At least 10 days before use in a trial slab, submit a mix design. The maximum ambient temperature range for a mix design is 18 degrees F. Submit more than 1 mix design based on ambient temperature variations anticipated during RSC placement. Each mix design must include:

1. Mix design identification number
2. Aggregate source
3. Opening age
4. Aggregate gradation
5. Types of cement and chemical admixtures
6. Mix proportions
7. Maximum time allowed between batching and placing
8. Range of effective ambient temperatures
9. Time of final setting
10. Modulus of rupture development data from laboratory-prepared samples, including tests at:
   10.1. 1 hour before opening age
   10.2. Opening age
   10.3. 1 hour after opening age
   10.4. 1 day
   10.5. 3 days
   10.6. 7 days
   10.7. 28 days
11. Shrinkage test data
12. Any special instructions or conditions such as water temperature requirements
41-9.01C(4) Reserved

41-9.01D Quality Control and Assurance

41-9.01D(1) General
Designate a QC manager and assistant QC managers to administer the QC plan. The QC managers must hold current American Concrete Institute (ACI) certification as a Concrete Field Testing Technician-Grade I and a Concrete Laboratory Testing Technician-Grade II, except the assistant QC managers may hold Concrete Laboratory Testing Technician-Grade I instead of Grade II.

The QC manager responsible for the production period involved must review and sign the sampling, inspection, and test reports before submitting them. The QC manager must be present for:

1. Each stage of mix design
2. Trial slab construction
3. Production and construction of RSC
4. Meetings with the Engineer relating to production, placement, or testing

The QC manager must not be a member of this project's production or paving crews, an inspector, or a tester. The QC manager must have no duties during the production and placement of RSC except those specified.

Testing laboratories and equipment must comply with the Department's Independent Assurance Program. At the time of the QC plan submittal, the Department evaluates the quality control samplers and testers.

41-9.01D(2) Just-in-time Training
Reserved

41-9.01D(3) Quality Control Plan
Establish, implement, and maintain a QC plan for pavement The QC plan must describe the organization and procedures used to:

1. Control the production process
2. Determine if a change to the production process is needed
3. Implement a change

The QC plan must include:

1. Names, qualifications, and certifications of QC personnel, including:
   1.1. QC manager
   1.2. Assistant QC managers
   1.3. Samplers and testers
2. Outline of procedure for the production, transportation, placement, and finishing of RSC
3. Outline of procedure and forms for concrete QC, sampling, and testing to be performed during and after RSC construction, including testing frequencies for modulus of rupture
4. Contingency plan for identifying and correcting problems in production, transportation, placement, or finishing RSC including:
   4.1. Action limits
   4.2. Suspension limits that do not exceed specified material requirements
   4.3. Detailed corrective action if limits are exceeded
   4.4. Temporary pavement structure provisions, including:
      4.4.1. The quantity and location of standby material
      4.4.2. Determination of need
5. Location of your quality control testing laboratory and testing equipment during and after paving operations
6. List of the testing equipment to be used, including the date of last calibration
7. Production target values for material properties that impact concrete quality or strength including cleanliness value and sand equivalent
8. Outline procedure for placing and testing trial slabs, including:
8.1. Locations and times
8.2. Production procedures
8.3. Placing and finishing methods
8.4. Sampling methods, sample curing, and sample transportation
8.5. Testing and test result reporting
9. Name of source plant with approved Material Plant Quality Program (MPQP)
10. Procedures or methods for controlling pavement quality including:
    10.1. Materials quality
    10.2. Contraction and construction joints
    10.3. Protecting pavement before opening to traffic

41-9.01D(4) Preparing Conference
Schedule a preparing conference and provide a facility to meet with the Engineer.

Preparing conference attendees must sign an attendance sheet provided by the Engineer. The preparing conference must be attended by your:

1. Project superintendent
2. Project manager
3. QC manager
4. Workers and your subcontractor’s workers, including:
   4.1. Foremen
   4.2. Concrete plant manager
   4.3. Concrete plant operator
   4.4. Concrete plant inspectors
   4.5. Personnel performing saw cutting and joint sealing
   4.6. Paving machine operators
   4.7. Inspectors
   4.8. Samplers
   4.9. Testers

The purpose of the preparing conference is to familiarize personnel with the project’s specifications. Discuss the QC plan and processes for constructing each item of work, including:

1. Production
2. Transportation
3. Trial slabs
4. Pavement structure removal
5. Placement
6. Contingency plan
7. Sampling
8. Testing
9. Acceptance

Do not start trial slabs or paving activities until the listed personnel have attended the preparing conference.

41-9.01D(5) Trial Slabs
Before starting individual slab replacement work, complete 1 trial slab for each mix design.

Place trial slabs near the job site at a mutually-agreed location that is neither on the roadway nor within the project limits. Trial slabs must be 10 by 20 feet and at least 10 inches thick.

During trial slab construction, sample and split the aggregate for grading, cleanliness value, and sand equivalent testing.

Fabricate and test beams under California Test 524 to determine the modulus of rupture values.
Cure beams fabricated for early age testing such that the monitored temperatures in the beams and the slab are always within 5 degrees F of each other.

Monitor and record the internal temperatures of trial slabs and early age beams at intervals of at least 5 minutes. Install thermocouples or thermistors connected to strip-chart recorders or digital data loggers to monitor the temperatures. Temperature recording devices must be accurate to within 2 degrees F. Measure internal temperatures at 1 inch from the top, 1 inch from the bottom, and no closer than 3 inches from any edge until early age testing is completed.

Cure beams fabricated for 3-day testing under California Test 524 except place them into sand at a time that is from 5 to 10 times the time of final setting measured under ASTM C403/C403M or 24 hours, whichever is earlier.

Trial slabs must have an opening age modulus of rupture of not less than 400 psi and a 3-day modulus of rupture of not less than 600 psi.

After authorization, remove and dispose of trial slabs and testing materials.

41-9.01D(6) Quality Control Testing

41-9.01D(6)(a) General

Provide continuous process control and quality control sampling and testing throughout RSC production and placement. Notify the Engineer at least 2 business days notice before any sampling and testing. Establish a testing facility at the job site or at an authorized location.

Sample under California Test 125.

During ISR—RSC placement, sample and fabricate beams for modulus of rupture testing within the first 30 cubic yards, at least once every 130 cu yd, and within the final truckload. Submit split samples and fabricate test beams for the Department's testing unless the Engineer informs you otherwise.

Determine the modulus of rupture at opening age under California Test 524, except beam specimens may be fabricated using an internal vibrator under ASTM C 31. Cure beams under the same conditions as the pavement until 1 hour before testing. Test 3 beam specimens in the presence of the Engineer and average the results. A single test represents no more than that day's production or 130 cu yd, whichever is less.

Determine the modulus of rupture at other ages using beams cured and tested under California Test 524 except place them in sand from 5 to 10 times the time of final setting under ASTM C403/C403M or 24 hours, whichever is earlier.

41-9.01D(6)(b) Rapid Strength Concrete

Your quality control must include testing RSC for the properties at the frequencies shown in the following table:
### RSC Minimum Quality Control

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleanness value</td>
<td>California Test 227</td>
<td>650 cu yd or 1 per shift</td>
</tr>
<tr>
<td>Sand equivalent</td>
<td>California Test 217</td>
<td>650 cu yd or 1 per shift</td>
</tr>
<tr>
<td>Aggregate gradation</td>
<td>California Test 202</td>
<td>650 cu yd or 1 per shift</td>
</tr>
<tr>
<td>Air content</td>
<td>California Test 504</td>
<td>130 cu yd or 2 per shift</td>
</tr>
<tr>
<td>Yield</td>
<td>California Test 518</td>
<td>2 per shift</td>
</tr>
<tr>
<td>Slump or penetration</td>
<td>ASTM C143 or California Test 533</td>
<td>1 per 2 hours of paving</td>
</tr>
<tr>
<td>Unit weight</td>
<td>California Test 518</td>
<td>650 cubic yards or 2 per shift</td>
</tr>
<tr>
<td>Aggregate Moisture Meter</td>
<td>California Test 223 or California Test 226</td>
<td>1 per shift</td>
</tr>
<tr>
<td>Calibration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modulus of rupture</td>
<td>California Test 524</td>
<td>Comply with section 41-9.01D(6)(a)</td>
</tr>
</tbody>
</table>

*Test at the most frequent interval.

*Check calibration of the plant moisture meter by comparing moisture meter readings with California Test 223 or California Test 226 test results.

Maintain control charts to identify potential problems and causes. Post a copy of each control chart at a location determined by the Engineer.

Individual measurement control charts must use the target values in the mix proportions as indicators of central tendency.

Develop linear control charts for:

1. Cleanness value
2. Sand equivalent
3. Fine and coarse aggregate gradation
4. Air content
5. Penetration

Control charts must include:

1. Contract number
2. Mix proportions
3. Test number
4. Each test parameter
5. Action and suspension limits
6. Specification limits
7. Quality control test results

For fine and coarse aggregate gradation control charts, record the running average of the previous 4 consecutive gradation tests for each sieve and superimpose the specification limits.

For air content control charts, the action limit is ±1.0 percent and the suspension limit is ±1.5 percent of the specified values. If no value is specified, apply the air content value used in the approved mix design.

As a minimum, a process is out of control if any of the following occurs:

1. For fine and coarse aggregate gradation, 2 consecutive running averages of 4 tests are outside the specification limits
2. For individual penetration or air content measurements:
   2.1. One point falls outside the suspension limit line
   2.2. Two points in a row fall outside the action limit line

Stop production and take corrective action for out of control processes or the Engineer rejects subsequent RSC.
Before each day's concrete pavement placement and at intervals not to exceed 4 hours of production, use a tachometer to test and record vibration frequency for concrete consolidation vibrators.

41.9.01D(6)(c) Reserved

41.9.01D(7) Acceptance Criteria

41.9.01D(7)(a) General

The final texture of ISR—RSC must pass visual inspection and have a coefficient of friction of at least 0.30 determined under California Test 342.

Allow at least 25 days for the Department to schedule testing for coefficient of friction. Notify the Engineer when the pavement is scheduled to be opened to traffic.

41.9.01D(7)(b) Modulus of Rupture

ISR—RSC is accepted based on your testing for modulus of rupture at opening age and the Department’s testing for modulus of rupture at 3 days.

ISR—RSC must have a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is at least 600 psi.

Calculate the test result as the average from testing 3 beams for each sample. The test result represents 1 paving shift or 130 cu yd, whichever is less.

41.9.01D(7)(c) Concrete Pavement Smoothness

The Department tests for concrete pavement smoothness using a 12-foot straightedge. Straightedge smoothness specifications do not apply to the pavement surface placed within 12 inches of existing concrete pavement except parallel to the centerline at the midpoint of a transverse construction joint.

The concrete pavement surface must not vary from the lower edge of a 12-foot straightedge by more than:

1. 0.01 feet when parallel to the centerline
2. 0.02 feet when perpendicular to the centerline extending from edge to edge of a traffic lane

41.9.01D(7)(d) Cracking and Raveling

The Engineer rejects an ISR—RSC slab under section 6-3.06 if within 1 year of contract acceptance there is either:

1. Partial or full-depth cracking
2. Concrete raveling consisting of either:
   2.1. Combined raveled areas more than 5 percent of each ISR—RSC slab area
   2.2. Any single raveled area of more than 4 sq ft

41.9.01D(8) Reserved

41.9.02 MATERIALS

41.9.02A General

Reserved

41.9.02B Rapid Strength Concrete

RSC for ISR—RSC must comply with section 90-3.

Use either the 1-1/2 inch maximum or the 1-inch maximum combined grading specified in section 90-1.02C(4)(d).

Air content must comply with the minimum requirements in section 40-1.02B(4).

41.9.02C Base Bond Breaker

Use base bond breaker no. 3, 4, or 5 under section 36-2.
41-9.02D  Reserved

41-9.03  CONSTRUCTION

41-9.03A  General
Complete ISR—RSC adjacent to new pavement or existing pavement shown for construction as a 1st order of work. Replace individual slabs damaged during construction before placing final pavement delineation.

41-9.03B  Removing Existing Pavement
Remove pavement under section 15-2.02. The Engineer determines the exact ISR—RSC limits after overlying layers are removed.

After removing pavement to the depth shown, grade to a uniform plane. Water as needed and compact the material remaining in place to a firm and stable base. The finished surface of the remaining material must not extend above the grade established by the Engineer.

41-9.03C  Drill and Bond Dowel Bars
Drill existing concrete and bond dowel bars under section 41-10 if described. Do not install dowel bars in contraction joints.

41-9.03D  Base Bond Breaker
Place base bond breaker before placing ISR—RSC. Comply with section 36-2.

41-9.03E  Placing Rapid Strength Concrete
Do not place RSC if the ambient air temperature is forecast by the National Weather Service to be less than 40 degrees F within 72 hours of final finishing.

Before placing RSC against existing concrete, place 1/4-inch thick commercial quality polyethylene flexible foam expansion joint filler across the original transverse and longitudinal joint faces and extend the full depth of pavement to the top of the base layer. Place the top of the joint filler flush with the top of the pavement. Secure joint filler to the joint face of the existing pavement to prevent the joint filler from moving during the placement of RSC.

Use metal or wood side forms. Wood side forms must not be less than 1-1/2 inches thick. Side forms and connections must be of sufficient rigidity that movement will not occur under forces from equipment or RSC. Clean and oil side forms before each use. Side forms must remain in place until the pavement edge no longer requires the protection of forms.

After you place RSC, consolidate it using high-frequency internal vibrators adjacent to forms and across the full paving width. Place RSC as nearly as possible to its final position. Do not use vibrators for extensive shifting of concrete pavement.

Spread and shape RSC with powered finishing machines supplemented by hand finishing. After you mix and place RSC, do not add water to the surface to facilitate finishing. You may request authorization to use surface finishing additives. Submit the manufacturer's instructions with your request.

Place consecutive concrete loads without interruption. Do not allow cold joints where a visible lineation forms after concrete is placed, sets, and hardens before additional concrete placed.

Where the existing transverse joint spacing in an adjacent lane exceeds 15 feet, construct an additional transverse contraction joint midway between the existing joints. Complete sawing of contraction joints within 2 hours of completion of final finishing.

Cut contraction joints a minimum of 1/3 the slab depth.

41-9.03F  Final Finishing
After preliminary finishing, round the edges of the initial paving width to a 0.04-foot radius. Round transverse and longitudinal construction joints to a 0.02-foot radius. Mark each ISR—RSC area with a stamp. The stamp mark must show the month, day, and year of placement and contract number. Level...
the location of the stamp with a steel trowel below the pavement texture. Orient the stamp mark so it can be read from the outside edge of ISR—RSC.

Before curing, texture the pavement. Perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with a steel-tined device that produces grooves parallel with the centerline.

Tines must be from 3/32 to 1/8 inch wide on 3/4-inch centers and have enough length, thickness, and resilience to form grooves from 1/8 to 3/16 inch deep after the concrete has hardened. Grooves must extend over the entire pavement width except do not construct grooves 3 inches from longitudinal pavement edges or joints.

Final texture must be uniform and smooth. Grooves must be parallel and aligned to the pavement edge across the pavement width. The groove alignment must not vary more than 0.1 foot for every 12 foot length.

Protect RSC under section 90-1.03C.

41-9.03G Temporary Pavement Structure
Temporary pavement structure must be RSC or 3-1/2 inch thick HMA over aggregate base.

41-9.03H Noncompliant Individual Slab Replacement
Replace an ISR—RSC slab with any of the following:
1. One or more full-depth cracks.
2. Concrete raveling.
3. Noncompliant smoothness except you may request authorization for grinding under section 42 and retesting. Grinding that causes a depression will not be considered. Smoothness must be corrected within 48 hours of placing ISR—RSC.

If the modulus of rupture at opening age is at least 400 psi and the modulus of rupture at 3 days is at least 500 psi but less than 600 psi, you may request authorization to leave the ISR—RSC in place and accept the specified deduction.

If pavement is noncompliant for coefficient of friction, groove or grind the pavement under section 42. Comply with section 40-1.03Q(4) and groove or grind before the installation of any required joint seal or edge drains adjacent to the areas to the noncompliant area.

If an ISR—RSC slab has partial depth cracking, treat it with high-molecular-weight methacrylate under section 41-3.

41-9.03I Replace Pavement Delineation
Replace traffic stripes, pavement markings, and markers that are removed, obliterated, or damaged by ISR—RSC under sections 84 and 85.

41-9.03J Reserved

41-9.04 PAYMENT
Replace base is not included in the payment for individual slab replacement (RSC).

Drill and bond dowel bars are not included in payment for individual slab replacement (RSC).

For individual slab replacement (RSC) with a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is greater than or equal to 500 psi but less than 550 psi, the Department deducts 10 percent of the payment for individual slab replacement (RSC).

For individual slab replacement (RSC) with a modulus of rupture at opening age that is at least 400 psi and a modulus of rupture at 3 days that is greater than or equal to 550 psi but less than 600 psi, the Department deducts 5 percent of the payment for individual slab replacement (RSC).
41-10 DRILL AND BOND BARS

41-10.01 GENERAL
41-10.01A Summary
Section 41-10 includes specifications for drilling, installing, and bonding tie bars and dowel bars in concrete pavement.

41-10.01B Definitions
Reserved

41-10.01C Submittals
Submit a certificate of compliance for:

1. Tie bars
2. Dowel bars
3. Dowel bar lubricant
4. Chemical adhesive
5. Epoxy powder coating

At least 15 days before delivery to the job site, submit the manufacturer’s recommendations and instructions for storage, handling, and use of chemical adhesive.

41-10.01D Quality Control and Assurance
41-10.01D(1) General
Drill and bond bar is accepted based on inspection before concrete placement.

41-10.01D(2) Reserved

41-10.02 MATERIALS
41-10.02A General
Dowel bar lubricant must comply with section 40-1.02D.

Chemical adhesive for drilling and bonding bars must be on the Authorized Material List. The Authorized Material List indicates the appropriate chemical adhesive system for concrete temperature and installation conditions.

Each chemical adhesive system container must clearly and permanently show the following:

1. Manufacturer’s name
2. Model number of the system
3. Manufacture date
4. Batch number
5. Expiration date
6. Current International Conference of Building Officials Evaluation Report number
7. Directions for use
8. Storage requirement
9. Warnings or precautions required by state and federal laws and regulations

41-10.02B Reserved

41-10.03 CONSTRUCTION
41-10.03A General
Drill holes for bars. Clean drilled holes in compliance with the chemical adhesive manufacturer’s instructions. Holes must be dry at the time of placing the chemical adhesive and bars. Use a grout retention ring when drilling and bonding dowel bars. Immediately after inserting the bar into the chemical adhesive, support the bar to prevent movement until chemical adhesive has cured the minimum time recommended by the manufacturer.

Apply dowel bar lubricant to the entire exposed portion of the dowel bar.
If the Engineer rejects a bar installation: stop paving, drilling, and bonding activities. Adjust your procedures and obtain the Engineer's verbal authorization before resuming paving, drilling, and bonding.

Cut the rejected bar flush with the pavement joint surface and coat the exposed end of the bar with chemical adhesive. Offset the new hole 3 inches horizontally from the rejected hole’s center.

41-10.03B Tie Bar Tolerance
Place tie bars within the tolerances shown in the following table:

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal skew (vertical skew: bar length)</td>
<td>1:6</td>
</tr>
<tr>
<td>Vertical skew (vertical skew: bar length)</td>
<td>1:6</td>
</tr>
<tr>
<td>Longitudinal translation (inch)</td>
<td>±1</td>
</tr>
<tr>
<td>Horizontal offset (embedment, inch)</td>
<td>±1</td>
</tr>
<tr>
<td>Height relative to the adjacent bar</td>
<td>±1</td>
</tr>
<tr>
<td>Vertical Depth (clearance from the pavement surface or bottom, inches, min)</td>
<td>3</td>
</tr>
</tbody>
</table>

41-10.03C Dowel Bar Tolerance
Place dowel bars within the tolerances specified in section 40-1.01D(7)(b)(v).

41-10.03D Reserved

41-10.04 PAYMENT
Not Used

41-11–41-15 RESERVED

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42 GROOVE AND GRIND CONCRETE
07-19-13
Replace the paragraph of section 42-1.01A with:

Section 42-1 includes general specifications for grooving and grinding concrete.

Replace the headings and paragraphs in section 42-3 with:

42-3.01 GENERAL
42-3.01A Summary
Section 42-3 includes specifications for grinding the surfaces of pavement, bridge decks, and approach slabs.

42-3.01B Definitions
Reserved

42-3.01C Submittals
Reserved

42-3.01D Quality Control and Assurance
Reserved
42-3.02 MATERIALS

Not Used

42-3.03 CONSTRUCTION

42-3.03A General

Grind surfaces in the longitudinal direction of the traveled way and grind the full lane width. Begin and end grinding at lines perpendicular to the roadway centerline.

Grinding must result in a parallel corduroy texture with grooves from 0.08 to 0.12 inch wide and from 55 to 60 grooves per foot of width. Grooves must be from 0.06 to 0.08 inch from the top of the ridge to the bottom of the groove.

Grind with abrasive grinding equipment using diamond cutting blades mounted on a self-propelled machine designed for grinding and texturing concrete pavements.

42-3.03B Pavement

Grind existing concrete pavement that is adjacent to an individual slab replacement. Grind the replaced individual slab and all the existing slabs immediately surrounding it. Grind after the individual slab is replaced.

Grind existing concrete pavement that is adjacent to new lanes of concrete pavement. Grind before paving.

After grinding, the existing pavement must comply with requirements for smoothness and coefficient of friction in section 40 except:

1. At the midpoint of a joint or crack, test smoothness with a straightedge. Both sides must have uniform texture.
2. Straightedge and inertial profiler requirements do not apply to areas abnormally depressed from subsidence or other localized causes. End smoothness testing 15 feet before and resume 15 feet after these areas.
3. Cross-slope must be uniform and have positive drainage across the traveled way and shoulder.

As an alternative to grinding existing concrete pavement, you may replace the existing pavement. The new concrete pavement must be the same thickness as the removed pavement. Replace existing pavement between longitudinal joints or pavement edges and transverse joints. Do not remove portions of slabs.

Replacement of existing concrete pavement must comply with requirements for individual slab replacement in section 41-9.

42-3.03C Bridge Decks, Approach Slabs, and Approach Pavement

Grind bridge decks, approach slabs, and approach pavement only if described.

The following ground areas must comply with the specifications for smoothness and concrete cover over reinforcing steel in section 51-1.01D(4):

1. Bridge decks
2. Approach slabs
3. Adjacent 50 feet of approach pavement

After grinding, the coefficient of friction must comply with section 51-1.01D(4).

42-3.04 PAYMENT

Grinding existing approach slabs and adjacent 50 feet of approach pavement is paid for as grind existing bridge deck.

The Department does not pay for grinding replacement concrete pavement or for additional grinding to comply with smoothness requirements.
Add to section 42:

42-4–42-9 RESERVED

DIVISION VI  STRUCTURES
46  GROUND ANCHORS AND SOIL NAILS
07-19-13

Replace the 1st paragraph of section 46-1.01C(2) with:

Submit 5 copies of shop drawings to OSD, Documents Unit. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal. Allow 30 days for the Department’s review. After review, submit from 6 to 12 copies, as requested, for authorization and use during construction.

Shop drawings and calculations must be sealed and signed by an engineer who is registered as a civil engineer in the State.

Replace the 3rd paragraph of section 46-1.01C(2) with:

Ground anchor shop drawings must include:

1. Details and specifications for the anchorage system and ground anchors.
2. Details for the transition between the corrugated plastic sheathing and the anchorage assembly.
3. If shims are used during lock-off, shim thickness and supporting calculations.
4. Calculations for determining the bonded length. Do not rely on any capacity from the grout-to-ground bond within the unbonded length.

Delete the 5th and 6th paragraphs of section 46-1.01C(2).

Replace the 4th paragraph of section 46-1.01D(2)(b) with:

Each jack and its gage must be calibrated as a unit under the specifications for jacks used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength in section 50-1.01D(3).

Replace the 3rd paragraph of section 46-1.01D(2)(d) with:

The Department may verify the test loads using the Department’s load cells. If requested, install and support the Department’s testing equipment during testing and remove the equipment after testing is complete.
Add to section 46-1.02:

46-1.02C Grout
Grout must consist of cement and water and may contain an admixture if authorized. Cement must comply with section 90-1.02B(2). Water must comply with section 90-1.02D. Admixtures must comply with section 90, except they must not contain chloride ions in excess of 0.25 percent by weight. Do not exceed 5 gallons of water per 94 lb of cement.

Mix the grout as follows:
1. Add water to the mixer followed by cement and any admixtures or fine aggregate.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
3. Agitate the grout continuously until the grout is pumped.
4. Do not add water after the initial mixing.

Add to section 46-1.03B:
Dispose of drill cuttings under section 19-2.03B.

Add to the end of section 46-1.03C:
Grouting equipment must be:
1. Capable of grouting at a pressure of at least 100 psi
2. Equipped with a pressure gage having a full-scale reading of not more than 300 psi

Delete the 3rd paragraph of section 46-2.01A.

Add to the beginning of section 46-2.01C:
Submittals for strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50-1.01C.

Add to section 46-2.01D:

46-2.01D(3) Steel
Strand tendons, bar tendons, bar couplers, and anchorage assemblies must comply with section 50-1.01D.

46-2.01D(4) Grout
The Department tests the efflux time of the grout under California Test 541.

Add to the beginning of section 46-2.02B:
Strand tendons, bar tendons, and bar couplers must comply with section 50-1.02B.
Replace the 1st paragraph of section 46-2.02E with:

The efflux time of the grout immediately after mixing must be at least 11 seconds.

Add between the 13th and 14th paragraphs of section 46-2.03A:

If hot weather conditions will contribute to quick stiffening of the grout, cool the grout by authorized methods as necessary to prevent blockages during pumping activities.

Add between the 1st and 2nd paragraphs of section 46-2.03D:

Secure the ends of strand tendons with a permanent type anchorage system that:

1. Holds the prestressing steel at a force producing a stress of at least 95 percent of the specified ultimate tensile strength of the steel
2. Permanently secures the ends of the prestressing steel

Replace the 2nd sentence of the 1st paragraph of section 46-3.02A with:

The epoxy-coated prefabricated reinforcing bar must comply with section 52-2.03, except the epoxy thickness must be from 10 to 12 mils.

Replace the 2nd paragraph of section 46-3.02B with:

Concrete anchors on bearing plates must comply with the specifications for studs in clause 7 of AWS D1.1.

Delete the 1st paragraph of section 46-3.02E.

 Replace "78-80" in the 1st table in the 2nd paragraph of section 47-2.02C with:

78-100
Replace the value for the sand equivalent requirement in the 2nd table in the 3rd paragraph of section 47-2.02C with:

12 minimum

Replace the 1st paragraph of section 47-2.02E with:

Steel wire must comply with the specifications for plain wire reinforcement in ASTM A1064/A1064M. Welded wire reinforcement must comply with the specifications for plain wire welded wire reinforcement in ASTM A1064/A1064M.

Hooks and bends must comply with the Building Code Requirements for Structural Concrete published by ACI.

Replace section 47-3 with:

47-3 REINFORCED CONCRETE CRIB WALLS

47-3.01 General
Section 47-3 includes specifications for constructing reinforced concrete crib walls.

Reinforced concrete crib walls must comply with section 51.

Reinforcement must comply with section 52.

Concrete crib walls consist of a series of rectangular cells composed of interlocking, precast, reinforced concrete headers, stretchers, and blocks.

47-3.02 Materials

47-3.02A General
Pads shown to be placed between bearing surfaces must either be (1) neoprene complying with the specifications for strip waterstops in section 51-2.05 or (2) commercial quality no. 30 asphalt felt. The protective board is not required for neoprene pads.

47-3.02B Crib Members

47-3.02B(1) General
All members may be manufactured to dimensions 1/8 inch greater in thickness than shown. The thickness of the lowest step must not be less than the dimension shown.

Stretchers may be manufactured 1/2 inch less in length than shown.

When an opening is shown in the face of the wall, special length stretchers and additional headers may be necessary.

For non-tangent wall alignments, special length stretchers may be required.

For non-tangent wall alignments and at locations where filler blocks are required, special length front face closure members may be required.

47-3.02B(2) Reinforcement
Reinforcing wire must comply with ASTM A 496/A 496M.

For hoops or stirrups use either (1) reinforcing wire or (2) deformed steel welded wire reinforcement. The size must be equivalent to the reinforcing steel shown. Deformed steel welded wire reinforcement must comply with ASTM A 497/A 497M.
47-3.02B(3) Concrete

Concrete test cylinders must comply with section 90-1.01D(5), except when the penetration of fresh concrete is less than 1 inch, the concrete in the test mold must be consolidated by vibrating the mold equivalent to the consolidating effort being used to consolidate the concrete in the members.

Cure crib members under section 51-4.02C.

When removed from forms, the members must present a true surface of even texture, free from honeycombs and voids larger than 1 inch in diameter and 5/16 inch in depth. Clean and fill other pockets with mortar under sections 51-1.02F and 51-1.03E(2).

External vibration resulting in adequate consolidation may be used.

If the Engineer determines that rock pockets are of the extent or character as to affect the strength of the member or to endanger the life of the steel reinforcement, replace the member.

Finish concrete-to-concrete bearing surfaces to a smooth plane. Section 51-1.03F does not apply to concrete crib members.

47-3.03 Construction

Place reinforced concrete crib walls to the lines and grades established by the Engineer. The foundation must be accepted by the Engineer before any crib members are placed.

The gap between bearing surfaces must not exceed 1/8 inch.

Where a gap of 1/16 inch to 1/8 inch exists or where shown, place a 1/16-inch pad of asphalt felt or sheet neoprene between the bearing surfaces.

47-3.04 Payment

The area of reinforced concrete crib wall is measured on the batter at the outer face for the height from the bottom of the bottom stretcher to the top of the top stretcher and for a length measured from end to end of each section of wall.

Add between the 3rd and 4th paragraphs of section 47-5.01:  

Reinforcement must comply with section 52.

Add to section 47-6.01A:  

The alternative earth retaining system must comply with the specifications for the type of wall being constructed.

Replace "sets" at each occurrence in the 1st paragraph of section 47-6.01C with:  

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48 TEMPORARY STRUCTURES

07-19-13

Replace "previously welded splice" and its definition in section 48-2.01B with:

previously welded splice: Splice made in a falsework member in compliance with AWS D1.1 or other recognized welding standard before contract award.

04-19-13

Add to section 48-2.01B:

independent support system: Support system that is in addition to the falsework removal system employing methods of holding falsework from above by winches, hydraulic jacks with prestressing steel, HS rods, or cranes.

07-19-13

Delete "field" in the 1st sentence of the 5th paragraph of section 48-2.01C(1).

Replace item 1 in the list in the 6th paragraph of section 48-2.01C(1) with:

1. Itemize the testing, inspection methods, and acceptance criteria used

04-19-13

Replace "sets" at each occurrence in the 4th paragraph of section 48-2.01C(2) with:

copies

07-19-13

Replace the 7th paragraph of section 48-2.01C(2) with:

If you submit multiple submittals at the same time or additional submittals before review of a previous submittal is complete:

1. You must designate a review sequence for submittals
2. Review time for any submittal is the review time specified plus 15 days for each submittal of higher priority still under review

09-16-11

Add to section 48-2.01C(2):

Shop drawings and calculations for falsework removal systems employing methods of holding falsework from above by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must include:

1. Design code used for the analysis of the structural members of the independent support system
2. Provisions for complying with current Cal/OSHA requirements
3. Load tests and ratings within 1 year of intended use of hydraulic jacks and winches
4. Location of the winches, hydraulic jacks with prestressing steel, HS rods, or cranes
5. Analysis showing that the bridge deck and overhang are capable of supporting all loads at all time
6. Analysis showing that winches will not overturn or slide during all stages of loading
7. Location of deck and soffit openings if needed
8. Details of repair for the deck and soffit openings after falsework removal

07-19-13

OCTOBER 2015
Replace the 1st paragraph of section 48-2.01D(2) with:

Welding must comply with AWS D1.1 or other recognized welding standard, except for fillet welds where the load demands are 1,000 lb or less per inch for each 1/8 inch of fillet weld.

Replace the 1st through 3rd sentences in the 2nd paragraph of section 48-2.01D(2) with:

Perform NDT on welded splices using UT or RT. Each weld and any repair made to a previously welded splice must be tested.

Replace the 3rd paragraph of section 48-2.01D(2) with:

For previously welded splices, perform and document all necessary testing and inspection required to certify the ability of the falsework members to sustain the design stresses.

Add to section 48-2.01D(3)(a):

Falsework removal system employing methods of holding falsework from above and members of the independent support system must support the sum of the actual vertical and horizontal loads due to falsework materials, equipment, construction sequence or other causes, and wind loading. Identifiable mechanical devices used in the falsework removal plan must meet applicable industry standards and manufacturer instructions for safe load carrying capacity. Unidentifiable winches must be capable of carrying twice the design load.

The load used for the analysis of overturning moment and sliding of the winch system must be 150 percent of the design load.

Add to section 48-2.03D:

Falsework removal employing methods of holding falsework by winches, hydraulic jacks with prestressing steel, HS rods, or cranes must also be supported by an independent support system when the system is not actively lowering the falsework at vehicular, pedestrian, or railroad traffic openings.

Bridge deck openings used to facilitate falsework removal activities must be formed and located away from the wheel path. The formed openings must be wedge shaped with a 5-inch maximum diameter at the top and a 3-inch maximum diameter at the bottom.

Anchor 10-inch-square aluminum or galvanized steel wire, 1/4-inch-mesh hardware cloth with a 0.025-inch minimum wire diameter firmly to the inside of the soffit openings. Construct a 1/2-inch drip groove to the outside of soffit openings.

Clean and roughen openings made in the bridge deck. Fill the deck openings with rapid setting concrete complying with section 15-5.02.

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49 PILING

Replace "sets" in the 1st paragraph of section 49-1.01C(2) with:

copies

Replace "set" in the 2nd paragraph of section 49-1.01C(2) with:

copy

Replace "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" in the 5th paragraph of section 49-1.01D(2) with:

"Tensile Load Applied by Hydraulic Jack(s) Acting Upward at One End of Test Beam(s)"

Add to section 49-1.03:

Dispose of drill cuttings under section 19-2.03B.

Replace the paragraph of section 49-2.01A(1) with:

Section 49-2.01 includes general specifications for fabricating and installing driven piles.

Epoxy-coated bar reinforcing steel used for pile anchors must comply with section 52-2.02.

Replace the 2nd paragraph of section 49-2.01D with:

Furnish piling is measured along the longest side of the pile from the specified tip elevation shown to the plane of pile cutoff.

Replace the paragraph of section 49-2.02A(1) with:

Section 49-2.02 includes specifications for fabricating and installing steel pipe piles.

Replace the definitions in section 49-2.02A(2) with:

shop welding: Welding performed at a plant on the Department's Authorized Facility Audit List.

field welding: Welding not performed at a plant on the Department's Authorized Facility Audit List.

Replace item 2 in the list in the paragraph of section 49-2.02A(3)(b) with:

2. Certified mill test reports for each heat number of steel used in pipe piles being furnished.
Replace the paragraph of section 49-2.02A(4)(a) with:

Section 11-3.02 does not apply to shop welds in steel pipe piles fabricated at a facility on the Department's Authorized Facility Audit List.

For groove welds using submerged arc welding from both sides without backgouging, qualify the WPS under Table 4.5 of AWS D1.1.

Replace "0.45" in the 2nd paragraph of section 49-2.02B(1)(a) with:

0.47

Replace the 1st paragraph of section 49-2.02B(1)(b) with:

Welds must comply with AWS D1.1. Circumferential welds must be CJP welds.

Delete the 5th paragraph of section 49-2.02B(1)(b).

Add to section 49-2.02B(1):

49-2.02B(1)(d) Reserved

Replace "4.8.4" in item 2.3 in the list in the 2nd paragraph of section 49-2.02B(2) with:

4.9.4

Delete the 3rd paragraph of section 49-2.02C(2).

Replace the paragraph of section 49-2.03A(1) with:

Section 49-2.03 includes specifications for fabricating and installing structural shape steel piles.

Replace the paragraph of section 49-2.03A(3) with:

Submit a certified material test report and a certificate of compliance that includes a statement that all materials and workmanship incorporated in the work and all required tests and inspections of this work have been performed as described.

Replace the 1st paragraph of section 49-2.03B with:

Structural shape steel piles must comply with ASTM A 36/A 36M, ASTM A 572/A 572M, ASTM A 709/A 709M, or ASTM A 992/A 992M.
Replace "sets" in the 1st paragraph of section 49-2.04A(3) with:

copies

Delete the 1st paragraph of section 49-2.04A(4).

Replace the 3rd and 4th paragraphs of section 49-2.04B(2) with:

Piles in a corrosive environment must be steam or water cured under section 90-4.03. If piles in a corrosive environment are steam cured, either:

1. Keep the piles continuously wet for at least 3 days. The 3 days includes the holding and steam curing periods.
2. Apply curing compound under section 90-1.03B(3) after steam curing.

Replace the 1st paragraph of section 49-3.01A with:

Section 49-3.01 includes general specifications for constructing CIP concrete piles.

Add to section 49-3.01A:

Concrete must comply with section 51.

Replace the 1st paragraph of section 49-3.01C with:

Except for CIDH concrete piles constructed under slurry, construct CIP concrete piles such that the excavation methods and the concrete placement procedures provide for placing the concrete against undisturbed material in a dry or dewatered hole.

Replace "Reserved" in section 49-3.02A(2) with:

dry hole:

1. Except for CIDH concrete piles specified as end bearing, a drilled hole that:
   1.1. Accumulates no more than 12 inches of water in the bottom of the drilled hole during a period of 1 hour without any pumping from the hole during the hour.
   1.2. Has no more than 3 inches of water in the bottom of the drilled hole immediately before placing concrete.
2. For CIDH concrete piles specified as end bearing, a drilled hole free of water without the use of pumps.

Replace "Reserved" in section 49-3.02A(3)(a) with:

If plastic spacers are proposed for use, submit the manufacturer's data and a sample of the plastic spacer. Allow 10 days for review.
Replace item 5 in the list in the 1st paragraph of section 49-3.02A(3)(b) with:

5. Methods and equipment for determining:
   5.1. Depth of concrete
   5.2. Theoretical volume of concrete to be placed, including the effects on volume if casings are withdrawn
   5.3. Actual volume of concrete placed

Add to the list in the 1st paragraph of section 49-3.02A(3)(b):

8. Drilling sequence and concrete placement plan.

Replace item 2 in the list in the 1st paragraph of section 49-3.02A(3)(g) with:

2. Be sealed and signed by an engineer who is registered as a civil engineer in the State. This requirement is waived for either of the following conditions:
   2.1. The proposed mitigation will be performed under the current Department-published version of ADSC Standard Mitigation Plan 'A' - Basic Repair without exception or modification.
   2.2. The Engineer determines that the rejected pile does not require mitigation due to structural, geotechnical, or corrosion concerns, and you elect to repair the pile using the current Department-published version of ADSC Standard Mitigation Plan 'B' - Grouting Repair without exception or modification.

Replace "49-2.03A(4)(d)" in the 1st paragraph of section 49-3.02A(4)(d)(i) with:

49-3.02A(4)(d)

Add to the beginning of section 49-3.02A(4)(d)(ii):

If the drilled hole is dry or dewatered without the use of temporary casing to control ground water, installation of inspection pipes is not required.

Replace item 1 in the list in the 1st paragraph of section 49-3.02A(4)(d)(ii) with:

1. Inspection pipes must be schedule 40 PVC pipe complying with ASTM D 1785 with a nominal pipe size of 2 inches. Watertight PVC couplers complying with ASTM D 2466 are allowed to facilitate pipe lengths in excess of those commercially available. Log the location of the inspection pipe couplers with respect to the plane of pile cutoff.

Add to section 49-3.02A(4)(d)(iv):

If the Engineer determines it is not feasible to use one of ADSC’s standard mitigation plans to mitigate the pile, schedule a meeting and meet with the Engineer before submitting a nonstandard mitigation plan.
The meeting attendees must include your representatives and the Engineer's representatives involved in the pile mitigation. The purpose of the meeting is to discuss the type of pile mitigation acceptable to the Department.

Provide the meeting facility. The Engineer conducts the meeting.

**Replace the 1st paragraph of section 49-3.02B(5) with:**

07-19-13

Grout must consist of cementitious material and water, and may contain an admixture if authorized. Do not exceed 5 gallons of water per 94 lb of cement.

Cementitious material must comply with section 90-1.02B, except SCMs are not required.

Water must comply with section 90-1.02D. If municipally supplied potable water is used, the testing specified in section 90-1.02D is waived.

Admixtures must comply with section 90, except admixtures must not contain chloride ions in excess of 0.25 percent by weight.

Use aggregate to extend the grout as follows:

1. Aggregate must consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight.
2. Fine aggregate must comply with section 90-1.02C(3).
3. Size of pea gravel must be such that 100 percent passes the 1/2-inch sieve, at least 85 percent passes the 3/8-inch sieve, and not more than 5 percent passes the no. 8 sieve.
4. Minimum cementitious material content of the grout must not be less than 845 lb/cu yd of grout.

Mix the grout as follows:

1. Add water to the mixer followed by cementitious material, aggregates, and any admixtures.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout.
3. Agitate the grout continuously until the grout is pumped.
4. Do not add water after initial mixing.

**Replace section 49-3.02B(8) with:**

01-20-12

49-3.02B(8) Spacers

Spacers must comply with section 52-1.03D, except you may use plastic spacers.

Plastic spacers must:

1. Comply with sections 3.4 and 3.5 of the Concrete Reinforcing Steel Institute's *Manual of Standard Practice*
2. Have at least 25 percent of their gross plane area perforated to compensate for the difference in the coefficient of thermal expansion between the plastic and concrete
3. Be of commercial quality

**Add between the 1st and 2nd paragraphs of section 49-3.02C(2):**

07-19-13

For CIDH concrete piles with a pile cap, the horizontal tolerance at the center of each pile at pile cut-off is the larger of 1/24 of the pile diameter or 3 inches. The horizontal tolerance for the center-to-center spacing of 2 adjacent piles is the larger of 1/24 of the pile diameter or 3 inches.
Add between the 3rd and 4th paragraphs of section 49-3.02C(2):

If drilling slurry is used during excavation, maintain the slurry level at least 10 feet above the piezometric head.

Add to section 49-3.02C(4):

Unless otherwise shown, the bar reinforcing steel cage must have at least 3 inches of clear cover measured from the outside of the cage to the sides of the hole or casing.

Place spacers at least 5 inches clear from any inspection tubes.

Place plastic spacers around the circumference of the cage and at intervals along the length of the cage, as recommended by the manufacturer.

For a single CIDH concrete pile supporting a column:

1. If the pile and the column share the same reinforcing cage diameter, this cage must be accurately placed as shown
2. If the pile reinforcing cage is larger than the column cage and the concrete is placed under dry conditions, maintain a clear horizontal distance of at least 3.5 inches between the two cages
3. If the pile reinforcing cage is larger than the column cage and the concrete is placed under slurry, maintain a clear horizontal distance of at least 5 inches between the two cages

Replace section 49-3.02C(6) with:

49-3.02C(6) Construction Joint

Section 49-3.02C(6) applies to CIDH concrete piles where a construction joint is shown.

If a permanent steel casing is not shown, you must furnish and install a permanent casing. The permanent casing must:

1. Be watertight and of sufficient strength to prevent damage and to withstand the loads from installation procedures, drilling and tooling equipment, lateral concrete pressures, and earth pressures.
2. Extend at least 5 feet below the construction joint. If placing casing into rock, the casing must extend at least 2 feet below the construction joint.
3. Not extend above the top of the drilled hole or final grade whichever is lower.
4. Not increase the diameter of the CIDH concrete pile more than 2 feet.
5. Be installed by impact or vibratory hammers, oscillators, rotators, or by placing in a drilled hole. Casings placed in a drilled hole must comply with section 49-3.02C(5).

Section 49-2.01A(4)(b) does not apply to permanent casings specified in this section.

Replace item 3 in the list in the 11th paragraph of section 49-3.02C(8) with:

3. Maintain the slurry level at least 10 feet above the piezometric head

Add to section 49-4.01:

Steel soldier piles must comply with section 49-2.03.

Replace the headings and paragraphs in section 49-4.02 with:

Concrete anchors must comply with the specifications for studs in clause 7 of AWS D1.1.
Replace "sets" at each occurrence in the 2nd and 3rd paragraphs of section 50-1.01C(3) with:

copies

Add to section 50-1.01C(3):

Include a grouting plan with your shop drawing submittal. The grouting plan must include:

1. Detailed grouting procedures
2. Type, quantity, and brand of materials to be used
3. Type of equipment to be used including provisions for backup equipment
4. Types and locations of grout inlets, outlets, and vents
5. Methods to clean ducts before grouting
6. Methods to control the rate of flow within ducts
7. Theoretical grout volume calculations for each duct
8. Duct repair procedures due to an air pressure test failure
9. Mixing and pumping procedures
10. Direction of grouting
11. Sequence of use of inlets and outlets
12. Procedure for handling blockages
13. Proposed forms for recording grouting information
14. Procedure for secondary grouting
15. Names of people who will perform grouting activities including their relevant experience and certifications

Add to section 50-1.01C:

50-1.01C(5) Grout

Submit a daily grouting report for each day grouting is performed. Submit the report within 3 days after grouting. The report must be signed by the technician supervising the grouting activity. The report must include:

1. Identification of each tendon
2. Date grouting occurred
3. Time the grouting started and ended
4. Date of placing the prestressing steel in the ducts
5. Date of stressing
6. Type of grout used
7. Injection end and applied grouting pressure
8. Actual and theoretical quantity of grout used to fill duct
9. Ratio of actual to theoretical grout quantity
10. Records of air, grout, and structure surface temperatures during grouting
11. Summary of tests performed and results, except submit compressive strength and chloride ion test results within 48 hours of test completion
12. Names of personnel performing the grouting activity
13. Summary of problems encountered and corrective actions taken
14. Summary of void investigations and repairs made
Replace the introductory clause in the 1st paragraph of section 50-1.01C(4) with:

Submit test samples for the materials shown in the following table to be used in the work:

Add between "the" and "test samples" in the 1st paragraph of section 50-1.01D(2):

prestressing steel

Replace the 3rd paragraph of section 50-1.01D(2) with:

The Department may verify the prestressing force using the Department's load cells.

Replace the 3rd paragraph in section 50-1.01D(3) with:

Each pressure gage must be fully functional and have an accurately reading, clearly visible dial or display. The dial must be at least 6 inches in diameter and graduated in 100 psi increments or less.

Add between the 5th and 6th paragraphs of section 50-1.01D(3):

Each jack and its gages must be calibrated as a unit.

Replace the 6th paragraph in section 50-1.01D(3) with:

Each jack used to tension prestressing steel permanently anchored at 25 percent or more of its specified minimum ultimate tensile strength must be calibrated by METS within 1 year of use and after each repair. You must:

1. Schedule the calibration of the jacking equipment with METS
2. Mechanically calibrate the gages with a dead weight tester or other authorized means before calibration of the jacking equipment by METS
3. Verify that the jack and supporting systems are complete, with proper components, and are in good operating condition
4. Provide labor, equipment, and material to (1) install and support the jacking and calibration equipment and (2) remove the equipment after the calibration is complete
5. Plot the calibration results

Each jack used to tension prestressing steel permanently anchored at less than 25 percent of its specified minimum ultimate tensile strength must be calibrated by an authorized laboratory within 6 months of use and after each repair.

Add to section 50-1.01D:

50-1.01D(4) Pressure Testing Ducts

For post-tensioned concrete bridges, pressure test each duct with compressed air after stressing. To pressure test the ducts:

1. Seal all inlets, outlets, and grout caps.
2. Open all inlets and outlets on adjacent ducts.
3. Attach an air compressor to an inlet at 1 end of the duct. The attachment must include a valve that separates the duct from the air source.
4. Attach a pressure gage to the inlet at the end of the duct.
5. Pressurize the duct to 50 psi.
6. Lock-off the air source.
7. Record the pressure loss after 1 minute.
8. If there is a pressure loss exceeding 25 psi, repair the leaks with authorized methods and retest.

Compressed air used to clear and test the ducts must be clean, dry, and free of oil or contaminants.

50-1.01D(5) Duct Demonstration of Post-Tensioned Members

Before placing forms for deck slabs of box girder bridges, demonstrate that any prestressing steel placed in the ducts is free and unbonded. If no prestressing steel is in the ducts, demonstrate that the ducts are unobstructed.

If prestressing steel is installed after the concrete is placed, demonstrate that the ducts are free of water and debris immediately before installing the steel.

Before post-tensioning any member, demonstrate that the prestressing steel is free and unbonded in the duct.

The Engineer must witness all demonstrations.

50-1.01D(6) Void Investigation

In the presence of the Engineer, investigate the ducts for voids between 24 hours and 72 hours after grouting completion. As a minimum, inspect the inlet and outlet ports at the anchorages and at high points in the tendons for voids after removal. Completely fill any voids found with secondary grout.

50-1.01D(7) Personnel Qualifications

Perform post-tensioning field activities, including grouting, under the direct supervision of a technician certified as a level 2 Bonded PT Field Specialist through the Post-Tensioning Institute. Grouting activities may be performed under the direct supervision of a technician certified as a Grouting Technician through the American Segmental Bridge Institute.

Replace the 6th paragraph of section 50-1.02B with:

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Package the prestressing steel in containers or shipping forms that protect the steel against physical damage and corrosion during shipping and storage.

Replace the 13th paragraph of section 50-1.02B with:

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Prestressing steel is rejected if surface rust either:

1. Cannot be removed by hand-cleaning with a fine steel wool pad
2. Leaves pits visible to the unaided eye after cleaning

Replace the 4th paragraph of section 50-1.02C with:

07-19-13

Admixtures must comply with section 90, except admixtures must not contain chloride ions in excess of 0.25 percent by weight.
Delete the 5th paragraphs of section 50-1.02C.

Add to section 50-1.02C:

Secondary grout must:
1. Comply with ASTM C 1107
2. Not have a deleterious effect on the steel, concrete, or bond strength of the steel to concrete

Replace item 9 including items 9.1 and 9.2 in the list in the 1st paragraph of section 50-1.02D with:
9. Have an inside cross-sectional area of at least 2.5 times the net area of the prestressing steel for multistrand tendons

Replace "3/8" in item 10 in the list in the 1st paragraph of section 50-1.02D with:
1/2

Delete the 2nd sentences in the 1st paragraph of section 50-1.02E.

Replace section 50-1.02F with:

50-1.02F Permanent Grout Caps
Permanent grout caps for anchorage systems of post-tensioned tendons must:
1. Be glass-fiber-reinforced plastic with antioxidant additives. The environmental stress-cracking failure time must be at least 192 hours under ASTM D 1693, Condition C.
2. Completely cover and seal the wedge plate or anchorage head and all exposed metal parts of the anchorage against the bearing plate using neoprene O-ring seals.
3. Have a grout vent at the top of the cap.
4. Be bolted to the anchorage with stainless steel complying with ASTM F 593, alloy 316. All fasteners, including nuts and washers, must be alloy 316.
5. Be pressure rated at or above 150 psi.

Add to section 50-1.02:

50-1.02G Sheathing
Sheathing for debonding prestressing strand must:
1. Be split or un-split flexible polymer plastic tubing
2. Have a minimum wall thickness of 0.025 inch
3. Have an inside diameter exceeding the maximum outside diameter of the strand by 0.025 to 0.14 inch

Split sheathing must overlap at least 3/8 inch.
Waterproofing tape used to seal the ends of the sheathing must be flexible adhesive tape.
The sheathing and waterproof tape must not react with the concrete, coating, or steel.

**Replace the 2nd paragraph of section 50-1.03A(3) with:**

After installation, cover the duct ends and vents to prevent water or debris from entering.

**Add to section 50-1.03A(3):**

Support ducts vertically and horizontally during concrete placement at a spacing of at most 4 feet.

**Delete "at least" in the 1st paragraph of section 50-1.03B(1).**

**Add to section 50-1.03B(1):**

After seating, the maximum tensile stress in the prestressing steel must not exceed 75 percent of the minimum ultimate tensile strength shown.

**Delete the 1st through 4th paragraphs of section 50-1.03B(2)(a).**

**Replace "temporary tensile strength" in the 7th paragraph of section 50-1.03B(2)(a) with:**

temporary tensile stress

**Add to section 50-1.03B(2)(a):**

If prestressing strand is installed using the push-through method, use guide caps at the front end of each strand to protect the duct from damage.

**Add to the list in the 2nd paragraph of section 50-1.03B(2)(c):**

3. Be equipped with permanent grout caps

**Replace section 50-1.03B(2)(d) with:**

50-1.03B(2)(d) Bonding and Grouting

50-1.03B(2)(d)(i) General

Bond the post-tensioned prestressing steel to the concrete by completely filling the entire void space between the duct and the prestressing steel with grout.

Ducts, vents, and grout caps must be clean and free from water and deleterious materials that would impair bonding of the grout or interfere with grouting procedures. Compressed air used for cleaning must be clean, dry, and free of oil or contaminants.

Prevent the leakage of grout through the anchorage assembly by positive mechanical means.

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Before starting daily grouting activities, drain the pump system to remove any water from the piping system.

Break down and thoroughly clean the pump and piping system after each grouting session.

After completing duct grouting activities:

1. Abrasive blast clean and expose the aggregate of concrete surfaces where concrete is to be placed to cover and encase the anchorage assemblies
2. Remove the ends of vents 1 inch below the roadway surface

50-1.03B(2)(d)(ii) Mixing and Proportioning
Proportion solids by weight to an accuracy of 2 percent.
Proportion liquids by weight or volume to an accuracy of 1 percent.
Mix the grout as follows:

1. Add water to the mixer followed by the other ingredients.
2. Mix the grout with mechanical mixing equipment that produces a uniform and thoroughly mixed grout without an excessive temperature increase or loss of properties of the mixture.
3. Do not exceed 5 gal of water per 94 lb of cement or the quantity of water in the manufacturer’s instructions, whichever is less.
4. Agitate the grout continuously until the grout is pumped. Do not add water after the initial mixing.

50-1.03B(2)(d)(iii) Placing
Pump grout into the duct within 30 minutes of the 1st addition of the mix components.
Inject grout from the lowest point of the duct in an uphill direction in 1 continuous operation maintaining a one-way flow of the grout. You may inject from the lowest anchorage if complete filling is ensured.
Before injecting grout, open all vents.
Continuously discharge grout from the vent to be closed. Do not close any vent until free water, visible slugs of grout, and entrapped air have been ejected and the consistency of the grout flowing from the vent is equivalent to the injected grout.
Pump the grout at a rate of 16 to 50 feet of duct per minute.
Conduct grouting at a pressure range of 10 to 50 psi measured at the grout inlet. Do not exceed maximum pumping pressure of 150 psi at the grout inlet.
As grout is injected, close the vents in sequence in the direction of flow starting with the closest vent.
Before closing the final vent at the grout cap, discharge at least 2 gal of grout into a clean receptacle.
Bleed all high point vents.
Lock a pressure of 5 psi into the duct by closing the grout inlet valve.

50-1.03B(2)(d)(iv) Weather Conditions
If hot weather conditions will contribute to quick stiffening of the grout, cool the grout by authorized methods as necessary to prevent blockages during pumping activities.
If freezing weather conditions are anticipated during and following the placement of grout, provide adequate means to protect the grout in the ducts from damage by freezing.

50-1.03B(2)(d)(v) Curing
During grouting and for a period of 24 hours after grouting, eliminate vibration from contractor controlled sources within 100 feet of the span in which grouting is taking place, including from moving vehicles, jackhammers, large compressors or generators, pile driving activities, soil compaction, and falsework removal. Do not vary loads on the span.
AC TRANSIT
INFRASTRUCTURE AND STATION PLATFORM
IFB # 2016-1354

DIVISION 2 – CIVIL SPECIFICATIONS
DIVISION 2.2 SEGMENT A – CALTRANS SPECIFICATIONS

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OCTOBER 2015

For PC concrete members, do not move or disturb the members after grouting for 24 hours. If ambient temperature drops below 50 degrees F, do not move or disturb the members for 48 hours.

Do not remove or open valves until grout has cured for at least 24 hours.

50-1.03B(2)(d)(vi)  Grouting Equipment

Grouting equipment must be:

1. Capable of grouting at a pressure of at least 100 psi
2. Equipped with a pressure gage having a full-scale reading of not more than 300 psi
3. Able to continuously grout the longest tendon on the project in less than 20 minutes

Grout must pass through a screen with clear openings of 1/16 inch or less before entering the pump.

Fit grout injection pipes, ejection pipes, and vents with positive mechanical shutoff valves capable of withstanding the pumping pressures. Do not remove or open valves until the grout has set. If authorized, you may substitute mechanical valves with suitable alternatives after demonstrating their effectiveness.

Provide a standby grout mixer and pump.

50-1.03B(2)(d)(vii)  Grout Storage

Store grout in a dry environment.

50-1.03B(2)(d)(viii)  Blockages

If the grouting pressure reaches 150 psi, close the inlet and pump the grout at the next vent that has just been or is ready to be closed as long as a one-way flow is maintained. Do not pump grout into a succeeding outlet from which grout has not yet flowed.

When complete grouting of the tendon cannot be achieved by the steps specified, stop the grouting operation.

50-1.03B(2)(d)(ix)  Secondary Grouting

Perform secondary grouting by vacuum grouting under the direct supervision of a person who has been trained and has experience in the use of vacuum grouting equipment and procedures.

The vacuum grouting process must be able to determine the size of the void and measure the volume of grout filling the void.

Vacuum grouting equipment must consist of:

1. Volumeter for the measurement of void volume
2. Vacuum pump with capacity of at least 10 cfm and equipped with a flow meter capable of measuring the amount of grout being injected

50-1.03B(2)(d)(x)  Vertical Tendon Grouting

Provide a standpipe at the upper end of the tendon to collect bleed water and allow it to be removed from the grout. The standpipe must be large enough to prevent the grout elevation from dropping below the highest point of the upper anchorage device. If the grout level drops to the highest point of the upper anchorage device, immediately add grout to the standpipe.

Remove the standpipe after the grout has hardened.

For vertical tendons in excess of 100 feet high or if grouting pressure exceeds 145 psi, inject grout at a higher vent from which grout has already flowed to maintain one-way flow.

50-1.03B(2)(d)(xi)  Vents

Place vents at the following locations:

1. Anchorage areas at both ends of the tendon
2. Each high point
3. 4 feet upstream and downstream of each crest of a high point
4. Each change in the cross section of duct

**Add to section 50-1.03B(2):**

**50-1.03B(2)(e) Debonding Prestressing Strands**

Where shown, debond prestressing strands by encasing the strands in plastic sheathing along the entire length shown and sealing the ends of the sheathing with waterproof tape.

Distribute the debonded strands symmetrically about the vertical centerline of the girder. The debonded lengths of pairs of strands must be equal.

Do not terminate debonding at any one cross section of the member for more than 40 percent of the debonded strands or 4 strands, whichever is greater.

Thoroughly seal the ends with waterproof tape to prevent the intrusion of water or cement paste before placing the concrete.

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

**51 CONCRETE STRUCTURES**

**07-18-14**

**Replace the paragraphs of section 51-1.01A with:**

Section 51-1 includes general specifications for constructing concrete structures.

Earthwork for the following concrete structures must comply with section 19-3:

1. Sound wall footings
2. Sound wall pile caps
3. Culverts
4. Barrier slabs
5. Junction structures
6. Minor structures
7. Pipe culvert headwalls, endwalls, and wingwalls for a pipe with a diameter of 5 feet or greater

Falsework must comply with section 48-2.

Joints must comply with section 51-2.

Elastomeric bearing pads must comply with section 51-3.

Reinforcement for the following concrete structures must comply with section 52:

1. Sound wall footings
2. Sound wall pile caps
3. Barrier slabs
4. Junction structures
5. Minor structures
6. PC concrete members

You may use RSC for a concrete structure only where the specifications allow the use of RSC.
Replace "sets" in the 1st paragraph of section 51-1.01C(2) with:

07-19-13

copies

Replace the heading of section 51-1.01D(4) with:

Testing Concrete Surfaces

04-19-13

Add to section 51-1.01D(4)(a):

The Engineer tests POC deck surfaces for smoothness and crack intensity.

04-19-13

Add to the list in the 1st paragraph of section 51-1.01D(4)(b):

3. Completed deck surfaces, including ramps and landings of POCs

04-19-13

Replace the 4th paragraph in section 51-1.01D(4)(b) with:

Except for POCs, surface smoothness is tested using a bridge profilograph under California Test 547. Two profiles are obtained in each lane approximately 3 feet from the lane lines and 1 profile is obtained in each shoulder approximately 3 feet from the curb or rail face. Profiles are taken parallel to the direction of traffic.

04-19-13

Add between the 5th and 6th paragraphs of section 51-1.01D(4)(b):

POC deck surfaces must comply with the following smoothness requirements:

1. Surfaces between grade changes must not vary more than 0.02 foot from the lower edge of a 12-foot-long straightedge placed parallel to the centerline of the POC
2. Surface must not vary more than 0.01 foot from the lower edge of a 6-foot-long straightedge placed perpendicular to the centerline of the POC

04-19-13

Add to section 51-1.01D(4)(d):

The Engineer measures crack intensity of POC deck surfaces after curing, before prestressing, and before falsework release. Clean the surface for the Engineer to measure surface crack intensity.

In any 100 sq ft portion of a new POC deck surface, if there are more than 10 feet of cracks having a width at any point of over 0.02 inch, treat the deck with methacrylate resin under section 15-5.05. Treat the entire deck width between the curbs to 5 feet beyond where the furthest continuous crack emanating from the 100 sq ft section is 0.02 inch wide. Treat the deck surface before grinding.

04-19-13

Replace the 2nd paragraph of section 51-1.02B with:

Except for minor structures, the minimum required 28-day compressive strength for concrete in structures or portions of structures is the compressive strength described or 3,600 psi, whichever is greater.

07-19-13
Add to section 51-1.03C(2)(c)(i):

Permanent steel deck forms are only allowed where shown or if specified as an option in the special provisions.

Replace the 3rd paragraph of section 51-1.03C(2)(c)(ii) with:

Compute the physical design properties under AISI's *North American Specification for the Design of Cold-Formed Steel Structural Members*.

Replace the 8th paragraph of section 51-1.03D(1) with:

Except for concrete placed as pipe culvert headwalls and endwalls, slope paving and aprons, and concrete placed under water, consolidate concrete using high-frequency internal vibrators within 15 minutes of placing concrete in the forms. Do not attach vibrators to or hold them against forms or reinforcing steel. Do not displace reinforcement, ducts, or prestressing steel during vibrating.

Add to section 51-1.03E(5):

Drill the holes without damaging the adjacent concrete. If reinforcement is encountered during drilling before the specified depth is attained, notify the Engineer. Unless coring through the reinforcement is authorized, drill a new hole adjacent to the rejected hole to the depth shown.

Add to section 51-1.03F(5)(a):

For approach slabs, sleeper slabs, and other roadway surfaces of concrete structures, texture the roadway surface as specified for bridge deck surfaces in section 51-1.03F(5)(b).

Replace "Reserved" in section 51-1.03F(5)(b) with:

51-1.03F(5)(b)(i) General

Except for bridge widenings, texture roadway surfaces of bridge decks, approach slabs, and sleeper slabs, and other roadway surfaces of concrete structures longitudinally by grinding and grooving or by longitudinal tining.

For bridge widenings, texture the roadway surfaces longitudinally by longitudinal tining.

In freeze-thaw areas, do not texture PCC surfaces of bridge decks.

51-1.03F(5)(b)(ii) Grinding and Grooving

When texturing the deck surface by grinding and grooving, place a 1/4 inch of sacrificial concrete cover on the bridge deck above the finished grade shown. Place items to be embedded in the concrete based on the final profile grade elevations shown. Construct joint seals after completing the grinding and grooving.

Before grinding and grooving, deck surfaces must comply with the smoothness and deck crack treatment requirements.

Grind and groove the deck surface as follows:
1. Grind the surface to within 18 inches of the toe of the barrier under section 42-3. Grinding must not reduce the concrete cover on reinforcing steel to less than 1-3/4 inches.

2. Groove the ground surfaces longitudinally under section 42-2. The grooves must be parallel to the centerline.

51-1.03F(5)(b)(iii) Longitudinal Tining

When texturing the deck surface by longitudinal tining, perform initial texturing with a burlap drag or broom device that produces striations parallel to the centerline. Perform final texturing with spring steel tines that produce grooves parallel with the centerline.

The tines must:

1. Be rectangular in cross section
2. Be from 3/32 to 1/8 inch wide on 3/4-inch centers
3. Have enough length, thickness, and resilience to form grooves approximately 3/16 inch deep

Construct grooves to within 6 inches of the layout line of the concrete barrier toe. Grooves must be from 1/8 to 3/16 inch deep and 3/16 inch wide after concrete has hardened.

For irregular areas and areas inaccessible to the grooving machine, you may hand construct grooves. Hand-constructed grooves must comply with the specifications for machine-constructed grooves.

Tining must not cause tearing of the deck surface or visible separation of coarse aggregate at the surface.

Add to section 51-1.03F:

51-1.03F(6) Finishing Pedestrian Overcrossing Surfaces

Construct deck surfaces, including ramps and landings of POCs to the grade and cross section shown. Surfaces must comply with the specified smoothness, surface texture, and surface crack requirements.

The Engineer sets deck elevation control points for your use in establishing the grade and cross section of the deck surface. The grade established by the deck elevation control points includes all camber allowances. Except for landings, elevation control points include the beginning and end of the ramp and will not be closer together than approximately 8 feet longitudinally and 4 feet transversely to the POC centerline. Landing elevation control points are at the beginning and the end of the landing.

Broom finish the deck surfaces of POCs. Apply the broom finish perpendicular to the path of travel. You may apply water mist to the surface immediately before brooming.

Clean any discolored concrete by abrasive blast cleaning or other authorized methods.

Replace the paragraphs of section 51-1.04 with:

If concrete involved in bridge work is not designated by type and is not otherwise paid for under a separate bid item, the concrete is paid for as structural concrete, bridge.

The payment quantity for structural concrete includes the volume in the concrete occupied by bar reinforcing steel, structural steel, prestressing steel materials, and piling.

The payment quantity for seal course concrete is the actual volume of seal course concrete placed except the payment quantity must not exceed the volume of concrete contained between vertical planes 1 foot outside the neat lines of the seal course shown. The Department does not adjust the unit price for an increase or decrease in the seal course concrete quantity.

Structural concrete for pier columns is measured as follows:
1. Horizontal limits are vertical planes at the neat lines of the pier column shown.
2. Bottom limit is the bottom of the foundation excavation in the completed work.
3. Upper limit is the top of the pier column concrete shown.

The payment quantity for drill and bond dowel is determined from the number and depths of the holes shown.

Replace section 51-2.01B(2) with:

51-2.01B(2) Reserved

Delete the 4th paragraph of section 51-2.01C.

Replace "SSPC-QP 3" in the 1st paragraph of section 51-2.02A(2) with:

AISC-420-10/SSPC-QP 3

Replace the 2nd and 3rd paragraphs of section 51-2.02B(3)(b) with:

Concrete saws for cutting grooves in the concrete must have diamond blades with a minimum thickness of 3/16 inch. Cut both sides of the groove simultaneously for a minimum 1st pass depth of 2 inches. The completed groove must have:

1. Top width within 1/8 inch of the width shown or ordered
2. Bottom width not varying from the top width by more than 1/16 inch for each 2 inches of depth
3. Uniform width and depth

Cutting grooves in existing decks includes cutting any conflicting reinforcing steel.

Add to the 1st paragraph of section 51-2.02D(3):

POC deck surfaces must comply with section 51-1.03F(6) before placing and anchoring joint seal assemblies.

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02D(1)(c)(ii) with:

copies

Replace "set" in the 7th paragraph of section 51-2.02D(1)(c)(ii) with:

copy

Add to the 1st paragraph of section 51-2.02D(3):

POC deck surfaces must comply with section 51-1.03F(6) before placing and anchoring joint seal assemblies.

Replace "sets" in the 2nd paragraph of section 51-2.02E(1)(c) with:

copies
Replace "set" in the 6th paragraph of section 51-2.02E(1)(c) with:

04-19-13

Replace the 2nd paragraph of section 51-2.02E(1)(e) with:

08-05-11

Except for components in contact with the tires, the design loading must be the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. Each component in contact with the tires must support a minimum of 80 percent of the AASHTO LRFD Bridge Design Specifications Design Truck with 100 percent dynamic load allowance. The tire contact area must be 10 inches measured normal to the longitudinal assembly axis by 20 inches wide. The assembly must provide a smooth-riding joint without slapping of components or tire rumble.

Replace "sets" in the 1st and 2nd paragraphs of section 51-2.02F(1)(c) with:

04-19-13

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Add between the 1st and 2nd paragraphs of section 51-4.01A:

04-19-13

Prestressing concrete members must comply with section 50.

Delete the 2nd paragraph of section 51-4.01A.

Replace the 3rd paragraph of section 51-4.01C(2) with:

04-20-12

For segmental or spliced-girder construction, shop drawings must include the following additional information:

1. Details showing construction joints or closure joints
2. Arrangement of bar reinforcing steel, prestressing tendons, and pressure-grouting pipe
3. Materials and methods for making closures
4. Construction joint keys and surface treatment
5. Other requested information

For segmental girder construction, shop drawings must include concrete form and casting details.

Replace "sets" in the 1st paragraph of section 51-4.01C(3) with:

04-19-13

copies

Delete the 1st and 2nd paragraphs of section 51-4.02A.

Replace the 3rd paragraph of section 51-4.02B(2) with:

04-20-12

For segmental or spliced-girder construction, materials for construction joints or closure joints at exterior girders must match the color and texture of the adjoining concrete.
Add to section 51-4.02B(2):

At spliced-girder closure joints:

1. If shear keys are not shown, the vertical surfaces of the girder segment ends must be given a coarse texture as specified for the top surface of PC members.
2. Post-tensioning ducts must extend out of the vertical surface of the girder segment closure end sufficiently to facilitate splicing of the duct.

For spliced girders, pretension strand extending from the closure end of the girder segment to be embedded in the closure joint must be free of mortar, oil, dirt, excessive mill scale and scabby rust, and other coatings that would destroy or reduce the bond.

Add to section 51-4.03B:

The specifications for prestressing force distribution and sequencing of stressing in the post-tensioning activity in 50-1.03B(2)(a) do not apply if post-tensioning of spliced girders before starting deck construction is described. The composite deck-girder structure must be post-tensioned in a subsequent stage.

Temporary spliced-girder supports must comply with the specifications for falsework in section 48-2.

Before post-tensioning of spliced girders, remove the forms at CIP concrete closures and intermediate diaphragms to allow inspection for concrete consolidation.

Add to section 51-5.01A:

Structure excavation and backfill must comply with section 19-3.

Treated permeable base must comply with section 29.

Replace the paragraph in section 51-5.02G with:

HMA for a temporary roadway structural section must comply with the specifications for minor HMA in section 39.

Delete the 1st paragraph of section 51-5.03B(3).

Delete the 2nd paragraph of section 51-5.03D(1).

Add between the 1st and 2nd paragraphs of section 51-7.01A:

Minor structures include:

1. Pipe culvert headwalls and endwalls for a pipe with a diameter less than 5 feet
2. Drainage inlets
3. Other structures described as minor structures
Delete the 4th paragraph of section 51-7.01A.

Replace the 1st and 2nd paragraphs of section 51-7.01B with:
Concrete must comply with the specifications for minor concrete.

Add to section 51:
51-8–51-15 RESERVED

52 REINFORCEMENT
07-18-14
Add to section 52-1.01A:
Splicing of bar reinforcement must comply with section 52-6.

Replace the 1st and 2nd paragraphs of section 52-1.02B with:
Reinforcing bars must be deformed bars complying with ASTM A 706/A 706M, Grade 60, except you may use:
1. Deformed bars complying with ASTM A 615/A 615M, Grade 60, in:
   1.1. Junction structures
   1.2. Sign and signal foundations
   1.3. Minor structures
   1.4. Concrete crib members
   1.5. Mechanically-stabilized-embankment concrete panels
   1.6. Masonry block sound walls
2. Deformed or plain bars complying with ASTM A 615/A 615M, Grade 40 or 60, in:
   2.1. Slope and channel paving
   2.2. Concrete barriers Type 50 and 60
3. Plain bars for spiral or hoop reinforcement in structures and concrete piles

Add to the list in the 3rd paragraph of section 52-1.02B:
9. Shear reinforcement stirrups in PC girders

Replace the 9th paragraph of section 52-1.03D with:
Terminate each unit of spiral reinforcement at both ends by lapping the spiral reinforcement on itself for at least 80 diameters followed by (1) a 135-degree hook with a 6-inch tail hooked around an intersecting longitudinal bar or (2) a mechanical lap splice coupler. Discontinuities in spiral reinforcement may be made only where shown or authorized. The spiral on each side of a discontinuity or a lap splice is a separate unit. Where discontinuities in spiral reinforcement are not allowed, splice the spiral.
reinforcement. Lap splices in spiral reinforcement must be lapped at least 80 diameters followed by (1) a 135-degree hook with a 6-inch tail hooked around an intersecting longitudinal bar or (2) a mechanical lap splice coupler.

Add to section 52-5.01D:

52-5.01D(4) Quality Assurance Testing
Secure, identify, and transport QA headed bar reinforcement test samples to METS as specified for splice test samples in section 52-5.01D(3)(b).

The Department tests headed bar reinforcement as specified for QC testing in section 52-5.01D(3)(b).

The Department will notify you of the QA test results for each bundle of 4 test samples of splices within 3 business days after METS receives the bundle unless more than 1 bundle is received on the same day, in which case allow 2 additional business days for each additional bundle received.

Replace the 6th paragraph of section 52-6.01D(4)(a) with:

Before performing service splice or ultimate butt splice testing, perform total slip testing on the service splice or ultimate butt splice test samples under section 52-6.01D(4)(b).

Replace section 52-6.02D with:

52-6.02D Ultimate Butt Splice Requirements
When tested under California Test 670, ultimate butt splice test samples must demonstrate necking as either of the following:

1. For "Necking (Option I)," the test sample must rupture in the reinforcing bar outside of the affected zone and show visible necking.
2. For "Necking (Option II)," the largest measured strain must be at least:
   2.1. Six percent for no. 11 and larger bars
   2.2. Nine percent for no. 10 and smaller bars

Replace the 2nd and 3rd paragraphs of section 52-6.03B with:

Do not splice the following by lapping:

1. No. 14 bars
2. No. 18 bars
3. Hoops
4. Reinforcing bars where you cannot provide a minimum clear distance of 2 inches between the splice and the nearest adjacent bar

53 SHOTCRETE

Replace the 2nd and 3rd paragraphs of section 53-2.01D(1) with:

Obtain and test all cores for compressive strength under ASTM C 42/C 42M at an authorized laboratory. The compressive strength is the average strength of the 3 cores.
Shotcrete must have a minimum compressive strength of 3,600 psi, unless otherwise described. The shotcrete must attain the minimum compressive strength at 28 days, except 42 days are allowed for shotcrete with a described minimum compressive strength greater than 3,600 psi.

54 WATERPROOFING

Add between "be" and "3/8 inch" in the 3rd paragraph of section 54-4.02C:

at least

Delete the 3rd paragraph of section 54-5.01A.

Delete "and HMA" in the 2nd paragraph of section 54-5.03.

Replace the last paragraph of section 54-5.03 with:

Do not allow traffic on the seal until HMA is placed over it.

Add to section 54:

54-7 SILANE WATERPROOFING TREATMENT

Reserved

54-8–54-10 RESERVED

55 STEEL STRUCTURES

Delete the 3rd paragraph in section 55-1.01C(1).

Replace the 3rd sentence of the 4th paragraph in section 55-1.01C(1) with:

For ASTM F 1554 anchor bolts, include chemical composition and carbon equivalence for each heat of steel.

Add to section 55-1.01C(1):

For HS connections, submit a record of which lots are used in each joint as an informational submittal.
Replace "sets" at each occurrence in the 1st paragraph of section 55-1.01C(2) with:

copies

Replace the list in the 2nd paragraph of section 55-1.01C(2) with:

1. Sequence of shop and field assembly and erection. For continuous members, include proposed steel erection procedures with calculations that show girder capacity and geometry will be correct.
2. Welding sequences and procedures.
3. Layout drawing of the entire structure with locations of butt welded splices.
4. Locations of temporary supports and welds.
5. Vertical alignment of girders at each stage of erection.
7. Details for connections not shown or dimensioned on the plans.
8. Details of allowed options incorporated in the work.
9. Direction of rolling of plates where orientation is specified.
10. Distortion control plan.
11. Dimensional tolerances. Include measures for controlling accumulated error to meet overall tolerances.
12. Material specification and grade listed on the bill of materials.
13. Identification of tension members and fracture critical members.
14. Proposed deviations from plans, specifications, or previously submitted shop drawings.
15. Contract plan sheet references for details.

Replace items 2 and 3 in the list in the 1st paragraph of section 55-1.01C(3) with:

2. Tension flanges and webs of horizontally curved girders
3. Hanger plates

Replace the 2nd paragraph of section 55-1.01C(3) with:

Furnish plates, shapes, or bars with extra length to provide for removal of check samples.

Delete the 1st and 2nd sentences in the 3rd paragraph of section 55-1.01C(3).

Replace the 4th paragraph of section 55-1.01C(3) with:

Remove material for test samples in the Engineer’s presence. Test samples for plates over 24 inches wide must be 10 by 12 inches with the long dimension transverse to the direction of rolling. Test samples for other products must be 12 inches long taken in the direction of rolling with a width equal to the product width.

Replace the 1st sentence of the 6th paragraph in section 55-1.01C(3) with:

Results of check testing are delivered to you within 20 days of receipt of samples at METS.
Delete the 2nd paragraph of section 55-1.01D(1).

Replace the 2nd sentence of the 4th paragraph in section 55-1.01D(1) with:
The calibration must be performed by an authorized repair and calibration center approved by the tool manufacturer.

Add to section 55-1.01D(1):
For bolts installed as snug tight, rotational capacity testing and installation tension testing are not required.
In addition to NDT requirements in AWS D1.5, ultrasonically test 25 percent of all main member tension butt welds in material over 1/2 inch thick.
Perform NDT on 100 percent of each pin as follows:
1. MT under ASTM A 788, S 18, with no linear indication allowed exceeding 3 mm
2. UT under ASTM A 788, S 20, level S and level DA in two perpendicular directions
The Engineer determines the location of all NDT testing for welding.

Delete the 2nd paragraph of section 55-1.01D(3)(a).

Replace section 55-1.01D(4)(b) with:
Perform rotational capacity testing on each rotational capacity lot under section 55-1.01D(3)(b) at the job site before installation.

Replace the 1st sentence of the 2nd paragraph in section 55-1.01D(4)(c) with:
Test 3 representative HS fastener assemblies under section 8 of Specification for Structural Joints Using High-Strength Bolts of the RCSC.

Replace the 1st paragraph in section 55-1.01D(4)(d) with:
Perform fastener tension testing to verify minimum tension in HS bolted connections no later than 48 hours after all fasteners in a connection have been tensioned.

Replace the 3rd paragraph in section 55-1.01D(4)(d) with:
Test 10 percent of each type of fastener assembly in each HS bolted connection for minimum tension using the procedure described in section 10 of Specification for Structural Joints Using High-Strength Bolts of the RCSC. Check at least 2 assemblies per connection. For short bolts, determine the inspection torque using steps 1 through 7 of "Arbitration of Disputes, Torque Method-Short Bolts" in Structural Bolting Handbook of the Steel Structures Technology Center.

OCTOBER 2015
### Replace the 1st table in the 1st paragraph of section 55-1.02A(1) with:

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon steel</td>
<td>ASTM A 709/A 709M, Grade 36 or ({\text{ASTM A36/A36M}})^a</td>
</tr>
<tr>
<td>HS low alloy columbium vanadium steel</td>
<td>ASTM A 709/A 709M, Grade 50 or ({\text{ASTM A 992/A 992M}\text{ or }\text{ASTM A 572/A 572M, Grade 50}})^a</td>
</tr>
<tr>
<td>HS low alloy structural steel</td>
<td>ASTM A 709/A 709M, Grade 50W or Grade HPS 50W, or ({\text{ASTM A 588/A 588M}})^a</td>
</tr>
<tr>
<td>HS low alloy structural steel plate</td>
<td>ASTM A 709/A 709M, Grade HPS 70W</td>
</tr>
<tr>
<td>High-yield strength quenched and tempered alloy steel plate suitable for welding</td>
<td>ASTM A 709/A 709M, Grade 100, Grade 100W, or Grade HPS 100W, or ({\text{ASTM A 514/A 514M}})^a</td>
</tr>
</tbody>
</table>

^aGrades you may substitute for the equivalent ASTM A 709 steel subject to the modifications and additions specified and to the requirements of ASTM A 709.

### Replace the 2nd table in the 1st paragraph of section 55-1.02A(1) with:

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel fastener components for general applications:</td>
<td></td>
</tr>
<tr>
<td>Bolts and studs</td>
<td>ASTM A 307</td>
</tr>
<tr>
<td>Anchor bolts</td>
<td>ASTM F 1554(^a)</td>
</tr>
<tr>
<td>HS bolts and studs</td>
<td>ASTM A 449, Type 1(^a)</td>
</tr>
<tr>
<td>HS threaded rods</td>
<td>ASTM A 449, Type 1(^a)</td>
</tr>
<tr>
<td>HS nonheaded anchor bolts</td>
<td>ASTM F 1554, Grade 105, Class 2A(^a)</td>
</tr>
<tr>
<td>Nuts</td>
<td>ASTM A 563, including appendix X1(^b)</td>
</tr>
<tr>
<td>Washers</td>
<td>ASTM F 844</td>
</tr>
<tr>
<td>Hardened Washers</td>
<td>ASTM F 436, Type 1, including S1 supplementary requirements</td>
</tr>
</tbody>
</table>

Components of HS steel fastener assemblies for use in structural steel joints:

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bolts</td>
<td>ASTM A 325, Type 1</td>
</tr>
<tr>
<td>Tension control bolts</td>
<td>ASTM F 1852, Type 1</td>
</tr>
<tr>
<td>Nuts</td>
<td>ASTM A 563, including appendix X1(^b)</td>
</tr>
<tr>
<td>Hardened washers</td>
<td>ASTM F 436, Type 1, Circular, including S1 supplementary requirements</td>
</tr>
<tr>
<td>Direct tension indicators</td>
<td>ASTM F 959, Type 325, zinc-coated</td>
</tr>
</tbody>
</table>

^aUse hardened washers.

^bZinc-coated nuts tightened beyond snug or wrench tight must be furnished with a dry lubricant complying with supplementary requirement S2 in ASTM A 563.
Replace the 3rd table in the 1st paragraph of section 55-1.02A(1) with:

<table>
<thead>
<tr>
<th>Material</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon steel for forgings, pins, and rollers</td>
<td>ASTM A 668/A 668M, Class D</td>
</tr>
<tr>
<td>Alloy steel for forgings</td>
<td>ASTM A 668/A 668M, Class G</td>
</tr>
<tr>
<td>Pin nuts</td>
<td>ASTM A 709/A 709M or ASTM A 563, including appendix X1&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Carbon-steel castings</td>
<td>ASTM A 27/A 27M, Grade 65-35, Class 1</td>
</tr>
<tr>
<td>Malleable iron castings</td>
<td>ASTM A 47/A 47M, Grade 32510</td>
</tr>
<tr>
<td>Gray iron castings</td>
<td>ASTM A 48, Class 30B</td>
</tr>
<tr>
<td>Carbon steel structural tubing</td>
<td>ASTM A 500/A 500M, Grade B; ASTM A 501, ASTM A 847/A 847M, or ASTM A 1085</td>
</tr>
<tr>
<td>Steel pipe&lt;sup&gt;b&lt;/sup&gt;</td>
<td>ASTM A 53, Type E or S, Grade B; ASTM A 106, Grade B; or ASTM A 139, Grade B</td>
</tr>
<tr>
<td>Stud connectors</td>
<td>ASTM A 108</td>
</tr>
</tbody>
</table>

<sup>a</sup>Zinc-coated nuts tightened beyond snug or wrench tight must be furnished with a dry lubricant complying with supplementary requirement S2 in ASTM A 563.

<sup>b</sup>Hydrostatic testing will not apply.

Replace the table in the 1st paragraph in section 55-1.02A(2) with:

<table>
<thead>
<tr>
<th>Material complying with ASTM A 709/A 709M</th>
<th>CVN impact value (ft-lb at temperature)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 36</td>
<td>15 at 40 ºF</td>
</tr>
<tr>
<td>Grade 50&lt;sup&gt;a&lt;/sup&gt; (Thickness up to 2 inches)</td>
<td>15 at 40 ºF</td>
</tr>
<tr>
<td>Grade 50W&lt;sup&gt;a&lt;/sup&gt; (Thickness up to 2 inches)</td>
<td>15 at 40 ºF</td>
</tr>
<tr>
<td>Grade 50&lt;sup&gt;a&lt;/sup&gt; (Thickness over 2 inches up to 4 inches)</td>
<td>20 at 40 ºF</td>
</tr>
<tr>
<td>Grade 50W&lt;sup&gt;a&lt;/sup&gt; (Thickness over 2 inches up to 4 inches)</td>
<td>20 at 40 ºF</td>
</tr>
<tr>
<td>Grade HPS 50W&lt;sup&gt;a&lt;/sup&gt; (Thickness up to 4 inches)</td>
<td>20 at 10 ºF</td>
</tr>
<tr>
<td>Grade HPS 70W (Thickness up to 4 inches)</td>
<td>25 at -10 ºF</td>
</tr>
<tr>
<td>Grade 100 (Thickness of 2-1/2 inches or less)</td>
<td>25 at 0 ºF</td>
</tr>
<tr>
<td>Grade 100W (Thickness over 2-1/2 inches up to 4 inches)</td>
<td>35 at 0 ºF</td>
</tr>
<tr>
<td>Grade HPS 100W (Thickness of 2-1/2 inches or less)</td>
<td>25 at -30 ºF</td>
</tr>
<tr>
<td>Grade HPS 100W (Thickness over 2-1/2 inches up to 4 inches)</td>
<td>35 at -30 ºF</td>
</tr>
</tbody>
</table>

<sup>a</sup>If the material yield strength is more than 65,000 psi, reduce the temperature for the CVN impact value 15 degrees F for each increment of 10,000 psi above 65,000 psi.
Steel, gray iron, and malleable iron castings must have continuous fillets cast in place in reentrant angles.

Delete the 3rd and 4th sentences in the 2nd paragraph in section 55-1.02A(5).

Section 55-1.02B(1) applies to work performed at the source and at the job site.

Ends of girder stiffeners shown as tight-fit must bear on the girder flange with at least point bearing. Local clearances between the end of the stiffener and the girder flange must be at most 1/16 inch.

Fabricate floor beams, stringers, and girders having end connection angles to exact length back to back of connection angles.

Use low-stress stamps for fracture critical members and tension members.

Slightly round edges and sharp corners, including edges marred, cut, or roughened during handling or erection.

Instead of machining, you may heat straighten steel not in contact with other metal bearing surfaces if the above tolerances are met.

Replace item 2 in the list in the 1st paragraph of section 55-1.02B(3) with:

2. Radius of bend measured to the concave face must comply with *Manual of Steel Construction* of the AISC

Plates to be bent to a smaller radius than specified in *Manual of Steel Construction* of the AISC must be bent hot.
Replace the introductory clause of the 2nd paragraph of section 55-1.02B(4) with:

Threads for pin ends and pin nuts 1-1/2 inches or more in diameter must comply with the following:

Replace the 3rd paragraph in section 55-1.02B(5) with:

Holes for pins must be:
1. True to the diameter specified.
2. At right angles to the member axis.
3. Parallel with each other except for pins where nonparallel holes are required.
4. Smooth and straight with the final surface produced by a finishing cut.

Replace the 1st paragraph in section 55-1.02B(6)(c) with:

Bolted connections using HS fastener assemblies must comply with Specification for Structural Joints Using High-Strength Bolts of the RCSC.

Replace the 7th paragraph in section 55-1.02B(6)(c) with:

For all bolts, thread stickout after tensioning must be at least flush with the outer nut face. At least 3 full threads must be located within the grip of the connection.

Delete the 3rd paragraph in section 55-1.02B(7)(a).

Add to section 55-1.02B(7)(a):

For welds indicated to be subject to tensile forces that are to receive RT, grind smooth and flush on both sides of welds before testing.

For groove weld surface profiles that interfere with NDT procedures, grind welds smooth and blend with the adjacent material.

For fillet weld surface profiles that interfere with NDT procedures, grind welds and blend the toes smoothly with the adjacent base metal.

Add to section 55-1.02B(7):

55-1.02B(7)(c) Steel Pedestrian Bridges
Reserved

Replace the 1st paragraph in section 55-1.02B(9) with:

Prepare and paint contact surfaces of HS bolted connections before assembly. Thoroughly clean all other surfaces of metal in contact to bare metal before assembly. Remove all rust, mill scale, and foreign material.
Replace the 1st sentence of the 4th paragraph in section 55-1.02B(9) with:
Preassemble truss work in lengths of at least 3 abutting panels and adjust members for line and camber.

Replace the 1st sentence of the 5th paragraph in section 55-1.02B(9) with:
Preassemble bolted splice joints for plate girders in lengths of at least 3 abutting sections and adjust abutting sections for line and camber.

Replace the 6th paragraph in section 55-1.02B(9) with:
Preassemble prepared splice joints for welded girders with abutting members and adjust for line and camber.

Replace the paragraphs in section 55-1.03C(1) with:
Reserved

Replace the 3rd sentence of the 1st paragraph in section 55-1.03C(2) with:
Attain full bearing on the concrete under bearing assemblies.

Replace the 3rd paragraph in section 55-1.03C(2) with:
During welding, protect bearings and bearing surfaces using authorized methods.

Replace section 55-1.03C(4) with:

55-1.03C(4) Continuous Members
Unless otherwise shown, structural steel girders are designed for continuity in supporting girder dead load. If erection procedures provide girder continuity for dead load, preassemble members with field joints in a no-load condition in a horizontal or an upright condition.

You may erect structural steel girders such that dead load girder continuity is not provided. If erection procedures do not provide girder continuity for dead load:
1. You may increase cross-sectional areas or change grades of steel to provide the specified capacity if authorized.
2. After erection, the erected structure must have a load-carrying capacity at least equal to the structure shown.

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
56 SIGNS

Replace the 4th paragraph of section 56-3.01A with:

The types of sign structures include:
1. Truss
2. Bridge mounted
3. Tubular

Replace "sets" in the 1st paragraph of section 56-3.01C(2) with:

copies

Delete the 7th paragraph of section 56-3.02K(2).

Replace the 1st paragraph of section 56-3.02M(1) with:

Galvanize all ferrous metal parts of the following sign structure types:
1. Truss
2. Bridge mounted
3. Tubular

Add between the 1st and 2nd paragraphs of section 56-3.02M(1):

Clean and paint all ferrous metal parts of tubular sign structures after galvanizing, including the areas to be covered by sign panels. Do not paint sign structures other than tubular type unless specified in the special provisions.

Replace the headings and paragraphs in section 56-3.02M(3) with:

Where specified, clean and paint sign structures under section 59-5.

57 WOOD AND PLASTIC LUMBER STRUCTURES

Replace "51-2.01C(3)" in the 1st paragraph of section 57-2.01C(3)(a) with:

57-2.01C(3)

Replace "sets" at each occurrence in the 1st paragraph of section 57-3.01C with:

copies
58 SOUND WALLS
04-19-13

Delete the 3rd paragraph of section 58-1.01.

Replace the 1st paragraph of section 58-2.01D(5)(a) with:

You must employ a special inspector and an authorized laboratory to perform Level 1 inspections and structural tests of masonry to verify the masonry construction complies with section 1704, "Special Inspections," and section 2105, "Quality Assurance," of the 2007 CBC.

Delete the 1st paragraph of section 58-2.02F.

Replace "sets" at each occurrence in the 1st paragraph of section 58-4.01C with:

copies

59 PAINTING
11-15-13

Replace "SSPC-SP 10" at each occurrence in section 59 with:

SSPC-SP 10/NACE no. 2

Replace "SSPC-SP 6" at each occurrence in section 59 with:

SSPC-SP 6/NACE no. 3

Replace "SSPC-CS 23.00" at each occurrence in section 59 with:

SSPC-CS 23.00/AWS C 2.23M/NACE no. 12

Replace "Specification for Structural Joints Using ASTM A325 or A 490 Bolts" in the 1st paragraph of section 59-2.01C(1) with:

Specification for Structural Joints Using High-Strength Bolts
Replace "SSPC-QP 3 or AISC SPE, Certification P-1 Enclosed" in item 3 in the list in the 1st paragraph of section 59-2.01D(1) with:

AISC-420-10/SSPC-QP 3 (Enclosed Shop)

Replace "Specification for Structural Joints Using ASTM A325 or A 490 Bolts" in the 1st paragraph of section 59-2.02 with:

Specification for Structural Joints Using High-Strength Bolts

Replace the paragraphs in section 59-2.03A with:

Clean and paint all exposed structural steel and other metal surfaces.

You must provide enclosures for cleaning and painting structural steel. Cleaning and painting of new structural steel must be performed in an Enclosed Shop as defined in AISC-420-10/SSPC-QP 3. Maintain atmospheric conditions inside enclosures within specified limits.

Except for blast cleaning within closed buildings, perform blast cleaning and painting during daylight hours.

Add to section 59-2.03B:

59-2.03B(3) Containment Systems
59-2.03B(3)(a) General

Construct containment systems when disturbing existing paint systems during bridge rehabilitation.

The containment system must be one of the following:

1. Ventilated containment system
2. Vacuum-shrouded surface preparation equipment and drapes and ground covers
3. Equivalent containment system if authorized

The containment system must contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

Properly maintain the containment system while work is in progress and do not change the containment system unless authorized.

Containment systems over railroad property must provide the minimum clearances as specified in section 5-1.20C for the passage of railroad traffic.

59-2.03B(3)(b) Ventilated Containment Systems
59-2.03B(3)(b)(i) General

If flexible framing is used, support and fasten it to (1) prevent the escape of abrasive and blast materials due to whipping from traffic or wind and (2) maintain clearances.

If the wind speed reaches 50 mph or greater, relieve the wind pressure on the containment system using an authorized method.

59-2.03B(3)(b)(ii) Design Criteria

Scaffolding or supports for the ventilated containment system must not extend below the vertical clearance level nor to the ground line at locations within the roadbed.
For truss-type bridges, all connections of the ventilated containment system to the existing structure must be made through the deck, girder, stringer, or floor beam system. No connections are allowed that will cause bending stresses in a truss member.

The ventilated containment system must comply with section 7-1.02K(6)(e).

The minimum total design load for the ventilated containment system must consist of the sum of the dead and live vertical loads.

Dead and live loads are as follows:

1. Dead load must consist of the actual load of the ventilated containment system
2. Live loads for bridges with only spot blast cleaning work must consist of:
   2.1. Uniform load of at least 25 psf applied over the supported area
   2.2. Moving concentrated load of 1000 lb to produce maximum stress in the main supporting elements of the ventilated containment system
3. Live loads for bridges with 100 percent blast cleaning to bare metal must consist of:
   3.1. Uniform load of at least 45 psf, which includes 20 psf of sand load, applied over the supported area
   3.2. Moving concentrated load of 1000 lb to produce maximum stress in the main supporting elements of the ventilated containment system

Assumed horizontal loads do not need to be included in the design of the ventilated containment system.

Maximum allowable stresses must comply with section 48-2.01D(3)(c).

59-2.03B(3)(b)(iii) Ventilation

The ventilation system in the ventilated containment system must be of the forced input airflow type with fans or blowers.

Negative air pressure must be employed within the ventilated containment system and will be verified by visual methods by observing the concave nature of the ventilated containment system while taking into account wind effects or by using smoke or other visible means to observe airflow. The input airflow must be properly balanced with the exhaust capacity throughout the range of operations.

The exhaust airflow of the ventilation system in the ventilated containment system must be forced into wet or dry dust collectors or bag houses.

Replace item 1 in the list in the 2nd paragraph of section 59-2.03C(1) with:

1. Apply a stripe coat of undercoat paint on all edges, corners, seams, crevices, interior angles, junctions of joining members, weld lines, and similar surface irregularities. The stripe coat must completely hide the surface being covered. If spot blast cleaning portions of the bridge, apply the stripe coat of undercoat paint before each undercoat and follow with the undercoat as soon as practical. If removing all existing paint from the bridge, apply the undercoat first as soon as practical and follow with the stripe coat of undercoat paint for each undercoat.

Replace the heading of section 59-2.03C(2) with:

Zinc Coating System

Add to section 59-2.03C(2)(a):

Coatings for new structural steel and connections between new and existing structural steel must comply with the requirements shown in the following table:
## Zinc Coating System

<table>
<thead>
<tr>
<th>Description</th>
<th>Coating</th>
<th>Dry film thickness (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All new surfaces:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undercoat</td>
<td>Inorganic zinc primer, AASHTO M 300 Type I or II</td>
<td>4–8</td>
</tr>
<tr>
<td>Finish coat&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Exterior grade latex&lt;sup&gt;b&lt;/sup&gt;, 2 coats</td>
<td>2 minimum each coat, 4–8 total</td>
</tr>
<tr>
<td>Total thickness, all coats</td>
<td></td>
<td>8–14</td>
</tr>
<tr>
<td>Connections to existing structural steel: &lt;sup&gt;c&lt;/sup&gt;</td>
<td>Inorganic zinc primer, AASHTO M 300 Type I or II</td>
<td>4–8</td>
</tr>
<tr>
<td>Finish coat&lt;sup&gt;a&lt;/sup&gt;</td>
<td>Exterior grade latex&lt;sup&gt;b&lt;/sup&gt;, 2 coats</td>
<td>2 minimum each coat, 4–8 total</td>
</tr>
<tr>
<td>Total thickness, all coats</td>
<td></td>
<td>8–14</td>
</tr>
</tbody>
</table>

<sup>a</sup>If no finish coats are described, a final coat of inorganic zinc primer is required.

<sup>b</sup>Exterior grade latex must comply with section 91-2.02 unless otherwise specified.

<sup>c</sup>Includes the following locations:
1. New and existing contact surfaces
2. Existing member surfaces under new HS bolt heads, nuts, or washers
3. Bare surfaces of existing steel after trimming, cutting, drilling, or reaming
4. Areas within a 4-inch radius from the point of application of heat for welding or flame cutting

Replace "Specification for Structural Joints Using ASTM A325 or A 490 Bolts" in the 7th paragraph of section 59-2.03C(2)(b)(i) with:

*Specification for Structural Joints Using High-Strength Bolts*

Add to section 59-2.03C:

59-2.03C(3) Moisture-Cured Polyurethane Coating System
Reserved

59-2.03C(4) State Specification Paint Waterborne Coating System

59-2.03C(4)(a) General
The State Specification PWB coating system for existing structural steel must comply with the requirements shown in the following table:
State Specification PWB Coating System

<table>
<thead>
<tr>
<th>Surface</th>
<th>Description</th>
<th>State Specification PWB Coating</th>
<th>Dry film thickness (mils)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surfaces cleaned to bare metal&lt;sup&gt;a&lt;/sup&gt;:</td>
<td>1st undercoat</td>
<td>145</td>
<td>2–3</td>
</tr>
<tr>
<td></td>
<td>2nd undercoat</td>
<td>146</td>
<td>2–3</td>
</tr>
<tr>
<td></td>
<td>1st finish coat</td>
<td>171</td>
<td>1.5–3</td>
</tr>
<tr>
<td></td>
<td>2nd finish coat</td>
<td>172</td>
<td>1.5–3</td>
</tr>
<tr>
<td>Total thickness, all coats</td>
<td>--</td>
<td>7–12</td>
<td></td>
</tr>
<tr>
<td>Existing painted surfaces to be topcoated:</td>
<td>Undercoat</td>
<td>146</td>
<td>2–3</td>
</tr>
<tr>
<td></td>
<td>1st finish coat</td>
<td>171</td>
<td>1.5–3</td>
</tr>
<tr>
<td></td>
<td>2nd finish coat</td>
<td>172</td>
<td>1.5–3</td>
</tr>
<tr>
<td>Total thickness, new coats</td>
<td>--</td>
<td>5–9</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Includes locations of spot blast cleaning

59-2.03C(4)(b) Finish Coats

Reserved

**Add to section 59-5.01:**

Where specified, prepare and paint sign structures under sections 59-2 and 59-3.

Instead of submitting proof of the certification complying with SSPC-QP 1, you may submit documentation with the painting quality work plan showing compliance with the requirements in section 3 of SSPC-QP 1.

Instead of submitting proof of the certification complying with SSPC-QP 2, you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 4.2 through 4.4 of SSPC-QP 2, Category A.

Instead of submitting proof of the certification complying with AISC-420-10/SSPC-QP 3 (Enclosed Shop), you may submit documentation with the painting quality work plan showing compliance with the requirements in sections 5 through 18 of AISC-420-10/SSPC-QP 3.

**Replace the paragraphs of section 59-5.03 with:**

59-5.03A General

You may prepare and paint sign structures before or after erection. After erection, repair damaged paint to the satisfaction of the Engineer.

The total dry film thickness of finish coats on contact surfaces of galvanized HS bolted connections (1) must be from 1 to 4 mils and (2) may be applied in 1 application.

59-5.03B Undercoating of Ungalvanized Surfaces

Blast-cleaned surfaces must receive a single undercoat consisting of an inorganic zinc coating as specified in AASHTO M 300, Type I or Type II, except:

1. The first 2 sentences of section 5.6 do not apply
2. Section 5.6.1 does not apply

If you propose to use a coating that is not on the Authorized Material List, submit the required documentation specified in section 5.6 of AASHTO M 300. Allow 30 days for the Engineer’s review.
59-5.03C Testing of Inorganic Zinc Coating
Perform adhesion and hardness testing no sooner than 72 hours after application of the single undercoat of inorganic zinc coating.

59-5.03D Finish Coating
The exposed area of inorganic zinc coating must receive a minimum of 2 finish coats of exterior grade latex paint.

The 1st finish coat color must match no. 24558 of FED-STD-595. The 2nd finish coat color must match no. 24491 of FED-STD-595. The total dry film thickness of the applications of the 2nd finish coat must be not less than 2 mils.

Replace section 59-7 with:

59-7 STAINING CONCRETE AND SHOTCRETE

59-7.01 GENERAL
59-7.01A General
59-7.01A(1) Summary
Section 59-7.01 includes specifications for preparing and staining concrete and shotcrete surfaces using an acid stain.

59-7.01A(2) Definitions
Reserved

59-7.01A(3) Submittals
Submit stain manufacturer’s product data and application instructions at least 7 days before starting staining activities.

59-7.01A(4) Quality Control and Assurance
Reserved

59-7.01B Materials
59-7.01B(1) General
Reserved

59-7.01B(2) Stain
Stain must:
1. Be a water-based solution of inorganic metallic salts
2. Contain dilute acid that penetrates and etches the concrete or shotcrete surface
3. Be a commercial quality product designed specifically for exterior applications
4. Produce abrasion-resistant color deposits

59-7.01B(3) Sealer
Reserved

59-7.01B(4) Joint Sealing Compound
Reserved

59-7.01C Construction
59-7.01C(1) General
Seal joints between concrete and shotcrete surfaces to be stained and adjacent metal with joint sealing compound before applying the stain.
Test surfaces for acceptance of the stain before applying the stain. Clean surfaces that resist accepting the stain and retest until passing.

Apply the stain under the manufacturer's instructions.

Before staining, the concrete or shotcrete surfaces must be:

1. At least 28 days old
2. Prepared under SSPC-SP 13/NACE no. 6
3. Thoroughly dry

Apply the stain uniformly to avoid excessive rundown. Work the stain into the concrete using a nylon bristle brush in a circular motion.

After the last coat of stain has dried, rinse stained surfaces with water and wet scrub with a stiff bristle nylon brush until the rinse water runs clear. Collect all rinse water.

Protect adjacent surfaces during staining.

Thoroughly cure each application of the stain and correct skips, holidays, thin areas, or other deficiencies before the next application.

Drips, puddles, or other irregularities must be worked into the concrete or shotcrete surface.

59-7.01C(2) Test Panel
For staining concrete or shotcrete, stain a test panel complying with section 51-1.01D(3).
For staining sculpted shotcrete, stain a test panel complying with section 53-3.01D(3).
The test panel must be:

1. Stained using the same personnel, materials, equipment and methods to be used in the work
2. Accessible for viewing
3. Displayed in an upright position near the work
4. Authorized for staining before starting the staining work

If ordered, construct additional test panels until a satisfactory color is attained.

The Engineer uses the authorized stained test panel to determine the acceptability of the stained surface.

Dispose of the test panels after the staining work is complete and authorized. Notify the Engineer before disposing of the test panels.

59-7.01D Payment
Not Used

59-7.02 SCULPTED SHOTCRETE AND TEXTURED CONCRETE
59-7.02A General
59-7.02A(1) Summary
Section 59-7.02 includes specifications for preparing and staining sculpted shotcrete and textured concrete surfaces using an acid stain.

59-7.02A(2) Definitions
Reserved

59-7.02A(3) Submittals
59-7.02A(3)(a) General
Reserved
59-7.02A(3)(b) Experience Qualifications
Submit the following documentation of the staining subcontractor's experience at least 10 days before the preconstruction meeting:

1. Summary of the staining subcontractor's experience that demonstrates compliance with section 59-7.02A(4)(b).
2. List of at least 3 projects completed in the last 5 years that demonstrate the staining subcontractor's ability to stain textured concrete or sculpted shotcrete surfaces similar to the textured concrete or sculpted shotcrete for this project. For each project include:
   2.1. Project description
   2.2. Name and phone number of the owner
   2.3. Staining completion date
   2.4. Color photos of the completed stained surface

59-7.02A(3)(c) Installation Plan
Submit an installation plan at least 10 days before the preconstruction meeting. The installation plan must include details for preparing and staining the textured concrete or sculpted shotcrete to achieve the required color, including:

1. Number of applications that will be used to apply the stain
2. For each application of the stain, a description of:
   2.1. Manufacturer, color, finish, and percentage strength mixture of the stain that will be applied
   2.2. Methods and tools that will be used to apply the stain
3. Methods for protecting adjacent surfaces during staining
4. Rinse water collection plan for containing all liquid, effluent, and residue resulting from preparing and staining textured concrete or sculpted shotcrete

59-7.02A(4) Quality Control and Assurance
59-7.02A(4)(a) General
Reserved
59-7.02A(4)(b) Contractor Qualifications
The staining subcontractor must:

1. Have experience in staining textured concrete or sculpted shotcrete surfaces to simulate the appearance of natural rock formations or stone masonry
2. Have successfully completed at least 3 projects in the past 5 years involving staining of concrete or sculpted shotcrete surfaces similar to the textured concrete or sculpted shotcrete for this project

59-7.02A(4)(c) Preconstruction Meeting
Before starting staining activities, conduct a meeting to discuss the installation plan. Meeting attendees must include the Engineer and all staining subcontractors.

59-7.02B Materials
Not Used
59-7.02C Construction
Not Used
59-7.02D Payment
Prepare and stain concrete and prepare and stain shotcrete are measured by the area of the vertical or sloped wall face stained.

Replace "soldier" in the 5th paragraph of section 59-9.03 with:

soldier

OCTOBER 2015
Replace section 59-11 with:

59-11 STAINING GALVANIZED SURFACES

Replace section 59-12 with:

59-12 ROCK STAINING

59-12.01 GENERAL
59-12.01A Summary
Section 59-12 includes specifications for applying stain to the exterior surface of landscape boulders, native rock that has been damaged or scarred, rock energy dissipaters, rock slope protection and gabion surfaces.

59-12.01B Submittals
Submit the following:
1. Work plan showing methods to control overspray and spillage, and to protect adjacent surfaces
2. Product data including the manufacturer's product sheet and the instructions for the application of the stain

59-12.01C Quality Control and Assurance
59-12.01C(1) General
Reserved

59-12.01C(2) Test Plot
Apply the stain to a test plot rock area of at least 3 by 3 feet at a location designated by the Engineer. Notify the Engineer at least 7 days before staining the test plot. Prepare and stain the test plot with the same materials, tools, equipment, and methods to be used in staining the final surfaces. Separate test plots are required for staining rock slope protection and native rock.

If ordered, prepare additional test plots. Additional test plots are change order work.

Obtain authorization of the test plot before starting the staining work. Use the authorized test plot as the standard for comparison in determining acceptability of staining. If the test plot is not incorporated into the work and the Engineer determines it is no longer needed, dispose of it.

59-12.02 MATERIALS
59-12.02A General
Reserved

59-12.02B Stain
Reserved

59-12.03 CONSTRUCTION
59-12.03A General
Reserved

59-12.03B Preparation
Before applying the stain:
1. Identify and obtain authorization for the areas to be stained
2. Remove oils, dirt, and other contaminants from the surfaces to be stained
3. Dry all surfaces to be stained

59-12.03C Application
After the areas to be stained have been identified, prepared, and the test plot authorized, stain the exposed surfaces under the manufacturer's instructions to achieve a color consistent with, or as close as possible to, the authorized test area color.

Control overspray and protect adjacent surfaces.

Keep stained surfaces dry for at least 20 days following the application of the stain.

59-12.04 PAYMENT
Rock stain areas are measured along the slope face.

DIVISION VII DRAINAGE
62 ALTERNATIVE CULVERTS

Add to the end of section 62-1.01:

Alternative culverts include concrete collars and concrete tees and reinforcement for connecting new pipe to existing or new facilities. Concrete for the collars and tees must be minor concrete. Reinforcement for the concrete collars or tee connections must comply with section 52.

Add to section 62:

62-5 TEMPORARY SLOTTED PIPE

Reserved

62-6–62-10 RESERVED

64 PLASTIC PIPE

Replace the 2nd paragraph of section 64-1.01A with:

Plastic pipe includes all necessary elbows, wyes, tees, other branches, fittings, coupling systems, concrete collars or tees, and reinforcement.

Replace item 1 in the list in the 3rd paragraph of section 64-1.02E with:

1. If watertight joints are shown, use Type S corrugated polyethylene pipe with gaskets. If watertight joints are not shown, use gasketed joints when specified. Gaskets for Type C corrugated polyethylene pipe must be installed on each side of the joint. Gaskets must comply with ASTM F477 and be factory-installed.
65 CONCRETE PIPE
07-19-13
Replace the 2nd paragraph of section 65-1.01 with:
10-19-12
Concrete pipe includes all necessary elbows, wyes, tees, other branches, concrete collars or tees, and reinforcement.

Replace section 65-2.02D with:
07-19-13
65-2.02D Reserved

68 SUBSURFACE DRAINS
04-18-14
Replace the 5th paragraph of section 68-4.02E with:
04-18-14
HMA for backfilling trenches must comply with HMA for miscellaneous areas as specified in section 39.

70 MISCELLANEOUS DRAINAGE FACILITIES
07-19-13
Replace section 70-5.02A(2) with:
01-20-12
70-5.02A(2) Plastic Flared End Sections
Plastic flared end sections must comply with ASTM D 3350.

Replace "40-1.03N" in item 2.4 of the 1st paragraph of section 70-5.06C with:
07-19-13
40-1.03K

Replace the 2nd, 3rd, and 4th paragraphs of section 70-7.02B with:
01-18-13
Before shipping, the exterior surfaces of the casing must be cleaned, primed, and coated to comply with ANSI/AWWA C213 or ANSI/AWWA C214.
Wrapping tape for repairing damaged coating and wrapping field joints and fittings must be a pressure-sensitive PVC or polyethylene tape with a minimum thickness of 50 mils, 2 inches wide.

OCTOBER 2015
Add to section 70-7.03:

01-18-13

Repair damaged coating on the casing and wrap field joints and fittings with wrapping tape as follows:

1. Before wrapping, thoroughly clean and prime the pipe casing, joints, and fittings under the tape manufacturer's instructions.
2. Wrap the tape tightly with 1/2 uniform lap, free from wrinkles and voids to provide not less than a 100-mil thickness.
3. Wrapping at joints must extend at least 6 inches over adjacent pipe casing coverings. Apply tension such that the tape will conform closely to contours of the joint.

Add to section 70:

07-19-13

70-8–70-15 RESERVED

DIVISION VIII  MISCELLANEOUS CONSTRUCTION

72  SLOPE PROTECTION

11-15-13

Replace the table in the 3rd paragraph of section 72-2.02A with:

11-15-13

<table>
<thead>
<tr>
<th>Property</th>
<th>California Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent specific gravity</td>
<td>206</td>
<td>2.5 minimum</td>
</tr>
<tr>
<td>Absorption</td>
<td>206</td>
<td>4.2% maximum</td>
</tr>
<tr>
<td>Durability Index</td>
<td>229</td>
<td>52 minimum</td>
</tr>
</tbody>
</table>

Notes:

Durability absorption ratio (DAR) = course durability index/(% absorption + 1)
If the DAR is greater than 10, the absorption may exceed 4.2 %
If the DAR is greater than 24, the durability index may be less than 52

Replace the row under "Class" in the table in the 1st paragraph of section 72-3.02B with:

01-20-12

<table>
<thead>
<tr>
<th>1/2 T</th>
<th>1/4 T</th>
<th>Light</th>
<th>Facing</th>
<th>Cobble</th>
</tr>
</thead>
</table>
Replace the table in the 2nd paragraph of section 72-3.02B with:

<table>
<thead>
<tr>
<th>Property</th>
<th>California Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparent specific gravity</td>
<td>206</td>
<td>2.5 minimum</td>
</tr>
<tr>
<td>Absorption</td>
<td>206</td>
<td>4.2% maximum</td>
</tr>
<tr>
<td>Durability index</td>
<td>229</td>
<td>52 minimum</td>
</tr>
</tbody>
</table>

Notes:
Durability absorption ratio (DAR) = course durability index/(% absorption + 1)
If the DAR is greater than 10, the absorption may exceed 4.2%
If the DAR is greater than 24, the durability index may be less than 52

Replace the row under "Rock class" in the table in the 2nd paragraph of section 72-3.03E with:

<table>
<thead>
<tr>
<th>1/2 T</th>
<th>1/4 T</th>
<th>Light</th>
<th>Facing</th>
<th>Cobble</th>
</tr>
</thead>
</table>

Delete the 5th and 6th paragraphs of section 72-11.01B.

Add to section 72-11.01B:
Expanded polystyrene and premolded expansion joint filler must comply with section 51-2.

Delete the 2nd paragraph of section 72-11.01C(1).

Delete the 7th paragraph of section 72-11.01C(1).

Add between the 7th and 8th paragraphs of section 72-11.01C(1):
Schedule the construction of the slope paving such that the work, including placing and finishing concrete and applying curing compound, is completed on the same day that the work is started.

Replace the 8th paragraph of section 72-11.01C(1) with:
If the Engineer determines that the size of the slope paving is too large to be constructed without an intermediate construction joint, place a joint at an authorized location. Complete a section of concrete bounded by permissible construction joints within the same day.

Replace the 1st paragraph of section 72-11.01C(2) with:
Construct and finish minor concrete slope paving under section 51-1.
Replace the 3rd paragraph of section 72-11.01C(2) with:

After striking-off to grade, hand float the concrete with floats that are at least 4 inches wide and 30 inches long. Broom the entire surface with a stiff-bristled broom to produce a uniform surface. Brooming must be done when the surface is sufficiently set to prevent deep scarring and must be accomplished by drawing the broom down the slope, leaving marks parallel to the slope. The Engineer may order you to apply a fine spray of water to the surface immediately before brooming.

Delete the 3rd paragraph of section 72-11.01D.

73 CONCRETE CURBS AND SIDEWALKS

Replace the paragraph in section 73-1.01A with:

Section 73-1 includes general specifications for constructing minor concrete items including concrete curbs, sidewalks, gutter depressions, driveways, island paving, and curb ramps; for installing detectable warning surfaces and precast parking bumpers; and for texturing and coloring concrete surfaces.

74 PUMPING EQUIPMENT AND CONTROLS

Replace the 1st paragraph of section 74-1.01C(3) with:

Submit at least 5 copies of product data to OSD, Documents Unit. Each copy must be bound together and include an index stating equipment names, manufacturers, and model numbers. Two copies will be returned. Notify the Engineer of the submittal. Include in the notification the date and contents of the submittal.

Replace the 1st sentence of the 1st paragraph in section 74-2.01D(2) with:

Drainage pumps must be factory certified under ANSI/HI 14.6.

75 MISCELLANEOUS METAL

Add between 2nd and 3rd paragraphs of section 75-1.03A:

Fabricate expansion joint armor from steel plates, angles, or other structural shapes. Shape the armor to the section of the concrete deck and match-mark it in the shop. Straighten warped sections of expansion...
joint armor before placing. Secure the expansion joint armor in the correct position during concrete placement.

Replace "SSPC-QP 3" in the 3rd paragraph of section 75-1.03E(4) with:

AISC-420-10/SSPC-QP3

Replace "metal beam guard railing" in the table in the 1st paragraph of section 75-1.05 with:

guardrail

Replace section 78 with:

78 INCIDENTAL CONSTRUCTION

78-1 GENERAL

Section 78 includes specifications for incidental bid items that are not closely associated with other sections.

78-2–78-50 RESERVED

80 FENCES

Add to section 80-2.02D:

Vertical stays must:

1. Comply with ASTM A641
2. Be 12-1/2 gage
3. Have a Class 3 zinc coating

Replace item 1 in the list in section 80-2.02E with:

Comply with ASTM A 116, Type Z, Grade 60, Class 1

Add after "galvanized wire" in the 1st paragraph of section 80-2.02F:

complying with ASTM A 641
Replace the 3rd and 4th paragraphs of section 80-2.02F with:

Each staple used to fasten barbed wire and wire mesh fabric to wood posts must:

1. Comply with ASTM F 1667
2. Be at least 1-3/4 inches long
3. Be manufactured from 9-gage galvanized wire

Wire ties used to fasten barbed wire and wire mesh to metal posts must be at least 11-gage galvanized wire complying with ASTM F 626. Clips and hog rings used for metal posts must be at least 9-gage galvanized wire complying with ASTM F 626.

Replace the 8th through 14th paragraphs of section 80-2.03 with:

Attach the wire mesh and barbed wire to each post.

Securely fasten tension wires to wood posts. Make a single or double loop around each post at each attachment point and staple the wire to the post. Use wire ties, hog rings, or wire clips to fasten the wires to the metal posts.

Connect each wood brace to its adjacent post with a 3/8 by 4-inch steel dowel. Twist the tension wires until the installation is rigid.

Stretch barbed wire and wire mesh fabric and fasten to each wood or steel end, corner, or gate post. Apply tension according to the manufacturer's instructions using a mechanical stretcher or other device designed for such use. If no tension is specified by the manufacturer, use 250 pounds for the required tension. Evenly distribute the pull over the longitudinal wires in the wire mesh such that no more than 50 percent of the original depth of the tension curves is removed. Do not use a motorized vehicle, truck, or tractor to stretch the wire.

Attach barbed wire and wire mesh fabric to the private-property side of posts. On curved alignments, place the wire mesh and barbed wire on the face of the post against which the normal pull of the wire mesh and wire will be exerted. Terminate the wire mesh and barbed wire at each end, corner, pull, and gate post in the new fence line. Attach wire mesh and barbed wire to each wood or steel end, corner, pull, or gate post by wrapping each horizontal strand around the post and tying it back on itself with at least 4 tightly-wound wraps.

At line posts, fasten the wire mesh to the post at the top and bottom and at intermediate points not exceeding 10 inches apart. Fasten each line of barbed wire to each line post. Use wire ties or clips to fasten the wires to metal posts under the post manufacturer’s instructions. Drive staples crosswise with the grain of the wood and pointed slightly downward. Drive staples just short of actual contact with the wires to allow free longitudinal movement of those wires and to prevent damage to the wire’s protective coating. Secure all wires to posts to maintain horizontal alignment.

Splices in barbed wire and wire mesh are allowed provided there are no more than 2 splices per 50 feet of fence. Use commercially-available galvanized mechanical wire splices or a wire splice created by tying off wire. Install mechanical wire splices with a tool designed for that purpose under the manufacturer’s instructions. Tie off the wire as follows:

1. Carry the ends of each wire 3 inches past the tied-off knot location and wrap around the wire for at least 6 turns in opposite directions.
2. Remove the splice tool and close the space by pulling the end of the wires together.
3. Cut the unused ends of the wire close and neat.

Delete "resisting moment" and its definition in section 80-3.01B.
Add to section 80-3.01B:

posts and braces: Framework that supports the metal fabric for chain link fence. Posts and braces include round and roll-formed cross sections used as line, end, latch, or corner posts and braces.

Add to section 80-3.01C:

Submit a certificate of compliance for posts and braces that includes the information specified in ASTM F1043, section 9.

Delete section 80-3.01D.

Replace the 1st paragraph of section 80-3.02B with:

The base metal for posts and braces must be commercial-quality, weldable steel complying with AASHTO M 181, Type 1, except for the protective coating requirements.

Posts and braces must comply with the strength requirements in ASTM F1043:
1. Group IA, regular grade, for round posts
2. Group II-L for roll-formed posts and braces

Delete the 4th through 8th paragraphs of section 80-3.02B.

Add between "coating" and "unless" in the 1st sentence of section 80-3.02C:

or ASTM F1345, Class 2,

DIVISION IX TRAFFIC CONTROL FACILITIES
83 RAILINGS AND BARRIERS

Replace "metal beam guard railing" at each occurrence in sections 83-1.02 and 83-1.03 with:

midwest guardrail system

Replace "guard rail" and "guard railing" at each occurrence in sections 83-1.02A and 83-1.02B with:

guardrail

Replace the heading of section 83-1.02B with:

Midwest Guardrail System
Add between "splices at" and "posts" in the 5th paragraph of section 83-1.02B:

midspan between

Replace "Metal rail posts, box spacers, and" in item 1 in the list in the 25th paragraph of section 83-1.02B with:

Metal box spacers and

Replace item 4 in the list in the 25th paragraph of section 83-1.02B with:

4. For the connection of guard railing to new bridge railing or barriers, anchor bolt holes must be drilled in the concrete parapet or formed using metal or PVC sleeves.

Delete items 6 and 7 in the list in the 25th paragraph of section 83-1.02B.

Replace "Type WB" at each occurrence in section 83-1.02B(2) with:

Type WB-31

Replace the heading of section 83-1.02B(3) with:

Temporary Midwest Guardrail System

Replace the 2nd sentence of the 9th paragraph of section 83-1.02D(1) with:

Posts and balusters must be normal to the profile grade. Transverse to the profile grade, railings must be plumb within a tolerance not to exceed 0.02 foot in 10 feet.

Replace "80-2.02" in the 2nd paragraph of section 83-1.02E with:

80-3.02B

Replace the 3rd paragraph of section 83-1.02G(2) with:

Stud bolts must comply with the specifications for studs in clause 7 of AWS D1.1.

Replace "horizontal" in the 8th paragraph of section 83-1.02G(2) with:

vertical

Replace "sets" in the 10th paragraph of section 83-1.02G(2) with:

copies

Replace the 1st sentence of the 1st paragraph of section 83-1.03 with:

Except for guardrail within the pay limits of a terminal system, a transition railing (Type WB-31), an end anchor assembly, or a rail tensioning assembly, midwest guardrail system is measured along the face of the rail element from end post to end post of the completed railing.
Add to section 83-2.02D(1):

For a concrete barrier transition:

1. Remove portions of the existing concrete barrier where shown under section 15-3
2. Roughen the contact surface of the existing concrete barrier
3. Drill and bond dowels into the existing concrete barrier under section 51-1

Add to section 83-2.02:

83-2.02H–83-2.02M Reserved

84 TRAFFIC STRIPES AND PAVEMENT MARKINGS

Replace section 84-1.01C with:

84-1.01C Submittals

For glass beads used in drop-on applications and in thermoplastic formulations, submit a certificate of compliance and test results for each lot of beads specifying the EPA test methods used and tracing the lot to the specific test sample. The testing for lead and arsenic content must be performed by an independent testing laboratory.

Submit retroreflectivity readings for traffic stripes and pavement markings at locations with deficient retroreflectivity determined by the Engineer.

84-1.01D Quality Control and Assurance

Test each lot of glass beads for arsenic and lead under EPA Test Method 3052 and 6010B or 6010C.

Applied traffic stripes and pavement markings must be retroreflective. Within 30 days of applying traffic stripes and pavement markings, the retroreflectivity of the stripes and markings must be a minimum of 250 mcd·m⁻²·lx⁻¹ for white and 125 mcd·m⁻²·lx⁻¹ for yellow when measured under ASTM E1710.

The Engineer will perform a nighttime, drive-through, visual inspection of the retroreflectivity of the traffic stripes and pavement markings and notify you of any locations with deficient retroreflectivity. Measure the retroreflectivity of the deficient areas using a retroreflectometer under ASTM E1710 and the sampling protocol specified in ASTM D7585.

Replace the paragraph in section 84-1.02 with:

Glass beads applied to paint must comply with State Specification 8010-004.

Glass beads applied to molten thermoplastic material must be Type 2 beads complying with AASHTO M 247. The glass beads must have a coating that promotes adhesion of the beads to thermoplastic.

At least 75 percent of the beads by count must be true spheres that are colorless and do not exhibit dark spots, air inclusions, or surface scratches when viewed under 20X magnification.

Each lot of glass beads used in pavement markings must contain less than 200 ppm each of arsenic and lead when tested under EPA Test Method 3052 and 6010B or 6010C.
Replace the 1st paragraph in section 84-2.04 with:

A double extruded thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 2 traffic stripes.
A double sprayable thermoplastic traffic stripe consisting of two 4-inch wide yellow stripes is measured as 1 traffic stripe.

Add to section 84:

84-6 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS WITH ENHANCED WET NIGHT VISIBILITY

Reserved

84-7–84-10 RESERVED

^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

86 ELECTRICAL SYSTEMS

10-17-14

Replace the paragraphs in section 86-1.01 with:

Section 86 includes general specifications for constructing and rehabilitating electrical systems.
Electrical systems must comply with the material and installation specifications in section 86-2.
Section 86-3 includes specifications for constructing controller assemblies.
Section 86-4 includes specifications for constructing traffic signal faces, programmed visibility signal faces, pedestrian signal faces, flashing beacons, ramp metering signs, and signal mounting assemblies.
Section 86-5 includes specifications for constructing vehicle detectors and pedestrian push button assemblies.
Section 86-6 includes specifications for constructing lighting systems.
Section 86-7 includes specifications for constructing rehabilitating electrical equipment.
Comply with Part 4 of the California MUTCD. Nothing in section 86 is to be construed as to reduce the minimum standards in this manual.
The locations shown for electrical systems are approximate; the Engineer determines the final locations.

Replace the paragraphs in section 86-1.015 with:

actuation: Actuation as defined in the California MUTCD.
channel: Discrete information path.
controller assembly: Assembly for controlling a system’s operations, consisting of a controller unit and auxiliary equipment housed in a rainproof cabinet.
controller unit: Part of the controller assembly performing the basic timing and logic functions.
detector: Detector as defined in the California MUTCD.
**electrolier:** Assembly of a lighting standard and luminaire.

**flasher:** Device for opening and closing signal circuits at a repetitive rate.

**flashing beacon control assembly:** Assembly of switches, circuit breakers, terminal blocks, flasher, wiring, and other necessary electrical components housed in a single enclosure for operating a beacon.

**inductive loop detector:** Detector capable of being actuated by an inductance change caused by a vehicle passing or standing over the loop.

**lighting standard:** Pole and mast arm supporting the luminaire.

**luminaire:** Assembly that houses the light source and controls the light emitted from the light source.

**magnetic detector:** Detector capable of being actuated by an induced voltage caused by a vehicle passing through the earth's magnetic field.

**powder coating:** Coating applied electrostatically using exterior-grade UV-stable polymer powder.

**pretimed controller assembly:** Assembly operating traffic signals under a predetermined cycle length.

**pull box:** A box with a cover that is installed in an accessible place in a run of conduit to facilitate the pulling in of wires or cables.

**signal face:** Signal face as defined in the *California MUTCD.*

**signal head:** Signal head as defined in the *California MUTCD.*

**signal indication:** Signal indication as defined in the *California MUTCD.*

**signal section:** Signal section as defined in the *California MUTCD.*

**signal standard:** Pole and mast arm supporting 1 or more signal faces with or without a luminaire mast arm.

**traffic-actuated controller assembly:** Assembly for operating traffic signals under the varying demands of traffic as registered by detector actuation.

**traffic phase:** Signal phase as defined in the *California MUTCD.*

**vehicle:** Vehicle as defined in the *California Vehicle Code.*

---

**Replace the paragraphs in section 86-1.02 with:**

Comply with 8 CA Code of Regs § 2299 et seq.

Electrical equipment must comply with one or more of the following standards:

1. ANSI
2. ASTM
3. EIA
4. NEMA
5. NETA
6. UL
7. Public Utilities Commission, General Order No. 95, "Rules for Overhead Electrical Sign Construction"

Materials and workmanship must comply with:

1. FCC rules

OCTOBER 2015
2. ITE standards
3. NEC
4. California Electrical Code

Electrical equipment and materials must be NRTL certified wherever applicable.

**Replace the paragraphs in section 86-1.03 with:**

Submit a schedule of values within 15 days after Contract approval.

Determine the quantities required to complete the work. Submit the quantities as part of the schedule of values.

Provide a schedule of values for each lump sum bid item.

Do not include costs for the traffic control system in the schedule of values.

The schedule of values must include the type, size, and installation method for:

1. Foundations
2. Standards and poles
3. Conduit
4. Pull boxes
5. Conductors and cables
6. Service equipment enclosures
7. Telephone demarcation cabinets
8. Vehicle signal heads and hardware
9. Pedestrian signal heads and hardware
10. Push buttons
11. Loop detectors
12. Luminaires and lighting fixtures
13. Materials shown in the quantity tables on plan sheets labeled E

**Replace the paragraphs in section 86-1.04 with:**

Within 15 days of Contract approval, submit a list of equipment and materials that you propose to install. Submit the list before shipping equipment or materials to the job site. The list must include the following information:

1. Manufacturer’s name
2. Make and model number
3. Month and year of manufacture
4. Lot and serial numbers
5. Dimensions
6. List of components
7. Manufacturer’s installation instructions
8. Contract number
9. Your contact information

Supplement the list with 2 copies of the following data:

1. Schematic wiring diagrams
2. Scale drawings of cabinets showing location and spacing of shelves, terminal blocks, and equipment, including dimensions
3. Operation manual
Electrical equipment constructed as shown does not require detailed drawings and diagrams.

Submit 3 sets of computer-generated schematic wiring diagrams for the cabinet.

Place the schematic wiring diagram in a heavy-duty plastic envelope and attach it to the inside of the cabinet door.

Prepare diagrams, plans, and drawings using graphic symbols in IEEE 315, “Graphic Symbols for Electrical and Electronic Diagrams.”

Replace the 5th paragraph of section 86-2.04B(2) with:

HS bolts, nuts, and flat washers used to connect slip base plates must comply with the requirements for HS fastener assemblies for use in structural steel joints in section 55-1.02A(1) except rotational capacity testing and tension testing are not required.

Delete the row for standard Type 36-20A in the table in the 6th paragraph of section 86-2.04B(2).

Replace the 10th paragraph of section 86-2.04B(2) with:

Bolted connections attaching signal or luminaire arm to the pole must be considered slip critical. Galvanized faying surfaces of plates on luminaire arm, signal arm, and pole must be roughened by hand using a wire brush before assembly and must comply with requirements for Class C surface conditions for slip-critical connections in Specification for Structural Joints Using High-Strength Bolts of the RCSC. Coatings for faying surfaces must comply with the RCSC specification for Class B coatings.

Replace the 1st sentence of item 8 in the list in the 1st paragraph of section 86-2.04B(3) with:

During manufacturing, longitudinal seams on vertical tubular members of cantilevered support structures must be within 90 degrees circumferentially of the center of the longest mast arm connection.

Delete item 15.3 in the list in the 1st paragraph of section 86-2.04B(3).

Add between "Exposed" and "conduit" in the 2nd paragraph of section 86-2.05B:

Type 1

Replace the 1st sentence of the 10th paragraph of section 86-2.05C with:

After installing conduit, install the pull tape.

Replace the 1st sentence of the 15th paragraph of section 86-2.05C with:

Conduit runs shown to be located behind curbs may be installed in the street within 3 feet of and parallel to the face of the curb by the trenching in pavement method.
Install an expansion-deflection fitting for expansion joints with a 1-1/2-inch movement rating. The fitting must be watertight and include a molded neoprene sleeve, a bonding jumper, and 2 silicon bronze or zinc-plated iron hubs.

Replace the 1st and 2nd sentences of the 2nd paragraph of section 86-2.05D with:

86-2.06 PULL BOXES

86-2.06A General

86-2.06A(1) Cover Marking

The cover marking must be clearly defined, uniform in depth, and parallel to either the long or short sides of the cover.

Marking letters must be 1 to 3 inches high.

Before galvanizing steel or cast iron cover, apply marking by one of the following methods:

1. Use cast iron strip at least 1/4 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover with 1/4-inch flathead stainless steel machine bolts and nuts. Peen bolts after tightening.
2. Use sheet steel strip at least 0.027 inch thick with letters raised a minimum of 1/16 inch. Fasten strip to cover by spot welding, tack welding, or brazing, with 1/4-inch stainless steel rivets or 1/4-inch roundhead stainless steel machine bolts and nuts. Peen bolts after tightening.
3. Bead weld the letters on cover such that the letters are raised a minimum of 3/32 inch.

86-2.06A(2) Installation and Use

Space pull boxes no more than 200 feet apart. You may install additional pull boxes to facilitate the work.

You may use a larger standard size pull box than that shown on the plans or specified.

A pull box in ground or sidewalk area must be installed as follows:

1. Embed bottom of the pull box in crushed rock.
2. Place a layer of roofing paper on the crushed rock.
3. Place grout over the layer of roofing paper. Grout must be 0.50 to 1 inch thick and sloped toward the drain hole.
4. Make a 1-inch drain hole in the center of the pull box through the grout and roofing paper.
5. Place grout between the pull box and the pull box extension, and around conduits.

The top of the pull box must be flush with the surrounding grade or the top of an adjacent curb, except in unpaved areas where the pull box is not immediately adjacent to and protected by a concrete foundation, pole, or other protective construction. Place the pull box 1-1/4 inches above the surrounding grade. Where practical, place a pull box shown in the vicinity of curbs or adjacent to a standard on the side of the foundation facing away from traffic. If a pull box is installed in a sidewalk area, adjust the depth of the pull box so that the top of the pull box is flush with the sidewalk.

Reconstruct the sump of an existing pull box if disturbed by your activities. Remove old grout and replace with new if the sump was grouted.

86-2.06B Non–Traffic Pull Boxes

Reserved

86-2.06C Traffic Pull Boxes

The traffic pull box and cover must comply with ASTM C857, "Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures," for HS20 loading. You must be able to place the load anywhere on the box and cover for 1 minute without causing cracks or permanent deformations.
Frame must be anchored to the box with 1/4 by 2-1/4 inch concrete anchors. Four concrete anchors must be included for No. 3-1/2(T) pull box; one placed in each corner. Six concrete anchors must be included for No. 5(T) and No. 6(T) pull boxes; one placed in each corner and one near the middle of each of the longer sides.

Nuts must be zinc-plated carbon steel, vibration resistant, and have a wedge ramp at the root of the thread.

After installation of traffic pull box, install the steel cover and keep it bolted down when your activities are not in progress at the pull box. When the steel cover is placed for the final time, the cover and Z bar frame must be cleaned of debris and tightened securely.

Steel cover must be countersunk approximately 1/4 inch to accommodate the bolt head. When tightened, the bolt head must not exceed more than 1/8 inch above the top of the cover.

Concrete placed around and under traffic pull boxes must be minor concrete.

---

Replace the 11th row in the table in the 1st paragraph of section 86-2.08B with:

<table>
<thead>
<tr>
<th>Grounded circuit conductor</th>
<th>Pedestrian push buttons</th>
<th>Wht</th>
<th>Blk</th>
<th>NBR</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signals and multiple lighting</td>
<td>Wht</td>
<td>None</td>
<td>NBR</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Flashing beacons and sign lighting</td>
<td>Wht</td>
<td>None</td>
<td>NBR</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Lighting control</td>
<td>Wht</td>
<td>None</td>
<td>C-3</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Service</td>
<td>Wht</td>
<td>None</td>
<td>NBR</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

Replace the 1st sentence of the 1st paragraph of section 86-2.08C with:

Circuit conductors, connectors, and terminals must be UL or NRTL listed and rated for 600 V(ac) operation.

Add to the beginning of section 86-2.09A:

Provide enough traffic signal light conductors for functional operation of the signal. Provide 3 spare conductors in all conduits containing traffic signal light conductors.

Replace the paragraphs in section 86-2.09C with:

Connectors must be crimp type. Use a manufacturer-recommended tool for connectors and terminals to join conductors. Comply with SAE-AS7928.

Terminate stranded conductors smaller than no. 14 in crimp style terminal lugs.

Terminate field conductors no. 12 and smaller with spade type terminals. Terminate field conductors no. 10 and larger with spade type or ring type terminals.

Replace the value for resistivity in the table in the 6th paragraph of section 86-2.09E with:

25 x 10^{13} \, \Omega \text{ per inch, minimum}
Add between "the" and "head" in the 3rd sentence of the 2nd paragraph of 86-2.09F:

connector

Replace "project" in the 3rd paragraph of section 86-2.11A with:

work

Replace "Contract" in item 2 in the list in the 11th paragraph of section 86-2.11A with:

work

Delete the 12th paragraph of section 86-2.11A.

Replace section 86-2.11C with:

86-2.11C Electrical Service for Booster Pumps
Provide electrical service from the service point to the booster pump.
Furnish conductors, conduit, and pull boxes from the service point to the booster pump.
Do not use Type 3 conduit unless shown otherwise.

Replace section 86-2.14A with:

86-2.14A General
Deliver material and equipment for acceptance testing to either METS or a testing location as ordered.
Allow 30 days for testing. The Department notifies you when testing is complete. You must pick up the material or equipment from the test site and deliver it to the job site.
If material or equipment is rejected, allow 30 days for retesting. The retesting period starts when replacement material or equipment is delivered to the test site.
If material or equipment submitted for testing does not comply with the specifications, remove it within 5 business days after you are notified that the equipment is rejected. If equipment is not removed within that period, the Department may ship it to you and deduct the shipping cost.
Testing and quality control procedures for traffic signal controller assemblies must comply with NEMA TS standards for traffic control systems.

Replace the 2nd paragraph of section 86-3.02A(1) with:

The Department furnishes the BBS components under section 6-2.03.
Replace the 9th paragraph of section 86-3.02B with:

The couplings between the external cabinet and Model 332L cabinet must include a conduit for power connections between the 2 cabinets. Couplings must include:

1. 2-inch nylon-insulated steel chase nipple
2. 2-inch sealing steel locknut
3. 2-inch nylon-insulated steel bushing

Delete item 1.3 in the list in the 7th paragraph of section 86-3.04A.

Replace the 2nd paragraph of section 86-4.01A with:

The housing must not fail structurally as described in the following table:

<table>
<thead>
<tr>
<th>Housing type</th>
<th>Test method</th>
<th>Description of structural failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal</td>
<td>California Test 666</td>
<td>Fracture within the housing assembly or deflection of more than half the lens diameter of the signal section during the wind load test</td>
</tr>
<tr>
<td>Plastic</td>
<td>California Test 605</td>
<td>Fracture within the housing assembly or deflection of more than 10 degrees in either the vertical or horizontal plane after the wind load has been removed from the front of the signal face or deflection of more than 6 degrees in either the vertical or horizontal plane after the wind load has been removed from the back of the signal face</td>
</tr>
</tbody>
</table>

Replace the 1st sentence of section 86-4.01A(1) with:

Each metal housing must have a metal visor.

Replace the 1st sentence of section 86-4.01A(2) with:

Each plastic housing must be molded in 1 piece or fabricated from 2 or more pieces and joined into a single piece.

Delete item 1 in the list in section 86-4.01D(1)(b).

Replace the paragraphs in section 86-4.01D(1)(c)(i) with:

LED signal modules must be on the Authorized Material List for LED traffic signals. The Department tests modules under section 86-2.14A, ANSI/ASQ Z1.4, and:

1. California Test 604 for LED and circular LED signal modules
2. California Test 3001 for arrow, U-turn, and bicycle LED signal modules
The LED signal modules submitted for testing must be typical production units. LEDs must be spread evenly across the module.

The Department may test the modules on all parameters specified in section 86-4.01D.

**Replace the 1st and 2nd sentences of the 3rd paragraph of 86-4.01D(2)(b) with:**

The electrical connection for each flashing LED signal module must be 4 secured, color-coded, jacketed copper wires. The wire must comply with the NEC.

**Replace the heading of section 86-4.02 with:**

PROGRAMMED VISIBILITY VEHICLE SIGNAL SECTION

**Replace "face" in the 1st paragraph of section 86-4.02 with:**

section

**Add before the 1st sentence in section 86-4.03A:**

The pedestrian signal face must be Type A.

**Replace the 1st sentence of the 2nd paragraph of section 86-4.03B with:**

The Department tests the pedestrian signal's front screen in a horizontal position with its edges supported.

**Delete items 1 and 4 in the list in section 86-4.03I(1)(b).**

**Replace the paragraphs of section 86-4.03I(1)(c)(i) with:**

The LED PSF module must be on the Authorized Material List for LED traffic signals.

The Department tests LED PSF modules under section 86-2.14A, ANSI/ASQ Z1.4, and California Test 606.

The LED PSF modules submitted for testing must be representative of typical production units.

The Department may test the modules on all parameters specified in section 86-4.03I.

**Replace item 1 in the list in the 1st paragraph of section 86-4.03I(2) with:**

1. Not include reflectors.
Replace item 6 in the list in the 1st paragraph of section 86-4.03I(2) with:

6. Be able to replace signal lamp optical units and pedestrian signal faces with LEDs.

Replace the table titled "Chromaticity Standards (CIE Chart)" in the 16th paragraph of section 86-4.03I(2) with:

<table>
<thead>
<tr>
<th>Chromaticity Standards (CIE Chart)</th>
<th>07-19-13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upraised hand</td>
<td></td>
</tr>
<tr>
<td>X: not greater than 0.659 or less than 0.600</td>
<td></td>
</tr>
<tr>
<td>Y: not greater than 0.390 or less than 0.331</td>
<td></td>
</tr>
<tr>
<td>Y = 0.990 - X</td>
<td></td>
</tr>
<tr>
<td>Walking person</td>
<td></td>
</tr>
<tr>
<td>X: not greater than 0.440 or less than 0.280</td>
<td></td>
</tr>
<tr>
<td>Y: not greater than 0.0483 + 0.7917(X) or less than 0.0983 + 0.7917(X)</td>
<td></td>
</tr>
</tbody>
</table>

Replace the paragraphs in section 86-4.03J with:

Reserved

Add between "beacon" and "must" in the 1st sentence of section 86-4.05:

signal face

Delete "face" in item 1 in the list in the 1st paragraph of section 86-4.05.

Replace the row for viscosity in the table in the 2nd paragraph of section 86-5.01A(3)(c) with:

| Viscosity, Brookfield Thermosel, no. 27 Spindle, 20 rpm, 190 °C | D 4402 | 2.5–3.5 Pa·s |

Replace the paragraph in section 86-5.01A(3)(d) with:

Use epoxy sealant for repair work in and around sawcuts housing inductive loops.

Replace "all loop conductors" in the 3rd paragraph of section 86-5.01A(4) with:

the detector lead-in cable

Replace "Encase the loop wires" in the 1st sentence of the 3rd paragraph of section 86-5.01A(5) with:

The loop wires must be encased
Replace section 86-5.02 with:

86-5.02 PUSH BUTTON ASSEMBLIES

The housing for a push button assembly must be die-cast or permanent mold-cast aluminum. The assembly must be rainproof and shockproof in any weather condition.

The push button's switch must be a single-pole, double-throw switching unit with screw-type terminals rated 15 A at 125 V(ac). The switch must have:

1. Plunger actuator and a U frame to allow recessed mounting in the push button housing
2. Operating force of 3.5 lb
3. Maximum pretravel of 5/64 inch
4. Minimum overtravel of 1/32 inch
5. Differential travel from 0.002 to 0.04 inch
6. 2-inch minimum diameter actuator

Where a push button is attached to a pole, the housing must be shaped to fit the pole's curvature. Use saddles if needed to make a neat and secure fit.

Where a push button is mounted on top of a 2-1/2-inch-diameter post, fit the housing with a slip fitter and use screws to rigidly secure it to the post.

Install the push button and the sign on the crosswalk side of the pole.

Attach the sign on a Type B push button assembly.

For a Type C push button assembly, mount the instruction sign on the same standard as the assembly using 2 straps and saddle brackets.

Add to section 86-5:

86-5.03 ACCESSIBLE PEDESTRIAN SIGNAL
Reserved

Replace "the amp" in item 2 in the list in the 1st paragraph of section 86-6.01A(2) with:

the lamp

DIVISION X MATERIALS

88 GEOSYNTHETICS

Add to section 88-1.01C:

Geosynthetics must be on the DataMine list for geotextiles and geosynthetics at the National Transportation Product Evaluation Program Web site. The product name, manufacturing source, and date of manufacture must be printed every 5 meters along the edge of the material.

Exceptions are:

1. Paving mat
2. Paving grid, Class 2 and 3
Replace the row for hydraulic bursting strength in the table in the 2nd paragraph of section 88-1.02B with:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puncture strength, lb min</td>
<td>ASTM D 6241</td>
<td>310</td>
</tr>
<tr>
<td>Trapezoid tearing strength, lb min</td>
<td>ASTM D 4533</td>
<td>56</td>
</tr>
</tbody>
</table>

Replace the 3rd paragraph in section 88-1.02C with:

Geocomposite wall drain must be from 0.25 to 2 inches thick.

Replace the value for permittivity of woven fabric in the table in the 1st paragraph of section 88-1.02E with:

0.05

Replace the value for apparent size opening of nonwoven fabric in the table in the 1st paragraph of section 88-1.02E with:

0.012

Replace the table in the 1st paragraph of section 88-1.02G with:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab breaking load, lb, 1-inch grip min, in each direction</td>
<td>ASTM D 4632</td>
<td>200</td>
</tr>
<tr>
<td>Apparent elongation, percent min, in each direction</td>
<td>ASTM D 4632</td>
<td>10</td>
</tr>
<tr>
<td>Water flow rate, gal per minute/sq ft min and max average roll value</td>
<td>ASTM D 4491</td>
<td>100-200</td>
</tr>
<tr>
<td>Permittivity, sec(^{-1}) min</td>
<td>ASTM D 4491</td>
<td>1.0</td>
</tr>
<tr>
<td>Apparent opening size, inches max average roll value</td>
<td>ASTM D 4751</td>
<td>0.023</td>
</tr>
<tr>
<td>Ultraviolet resistance, % min retained grab breaking load, 500 hr.</td>
<td>ASTM D 4355</td>
<td>70</td>
</tr>
</tbody>
</table>
Replace the table in the 1st paragraph of section 88-1.02H with:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test</th>
<th>Woven</th>
<th>Nonwoven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grab breaking load, lb, 1-inch grip min, in each direction</td>
<td>ASTM D 4632</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Apparent elongation, percent min, in each direction</td>
<td>ASTM D 4632</td>
<td>15</td>
<td>50</td>
</tr>
<tr>
<td>Water flow rate, gal per minute/sq ft min and max average roll value</td>
<td>ASTM D 4491</td>
<td>4-10</td>
<td>80-120</td>
</tr>
<tr>
<td>Permittivity, sec** min</td>
<td>ASTM D 4491</td>
<td>0.05</td>
<td>1.0</td>
</tr>
<tr>
<td>Apparent opening size, inches max average roll value</td>
<td>ASTM D 4751</td>
<td>0.023</td>
<td>0.012</td>
</tr>
<tr>
<td>Ultraviolet resistance, % min retained grab breaking load, 500 hr.</td>
<td>ASTM D 4355</td>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>

Replace section 88-1.02P with:

### 88-1.02P Biaxial Geogrid

Geosynthetics used for biaxial geogrid must be a punched and drawn polypropylene material formed into an integrally formed biaxial grid. When tested under the referenced test methods, properties of biaxial geogrid must have the values shown in the following table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aperture size, inch** min and max</td>
<td>Calipered</td>
<td>0.8-1.3 x 1.0-1.6</td>
</tr>
<tr>
<td>Rib thickness, inch min</td>
<td>Calipered</td>
<td>0.04</td>
</tr>
<tr>
<td>Junction thickness, inch min</td>
<td>Calipered</td>
<td>0.150</td>
</tr>
<tr>
<td>Tensile strength, 2% strain, lb/ft** min</td>
<td>ASTM D 6637</td>
<td>410 x 620</td>
</tr>
<tr>
<td>Tensile strength at ultimate, lb/ft** min</td>
<td>ASTM D 6637</td>
<td>1,310 x 1,970</td>
</tr>
<tr>
<td>Ultraviolet resistance, percent min retained tensile strength, 500 hours</td>
<td>ASTM D 4355</td>
<td>100</td>
</tr>
<tr>
<td>Junction strength, lb/ft** min</td>
<td>ASTM D 7737</td>
<td>1,220 x 1,830</td>
</tr>
<tr>
<td>Overall flexural rigidity, mg-cm min</td>
<td>ASTM D 7748</td>
<td>750,000</td>
</tr>
<tr>
<td>Torsional rigidity at 20 cm-kg, mm-kg/deg** min</td>
<td>GRI:GG9</td>
<td>0.65</td>
</tr>
</tbody>
</table>

**Machine direction x cross direction

*Geosynthetic Research Institute, Test Method GG9, *Torsional Behavior of Bidirectional Geogrids When Subjected to In-Plane Rotation*
Replace section 88-1.02Q with:

88-1.02Q Geosynthetic Bond Breaker
Geosynthetic bond breaker must be nonwoven; needle punched; not heat treated; polypropylene, polyethylene material.

When tested under the referenced test methods, properties of geosynthetic bond breaker material must have the values shown in the following table:

<table>
<thead>
<tr>
<th>Property</th>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass per unit area, oz/sq yd</td>
<td>ASTM D 5261</td>
<td>14.7</td>
</tr>
<tr>
<td>Thickness at 29 psi, mm</td>
<td>ASTM D 5199</td>
<td>1.0</td>
</tr>
<tr>
<td>Tensile strength at ultimate, lbs/ft</td>
<td>ASTM D 4595</td>
<td>685</td>
</tr>
<tr>
<td>Elongation, percent max</td>
<td>ASTM D 4595</td>
<td>130</td>
</tr>
<tr>
<td>Permittivity at 2.9 psi, m/s</td>
<td>ASTM D 5493</td>
<td>0.0001</td>
</tr>
<tr>
<td>Hydraulic transmissivity at 29 psi, m/s</td>
<td>ASTM D 6574</td>
<td>0.0002</td>
</tr>
<tr>
<td>Ultraviolet resistance, percent min retained grab breaking load, 500 hours</td>
<td>ASTM D 4355</td>
<td>60</td>
</tr>
</tbody>
</table>

90 CONCRETE

Replace the 3rd paragraph of section 90-1.01C(7) with:
Submit weighmaster certificates in printed form or, if authorized, in electronic media. Present electronic media in a tab-delimited format on a CD or DVD. Captured data for the ingredients represented by each batch must be line feed carriage return and one line separate record with sufficient fields for the specified data.

Replace the 3rd paragraph of section 90-3.01C(5) with:
Production data must be input by hand into a pre-printed form or captured and printed by the proportioning device. Present electronic media containing recorded production data in a tab-delimited format on a CD or DVD. Each capture of production data must be followed by a line feed carriage return with sufficient fields for the specified data.

Replace the 1st paragraph of section 90-4.01A with:
Section 90-4 includes specifications for fabricating PC concrete members.
Replace the paragraphs in section 90-4.01C with:

90-4.01C(1) General
For reports and logs, type or clearly print the name next to the signature of the person signing the report or log.

Submit expansion test data under section 90-4.02, if required.

90-4.01C(2) Certificates of Compliance
Submit a certificate of compliance for the cementitious material used in PC concrete members. The certificate must be signed by the PC concrete product manufacturer.

Submit a certificate of compliance for each PC concrete member. The certificate of compliance for tier 1 and tier 2 members must be signed by the QC manager. The certificate of compliance for tier 3 members must be signed by the QC Inspector.

90-4.01C(3) Precast Concrete Quality Control Plan
Before performing any precasting activities for tier 1 and tier 2 PC concrete members, submit 3 copies of the project-specific QC plan for the PC plant. The QC plan must supplement the information from the authorized facility audit. Submit a separate QC plan for each plant. Allow 25 days for review.

Each project-specific QC plan must include:

1. Name of the precasting plant, concrete plants, and any testing laboratory to be used.
2. Manual prepared by the precasting plant that includes:
   1. Equipment description
   2. Testing procedures
   3. Safety plan
   4. Personnel names, qualifications, and copies of certifications
3. QC manager and QC inspector names, qualifications, and copies of certifications.
4. Organizational chart showing QC personnel and their assigned QC responsibilities.
5. Methods and frequencies for performing QC procedures including inspections, material testing, and any survey performed for all components of PC concrete members. Components include prestressing, concrete, grout, reinforcement, steel, miscellaneous metal, and formwork.
6. System for reporting noncompliant PC concrete members to the Engineer.
7. System for identification and tracking repairs and repair methods.
8. Procedure for the reinspection of repaired PC concrete members.
9. Forms for certificates of compliance, daily production logs, and daily reports.

Submit a revised QC plan for any changes to:
1. Concrete plants
2. Material sources
3. Material testing procedures
4. Testing laboratory
5. Procedures and equipment
6. Updated systems for tracking and identifying PC concrete members
7. QC personnel

After authorization, submit 7 copies of each authorized QC plan and make 1 copy available at each location where work is performed.

Allow 7 days for review of a revised QC plan.

90-4.01C(4) Daily Production Log
The QC inspector must provide reports to the QC manager for each day that precasting activities are performed.

The QC manager must maintain a daily production log of PC activities for each day's precasting. PC activities include setting forms, placing reinforcement, setting prestressing steel, casting, curing, post...
tensioning, and form release. This daily log must be available at the precasting plant. The daily log must include:

1. Plant location
2. Specific description of casting or related activities
3. Any problems or deficiencies discovered
4. Any testing or repair work performed
5. Names of QC inspectors and the specific QC inspections they performed that day
6. Reports for that day’s precasting activities from each QC inspector including before, during, and after precast inspections

Immediately notify the Engineer when any precasting problems or deficiencies are discovered, and submit the proposed repair or process changes necessary to correct them.

**90-4.01C(5) Precast Concrete Report**

Before shipping PC concrete members, submit a PC concrete report. The report must include:

1. Reports of all material tests and any survey checks
2. Documentation that:
   2.1. You have evaluated all tests
   2.2. You corrected all rejected deficiencies
   2.3. Repairs have been reexamined with the required tests and found acceptable
3. Daily production logs
4. Certificates of compliance
5. Documentation of inspections

Each person who performs a material test or survey check must sign the corresponding report and submit the report directly to the QC manager.

**Replace the paragraphs in section 90-4.01D with:**

**90-4.01D(1) General**

Quality control and assurance for PC concrete includes:

1. Your QC program
2. Department's acceptance of PC concrete members

PC concrete members are categorized into the following 4 tiers:

1. Tier 1 consists of:
   1.1. Components of bridge structures, including girders, deck panels, bent caps, abutments, slabs, closure wall panels, and piling
   1.2. Prestressed pavement
2. Tier 2 consists of:
   2.1. Components of earth retaining systems
   2.2. Wingwalls
   2.3. Types A, B, and C pipe culvert headwalls, endwalls, and wingwalls
   2.4. Pavement
   2.5. Box culverts
   2.6. Sound wall panels and supports
3. Tier 3 consists of:
   3.1. Pipes
   3.2. Pipe drainage facilities
   3.3. Straight and "L" pipe culvert headwalls except those listed under tier 2
   3.4. Drainage Inlets
   3.5. Flared end sections
4. Tier 4 consists of any member not described as tier 1, tier 2, or tier 3
90-4.01D(2) Quality Control

90-4.01D(2)(a) General

For tier 1 and tier 2 PC concrete members:

1. Fabricate PC concrete members at a plant on the Authorized Facility Audit List
2. Assign a PC concrete QC manager to the plant
3. Assign a QC inspector who is either registered as a civil engineer in the State or:
   3.1. For tier 1, has a Plant Quality Personnel Level II certification from the Precast/Prestressed Concrete Institute
   3.2. For tier 2, has a Plant Quality Personnel Level I certification from the Precast/Prestressed Concrete Institute
4. Prepare a PC concrete QC plan
5. Perform PC concrete materials testing
6. Maintain a daily production log
7. Prepare a PC concrete report
8. Prepare a certificate of compliance

For tier 3 PC concrete members:

1. Assign a QC inspector who has one of the following qualifications:
   1.1. Registration as a civil engineer in the State.
   1.2. Plant Quality Personnel, Level I certification from the Precast/Prestressed Concrete Institute.
   1.3. Competency to perform inspection of PC operations. An inspector is competent if the individual has completed training or has experience in PC operations and inspection.
2. Prepare a certificate of compliance

For tier 4 PC concrete members, prepare a certificate of compliance.

For each ASTM test method specified in this section, the material's test result must comply with the requirement specified for the comparable test in section 90 unless otherwise specified.

If curing compound is used, provide certificate of compliance as specified in section 90-1.01C(5).

If PC concrete is manufactured at an established PC concrete plant, a trial batch and prequalification of the materials, mix proportions, mixing equipment, and procedures under section 90-1.01D(5)(b) are not required.

90-4.01D(2)(b) Quality Control Meeting

After submitting the PC concrete QC plan, hold a meeting to discuss the requirements for PC concrete QC. The meeting attendees must include the Engineer, the PC concrete QC manager, and a representative from each plant performing PC concrete activities for the Contract.

90-4.01D(2)(c) Sampling, Testing, and Inspecting

The QC laboratory testing personnel or the QC inspector must witness sampling. The QC laboratory testing personnel must perform testing.

QC laboratory testing personnel must have the following certifications, as applicable:

1. ACI Strength Testing Technician
2. ACI Concrete Laboratory Testing Technician Level 1
3. ACI Aggregate Testing Technician Level 2

The QC Inspector must perform inspections before, during, and after casting is complete.

QC field testing and inspection personnel must have an ACI Concrete Field Testing Technician, Grade I certification.
For each mix design used for tier 1 and tier 2 PC concrete members, perform sampling and testing at the minimum frequencies shown in the following tables:

### Aggregate QC Tests

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate gradation</td>
<td>ASTM C136</td>
<td>Once per 400 cu yd of concrete cast or once a week, whichever is more frequent</td>
</tr>
<tr>
<td>Sand equivalent</td>
<td>ASTM D2419</td>
<td></td>
</tr>
<tr>
<td>Percent fines under 75 microns</td>
<td>ASTM C117</td>
<td></td>
</tr>
<tr>
<td>Moisture content of fine aggregate</td>
<td>ASTM C566, or electronically actuated moisture meter</td>
<td>1–2 times per each day of pour, depending on conditions</td>
</tr>
</tbody>
</table>

*Percent fines under 75 microns test replaces the cleanliness test in section 90-1.02C with the requirements of 1.5 percent maximum for “Operating Range” and 2.0 percent maximum for “Contract Compliance.” The 5th paragraph of section 90-1.02C(2) does not apply.

*Electronically actuated moisture meter must be calibrated once per week per ASTM C566.

### Concrete QC Tests

<table>
<thead>
<tr>
<th>Property</th>
<th>Test method</th>
<th>Minimum testing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressive strength</td>
<td>ASTM C172/C172M, ASTM C31/C31M, and ASTM C39/C39M</td>
<td>Once per 100 cu yd of concrete cast, or every day of casting, whichever is more frequent</td>
</tr>
<tr>
<td>Slump</td>
<td>ASTM C143/C143M</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>ASTM C1064/C1064M</td>
<td></td>
</tr>
<tr>
<td>Density</td>
<td>ASTM C138</td>
<td>Once per 600 cu yd of concrete cast or each week of batching, whichever is more frequent</td>
</tr>
<tr>
<td>Air content</td>
<td>ASTM C231/C231M or ASTM C173/C173M</td>
<td>If concrete is air entrained, once for each set of cylinders, and when conditions warrant</td>
</tr>
</tbody>
</table>

*ASTM C173/C173M must be used for lightweight concrete.

*Cylinders must be 6 by 12 inches.

If concrete is batched at more than 1 plant, perform the tests at each plant.

Cure test cylinders for determining time of prestressing loading in the same manner as the concrete in the member.
Cure test cylinders for determining compliance with 28-day strength requirements in the same manner as the member until completion of the steam curing process followed by a water bath or moist room at 60 to 80 degrees F until tested.

For PC concrete that is steam cured, concrete designated by compressive strength is acceptable if its compressive strength reaches the described 28-day compressive strength in no more than the maximum number of days specified or allowed after the concrete is cast.

**90-4.01D(3) Quality Assurance**

For PC concrete that is steam cured, the Engineer evaluates the compressive strength based on individual tests representing specific portions of production.

**Add between the 1st and 2nd paragraphs of section 90-4.02:**

PC portland cement based repair material must be on the Authorized Material List.

If municipally supplied potable water is used for PC concrete, the testing specified in section 90-1.02D is waived unless requested.

**Add to section 90-4.03:**

For dimensional tolerances of PC concrete members, comply with the Precast/Prestressed Concrete Institute Concrete Institute’s *Tolerance Manual for Precast and Prestressed Concrete Construction, MNL 135-00.*

For tier 1 and tier 2 PC concrete members, apply curing compound using power-operated spraying equipment. You may request application by hand spraying for small quantities of PC concrete members. For tier 3 and tier 4 PC concrete members, the application of curing compound may be hand sprayed.

**Replace the item 2 in the list in the 2nd paragraph of section 90-4.03 with:**

2. To prevent moisture loss on the exposed surfaces during the presteaming period, cover the concrete as soon as possible after casting or keep the exposed surfaces wet by fog spray, curing compound, or wet blankets.

91  **PAINT**

**Add to section 91-2:**

91-2.03  **MOISTURE-CURED POLYURETHANE COATING**

Reserved

**Replace "saint" in the 1st paragraph of section 91-4.05 with:**

paint
92 ASPHALTS
07-19-13
Replace "Reserved" in section 92-1.01B with:

modified asphalt binder: Asphalt binder modified with polymers, crumb rubber, or both.

Replace the row for dynamic shear for original binder in the table in the 1st paragraph of section 92-1.02B with:

<table>
<thead>
<tr>
<th>Dynamic shear, Test temperature at 10 rad/s, °C</th>
<th>T 315</th>
<th>58</th>
<th>64</th>
<th>64</th>
<th>64</th>
<th>70</th>
</tr>
</thead>
<tbody>
<tr>
<td>min G*/sin(delta), kPa</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>max G*/sin(delta), kPa</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td></td>
</tr>
</tbody>
</table>

Replace 2nd paragraph of section 92-1.02B with:

PG modified asphalt binder must comply with the requirements shown in the following table:
### PG Modified Asphalt Binder

<table>
<thead>
<tr>
<th>Property</th>
<th>AASHTO Test Method</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PG 58–34 M</td>
</tr>
<tr>
<td>Original Binder</td>
<td></td>
<td>230</td>
</tr>
<tr>
<td>Flash point, min °C</td>
<td>T 48</td>
<td></td>
</tr>
<tr>
<td>Solubility, min %</td>
<td>T 44&lt;sup&gt;a&lt;/sup&gt;</td>
<td>97.5</td>
</tr>
<tr>
<td>Viscosity at 135 °C&lt;sup&gt;c&lt;/sup&gt;, max, Pa·s</td>
<td>T 316</td>
<td>3.0</td>
</tr>
<tr>
<td>Dynamic shear, Test temperature at 10 rad/s, °C</td>
<td>T 315</td>
<td>58</td>
</tr>
<tr>
<td>min G*/sin(delta), kPa</td>
<td></td>
<td>1.00</td>
</tr>
<tr>
<td>RTFO test&lt;sup&gt;d&lt;/sup&gt;, Mass loss, max, %</td>
<td>T 240</td>
<td>1.00</td>
</tr>
<tr>
<td>RTFO Test Aged Binder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic shear, Test temperature at 10 rad/s, °C</td>
<td>T 315</td>
<td>58</td>
</tr>
<tr>
<td>min G*/sin(delta), kPa</td>
<td></td>
<td>2.20</td>
</tr>
<tr>
<td>Dynamic shear, Test temperature at 10 rad/s, °C</td>
<td>T 315</td>
<td>80&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>max (delta), degree</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elastic recovery, Test temperature °C</td>
<td>T 301</td>
<td>25</td>
</tr>
<tr>
<td>min recovery, %</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>PAV&lt;sup&gt;g&lt;/sup&gt;, temperature, °C</td>
<td>R 28</td>
<td>100</td>
</tr>
<tr>
<td>RTFO Test and PAV Aged Binder</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamic shear, Test temperature at 10 rad/s, °C</td>
<td>T 315</td>
<td>16</td>
</tr>
<tr>
<td>max G*/sin(delta), kPa</td>
<td></td>
<td>5000</td>
</tr>
<tr>
<td>Creep stiffness, Test temperature, °C</td>
<td>T 313</td>
<td>-24</td>
</tr>
<tr>
<td>max S-value, kPa</td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>min M-value</td>
<td></td>
<td>0.300</td>
</tr>
</tbody>
</table>

<sup>a</sup>The Department allows ASTM D 5546 or ASTM D 7753 instead of AASHTO T 44. Particles recovered from ASTM D 5546 or ASTM D 7753 or AASHTO T 44 must be less than 250 μm.

<sup>b</sup>Report only for spray application.

<sup>c</sup>The Engineer waives this specification if the supplier provides written certification the asphalt can be adequately pumped and mixed at temperatures meeting applicable safety standards.

<sup>d</sup>“RTFO Test” means the asphaltic residue obtained using the Rolling Thin Film Oven Test, AASHTO Test Method T 240 or ASTM D 2872. The residue from mass change determination may be used for other tests.

<sup>e</sup>Test temperature is the temperature at which G*/sin(delta) is 2.2 kPa. A graph of log G*/sin(delta) plotted against temperature may be used to determine the test temperature when G*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G*/sin(delta) is 2.2 kPa. The graph must have at least two points that envelop G*/sin(delta) of 2.2 kPa and the test temperature must not be more than 6 degree C apart. The Engineer also accepts direct measurement of (delta) at the temperature when G*/sin(delta) is 2.2 kPa.

<sup>f</sup>Tests without a force ductility clamp may be performed.

<sup>g</sup>“PAV” means “Pressure Aging Vessel.”

Do not modify PG modified asphalt binder using polyphosphoric acid.
Crumb rubber must be from automobile and truck tires and must be free from contaminants including fabric, metal, minerals, and other nonrubber substances.

PG modified asphalt binder modified with crumb rubber must be homogeneous and must not contain visible particles of crumb rubber.

The supplier of PG modified asphalt binder modified with crumb rubber must:

1. Report the amount of crumb rubber by weight of asphalt binder
2. Certify a minimum of 10 percent of crumb rubber by weight of asphalt binder

93 LIQUID ASPHALTS

Replace "Celsius" the 1st row in the table in the 8th paragraph of section 93-1.04 with:

Fahrenheit

94 ASPHALTIC EMULSIONS

Replace the 1st paragraph of section 94-1.04 with:

Asphaltic emulsion is measured by weight under the specifications requiring its use. If water is added to the asphaltic emulsion, the quantity of asphaltic emulsion is determined before the addition of water.