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MESSAGE FROM THE BOARD OF DIRECTORS (to be inserted)
EXECUTIVE SUMMARY

The East Bay was founded with transit, but now too much of our land and our streets is devoted to the automobile. Nonetheless, the cities and communities of the East Bay have valuable opportunities to focus again on transit. Between 1995 and 2000, until the economic downturn, the number of people riding transit in the East Bay rose every year, proving that it can be done.

AC Transit has prepared Designing With Transit to illustrate the many ways that cities can put transit back at the center of their planning and street design. It is a handbook written to help Councilmembers, Planning Commissioners, city planners, and anyone else who cares about building transit-friendly communities. Whether a community is updating its General Plan, approving a development, or preparing a streetscape design, it can build transit into the plans. Designing With Transit helps gives communities the tools to plan transit-oriented developments, linking them with safe and pleasant and walking paths to safe and efficient transit corridors. The Handbook is focused on key issues, on practical actions communities can take.

After the introduction, Designing With Transit opens with an overview of the East Bay transit system. It then outlines transit-supportive policies and best practices in three main areas. It devotes a chapter to each of the following questions:

- **Planning:** How can communities plan their land use to support transit?
- **Walking:** How can communities make it safe and pleasant for people to walk to transit?
- **Streets and Sidewalks:** How can communities manage streets and sidewalks for transit?

Designing With Transit carries the message that transit-oriented development and design is about buses as well as rail. Bus corridors reach deep into East Bay communities, providing numerous opportunities for transit-friendly development. Designing With Transit includes these bus-oriented topics:

- How can communities plan their bus corridors to maximize pedestrian and transit-friendliness (Chapter 3)?
- How can buildings, sidewalks, and bus stops best be linked together to encourage transit ridership (Chapter 4)?
- How can "multimodalism"--the idea that streets should work for all types of travel be made real and made to support bus travel (Chapter 5)?

There is a lot of discussion now--in the press, in academia, in government--about new ways (or rediscovered old ways) to make transit more a part of everyone’s life in the Bay Area. Many different terms are used for this approach to building communities. It is variously known as "new urbanism," "smart growth," "transit-oriented development," "transit villages," "placemaking," and by other terms. The terminology is not important, what is important is that communities are being rebuilt to make them more accessible and more inviting to transit passengers and pedestrians. AC Transit hopes that this handbook will contribute to that effort.
Acknowledgements

The following AC Transit staff have reviewed all or part of Designing With Transit and/or contributed to the document:

Anthony Bruzzone; Jim Cunradi; Howard Der; Tony Divito; Compton Gault; Greg Hunter; Kathleen Kelly; Nathan Landau; Jaimie Levin; Robin Little; Cesar Pujol; Joe Schlenker; Greg Shiffer; Nancy Skowbo; Tina Spencer; Jon Twichell; Lenore Weiss;

AC Transit would also like to thank the following people from other agencies who made comments orally and/or in writing on the draft of Designing With Transit at one or more stages of its development. These comments have helped us improve the document. All responsibility for the content of Designing With Transit of course rests with AC Transit:

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Jason Patten, Oakland Pedestrian Safety Project
Reh-Lin Chen, City of San Leandro
Adele Ho, City of San Pablo
Lisa Hammon, West Contra Costa Transportation Advisory Committee (WCCTAC)
PART ONE--BACKGROUND AND CONTEXT
Chapter 1 INTRODUCTION TO DESIGNING WITH TRANSIT

A. The Purpose of this Handbook

The broadest purpose of this Handbook is to contribute to redressing the balance of the transportation/land use system in the East Bay. It is to encourage "multimodal" transportation planning--planning and engineering which supports transit, walking, and bicycling, not just automobiles. This Handbook is particularly focused on the often neglected needs of bus transit, and of the primary means to access bus transit--walking.

The American transportation system has become profoundly unbalanced, excessively reliant on the automobile. For decades, the system has developed to encourage mobility by auto, with transit an afterthought at best. Transit systems that were built in those decades were often designed for access primarily by car. As a result, sprawling, low density development that can only be effectively served by automobiles has proliferated. Bus transit came to be seen by many as "last resort" transportation for the transit "dependent", an image that further discouraged ridership and helped stimulate a spiral of decline. The outcome is that Americans take more of our trips by car than citizens of any other developed country, including Canada.

The East Bay does not escape this automobile dominance. Yet there are building blocks here for transit to build on. The older communities of the East Bay were initially developed around transit. More recently, some BART stations have helped reinforce the importance of East Bay downtowns and neighborhood commercial districts. This history has meant that many of these communities continue to have land use patterns that make effective transit service possible.

This Handbook outlines AC Transit's analysis of how the East Bay can be rebuilt in a more transit-friendly manner. It aims to provide practical guidance about how these can be achieved through land use planning, development of pedestrian facilities, and traffic engineering. This Handbook is designed to help implement AC Transit Policy 520--Encouraging the Promotion of Public Transit in Land Use Developments Within AC Transit's Service Area, passed by the AC Transit Board of Directors in 1994 and amended in 1997. This Handbook also updates AC Transit's Guide for Including Public Transit in Land Use Planning, and our Transit Facilities Standards Manual, both published in 1983. Designing With Transit also forms the background for AC Transit's review of Environmental Impact Reports and other planning documents.

Publishing this handbook is an integral part of AC Transit's ongoing work with our partners. It is important to make our views known because AC Transit provides service primarily on facilities developed and controlled by other agencies. Our bus service operates on roads managed by cities, counties, and Caltrans. Our stops are located on sidewalks controlled by these agencies, and can be sited only with their approval. AC Transit must try to serve the land uses approved by cities and counties, whether those uses are transit supportive or not.

Many agencies have been excellent partners with transit in supporting transit service. But sometimes it is unclear to our partners what issues are important to AC Transit and why. This Handbook is an effort to summarize and organize our knowledge and concerns, so that these collaborative efforts can reach a higher level.

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1 The term "transit dependent" overlooks the many passengers who choose to take transit, and overlooks the choices that all travelers have. It is also a loaded term because being "dependent" carries great stigma with it in America.
B. Why Should Communities Care About Transit? The Benefits of Transit

This handbook is all about integrating transit into East Bay communities. Its basic message is simple--whatever you do in developing your community--consider how it will affect transit, and how it can be made to help rather than harm transit.

But why should your community care about transit at all? Because transit benefits communities in many ways:

**Mobility choices**: Transit provides mobility choices to residents. To people without cars, transit is critical. For people with cars, transit provides another option to always driving everywhere. A recent survey of AC Transit passengers estimates that as many as 40% could have chosen another mode of travel.

**Attracts Residents**: Good quality transit can help attract residents to a community. Transit availability is a factor many people consider in evaluating where to live.

**Air Quality Improvements**: Transit shifts people out of their cars and onto less polluting modes of travel. Transit trips are most likely to happen during peak hours and along busy, congested corridors, the very conditions that lead cars to pollute the most.

**Reduced Congestion**: Transit use may reduce congestion on streets and highways.

**More efficient land use**: When people reach their destinations by transit rather than driving, it reduces the need for parking. Space that otherwise would have been devoted to parking can be used for buildings instead.

**Urban vitality**: Transit brings people together in urban centers, making commercial and downtown areas lively. From Boston to Berlin to Beijing, the world's great cities rely on transit to bring people to their centers.

**Public Safety**: Transit passengers populate the streets of a community, providing "eyes on the street."

Transit is a community service and a community asset, much like libraries, parks, or schools. Investing in transit is investing in the community.
C. How to Use This Handbook

AC Transit is publishing Designing With Transit for anyone with an interest in making the East Bay more transit-friendly. We hope that it will be useful to people who are involved with the local transportation/land use system—City Councilmembers, City commissioners, planners, traffic engineers, community activists, and others.

The Handbook walks through approaches to making your community more transit-friendly. Transit-friendliness depends on all of the elements in this Handbook—land use, the pedestrian network, and the street/sidewalk system. Chapters 1 and 2 provide background and context—introducing this handbook and the East Bay transit system respectively. Chapter 3—Communities Around Transit: Centering Planning on Transit looks at how to improve transit-friendliness on a community-wide, planning level. Chapter 4 looks at how communities can most effectively be connected to transit through pedestrian access. Chapter 5—Making Transit-Friendly Streets and Stops—moves the focus to the streets and sidewalks that the transit system uses.

This handbook does not replace consultation between AC Transit and individual cities and communities about individual issues. It is instead designed to enhance that consultative process and ground it in general Policies. We hope that Designing With Transit will give cities, counties, and other stakeholders a clearer idea of AC Transit’s basic concerns. That can be used as a focus basis which to focus detailed discussion of individual situations.
Chapters for Specific Readers

Although the topics in this handbook are interconnected, many readers will want to concentrate on certain chapters of this handbook. We suggest the following:

Chapters 1 and 2 introduce this Handbook and the AC Transit system, and should be read by everyone, because they provide background for later chapters in the Handbook.

Chapter 3--Planning Transit-Friendly Communities--is particularly relevant to people who are involved with city planning decisions. City Councilmembers, Planning and zoning commissioners, land use planners, developers and citizen planning activists should read this chapter.

Chapter 4--Walkways to Transit is particularly relevant to people working on the pedestrian network. Transportation Commissioners, transportation planners, transportation/traffic engineers, and pedestrian advocates should read this chapter.

Chapter 5--Making Transit-Friendly Streets and Stops is particularly relevant to people who are involved with making decisions about streets, roads, and sidewalks. Transportation and Public Works Commissioners, transportation planners, public works engineers, and traffic engineers should read this chapter.

Chapters of Particular Interest to Particular Audiences

<table>
<thead>
<tr>
<th>Audience</th>
<th>Chapter 2--Transit System</th>
<th>Chapter 3--Community Planning</th>
<th>Chapter 4--Pedestrians</th>
<th>Chapter 5--Streets</th>
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</thead>
<tbody>
<tr>
<td>City Council members</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td>Transportation Planners and Commissioners</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Land Use Planners and Commissioners</td>
<td>X</td>
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<td>X</td>
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<td>Traffic/Transportation Engineers</td>
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<td>TDM Coordinators</td>
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<td>Developers</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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</table>

Different Chapters will be of greater interest if you are working on a particular type of document:

- For a General Plan or Area Plan, Chapter 3 will be most useful.
- For a Zoning Ordinance, Chapter 3 will be particularly useful.
- For a Design Review Ordinance or Practices, Chapter 4 will be particularly useful.
- For a Streetscape Plan, Chapter 5 will be particularly useful.
- For planning bus stop locations, Chapter 5 will be particularly useful.
- For a development application, Chapters 3 and 4 will be particularly useful.
Chapter 2 THE EAST BAY TRANSIT SYSTEM

This Chapter describes the existing and planned transit system in the East Bay in some detail to illustrate how the transit system forms the basis for transit-oriented development. The chapter briefly describes how AC Transit's route network is structured and why it is structured that way.  

This Chapter is designed to highlight the fact that the East Bay transit system depends on both AC Transit and BART, as well as the contributions of other services. AC Transit provides the primary service within the East Bay, while BART provides regional connections to San Francisco and elsewhere. Bus service in the East Bay is strongly connected to BART service. 

A. The Inner East Bay and its Transit System

The AC Transit District: The AC Transit district is the legally defined area where AC Transit is the main bus transit provider. The district includes most of Alameda County and part of Contra Costa County. It stretches from Richmond in the north to Fremont in the south. The District includes 13 cities and unincorporated portions of Alameda and Contra Costa Counties. The District is illustrated in Map 1.  

Regionally, the AC Transit district can be considered to be part of the "second ring" of development, outside of San Francisco but along San Francisco Bay. The district includes long-developed urban, higher density areas such as Oakland and Berkeley, along with newer, lower-density areas, particularly on the northern and southern edges of the district. Among transit districts in California, the AC Transit District has the third highest population density, after San Francisco and Los Angeles. 

The central portion of the district focuses on multi-use centers such as Downtown Oakland and Downtown Berkeley. North and especially south of the core major employers and destinations are typically more scattered. The older areas of the district were developed around a network of streetcar lines, but major destinations in newer areas (e.g. shopping malls) were generally developed based on freeway and roadway rather than transit access. Given these land use patterns, transit ridership is generally highest in the central and northern portions of the district. Constrained by the Bay to the west and the hills to the east, trips in the inner East Bay are primarily north-south rather than east-west. 

The Inner East Bay transit system is primarily made up of AC Transit bus lines and BART rail lines. AC Transit operates 71 local (East Bay only) lines, while BART has 21 stations in the AC Transit District, half of its systemwide total of 43 stations. There are also more localized transit services in the East Bay as well as bus routes connecting the East Bay to other parts of the region. 

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2 Levels of bus service vary with the availability of funds. However, the basic structure described in this chapter remains despite funding changes. In years of poor funding, the system becomes more skeletal, with less service in addition to the trunk lines. In years of good funding, the overall system grows, but the trunk lines remain the most important elements.

3 Union City is not part of the AC Transit District, but AC Transit operates service there by agreement with the city.
To destinations outside of the district, AC Transit also operates Transbay service over the bridges across the Bay, mostly to San Francisco. The AC Transit district is very long and narrow—almost 45 miles north to south but generally less than 5 miles east to west (excluding unpopulated areas).

**AC Transit Ridership:** By American standards, AC Transit has strong ridership. AC Transit ranks third in total ridership among Bay Area transit agencies, after San Francisco's Municipal Railway (Muni) and BART respectively. On a per capita basis, AC Transit has the highest ridership in California after Muni.

**AC Transit At a Glance**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Details</th>
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<tbody>
<tr>
<td>Largest public bus-only system in California and the fourth largest in the nation.</td>
<td></td>
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<tr>
<td>Over 2,500 employees working at 7 facilities.</td>
<td></td>
</tr>
<tr>
<td>6,500 bus stops on 129 fixed routes.</td>
<td></td>
</tr>
<tr>
<td>Almost 800 buses, driven 21 million annual service miles, connecting to 10 other bus systems, 22 BART stations, and 6 Amtrak stations.</td>
<td></td>
</tr>
<tr>
<td>230,000 passengers per day, including 13,000 at the Transbay Terminal.</td>
<td></td>
</tr>
<tr>
<td>Almost 69 million passengers each year!</td>
<td></td>
</tr>
<tr>
<td>A service area of 400 square miles, including 13 cities, 9 unincorporated areas, and a population of 1.4 million.</td>
<td></td>
</tr>
<tr>
<td>And the <strong>Best of the Best</strong> (bus driving roadeo) for four years running!</td>
<td></td>
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**B. AC Transit's Systemwide Service Deployment Policies**

This section addresses how AC Transit makes decisions about what service to provide. AC Transit operates in an environment where funds are insufficient to provide all possible bus services. Therefore the District must make decisions that will provide an effective, efficient transit system. The following Service Deployment Policies are the basis for making those decisions. They were adopted as part of the District's Short Range Transit Plan (SRTP) in 2001 and will be reviewed for the 2003 SRTP. The policies are explained in greater detail in the SRTP--some are also discussed further in this Handbook. "The District" in the discussion below refers to AC Transit, which is formally known as the Alameda-Contra Costa Transit District.

**AC Transit Service Deployment Policies (Selected)**

<table>
<thead>
<tr>
<th><strong>Service Effectiveness Criteria</strong></th>
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<tbody>
<tr>
<td>Provide fast, thorough, coordinated, reliable, and easily accessible service on trunk routes</td>
</tr>
<tr>
<td>Coordinate service with land use</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Service Efficiency Criteria</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain and enforce minimum route productivity standards</td>
</tr>
<tr>
<td>Advocate for and/or implement transit priority and transit preferential measures in congested locations</td>
</tr>
<tr>
<td>Maintain and enforce minimum bus stop spacing</td>
</tr>
</tbody>
</table>
Network Design Criteria

- Adopt service allocation policies based on density
- Implement limited stop/Rapid service based on demand
- Implement express bus service where beneficial
- Implement Transbay bus service where beneficial
- Encourage intra-East Bay ridership on Transbay lines
- Investigate flexible service options
- Maintain and enhance owl service on its trunk corridors
- Maintain minimum route spacing/coverage
- Adopt span-of-service definitions for different service types
- Provide seamless transfers (time, location, provider)
- Reorganize branching routes in favor of better connections
- Operate only one bus line per corridor when possible
- Schedule consistent headways
- Renumber the routes so they have a logical numbering system

C. Service Planning and Network Design

How does AC Transit translate these policies into a network of routes? The first step in doing so is developing a network design that focuses resources on the core routes that carry the most riders. As the SRTP says, "The District aims to allocate 70% of its resource to demand-based services, with remaining 30% contributing to a basic level of geographic coverage. " The demand-based services are the bus lines with the highest levels of ridership. Geographic coverage refers to the need to provide service to all parts of the district even when that service has lower ridership and revenue.

Trunk Routes

AC Transit's ridership is highly concentrated on longstanding trunk lines. Lines on just five corridors carry over 40% of the total ridership on the system. As the SRTP notes, "Not surprisingly, these lines serve the most developed and dense part of the region, with population densities approaching 10,000-12,000 people per square mile on the busiest arterial streets." The population--and therefore the population density--of the AC Transit district is increasing slowly. The location of major high density areas has tended to be stable over time.

The five high ridership, trunk line corridors are as follows. Corridors are identified with the lines that serve them as of December, 2003:

- **International Blvd./E. 14th St.**, Hayward-San Leandro-Oakland (lines 82 & 82L)
- **Foothill/Bancroft-Telegraph/Shattuck**, San Leandro-Berkeley (lines 40 & 43)
- **Macarthur Blvd.**, San Leandro-Oakland-Emeryville (lines 57 & N).
- **Broadway/College**, Berkeley-Oakland-Alameda (line 51)
- **San Pablo**, Oakland-Albany-El Cerrito-Richmond-San Pablo (lines 72, 72M, 72R)

Trunk routes provide frequent service through densely populated areas to major destinations, accounting for their high ridership. The trunk routes serve Downtown Oakland, Downtown Berkeley, the University of California, and 16 BART stations. Trunk routes also serve a number of key destinations away from BART, such as Hilltop Mall, Alta Bates Hospital, College of

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4The persistence of certain corridors as trunk lines reflects the East Bay's initial development around Key System trolley routes. An illustration of this persistence is found in a 1950 report on East Bay transit that cited such streets as East 14th St., San Pablo Avenue, and Telegraph Avenue as key transit corridors.
Alameda, Eastmont Town Center, and San Leandro Hospital. Trunk routes operate 7 days per week, from at least 6 a.m. to midnight, although several of these lines operate 24 hours a day on at least a portion of their route. They generally operate for several miles along a major street, making their route easy to understand. Several routes have or will have faster "Rapid" or "limited" service along with local service.

Major Routes
In addition to trunk routes, there are other major routes serving key corridors in the district which have been identified in AC Transit's Strategic Vision. These corridors are:

- Macarthur/Oakland Airport, East Oakland-Oakland Airport (line 50)
- Hesperian Blvd., San Leandro-Hayward, Union City (line 97)
- 6th St./Hollis, Berkeley- West Oakland-Alameda (line 19)
- Sacramento/Market, Berkeley-Oakland (line 88)
- Outer E. 14th St./Mission, San Leandro-Hayward-Union City (line 99)

Major routes are scaled down versions of trunk routes. They operate long north-south routes and long hours, but typically at lower frequencies than trunk routes (currently some major routes operate every 20 minutes). They provide the principal service either in lower density areas, or in areas between other trunk routes.

AC Transit's Types of Bus Service

AC Transit provides three basic types of service

- Trunk routes, which provide frequent service on heavily used corridors
- Crosstown routes connecting neighborhoods to trunk routes and BART
- Express/Transbay routes, which take passengers directly (via the freeway) to major destinations such as Downtown San Francisco

<table>
<thead>
<tr>
<th>Type of Service</th>
<th>Examples</th>
<th>Purpose of Service Type</th>
<th>Typical Terminals</th>
<th>Typical Service Characteristics</th>
<th>Typical Ridership Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trunk</td>
<td>43--Shattuck; 51--Broadway; 82--International</td>
<td>Main line, usually north-south service carrying large loads to key destinations, BART</td>
<td>BART stations, transit centers</td>
<td>Frequent service, service to multiple destinations, evening service</td>
<td>Heaviest loads, all day demand, travel moderate distances (1-5 miles)</td>
</tr>
<tr>
<td>Crosstown</td>
<td>9--Berkeley. 76--Cutting 92--Hayward State</td>
<td>Service (generally east-west) connecting to trunks routes and to BART</td>
<td>BART station at one end, local destination at other</td>
<td>Lower frequencies, shorter operating hours</td>
<td>Lighter loads, shorter distance travel</td>
</tr>
<tr>
<td>Express/Transbay</td>
<td>L--Richmond; M--San Mateo Bridge O--Alameda</td>
<td>Take passengers from home to San Francisco and West Bay</td>
<td>Transbay Terminal in San Francisco</td>
<td>Non-stop express running on freeway</td>
<td>Highly peaked loads in commute hours</td>
</tr>
</tbody>
</table>

In addition to these main service types, AC Transit runs some more specialized routes. Examples include school-oriented service (this service is open to the general public) and evening/night only service (such as line 376 in Richmond/North Richmond). Late night service is also known as "owl" service.
Geographic Coverage

Geographic coverage is the other element of AC Transit's service model besides trunk/major routes. The trunk and major routes provide service within walking distance of most, but not all of the population of the district. The trunks also generally do not provide east-west service (or "crosstown" service), although some trunk lines turn and run east-west for a portion of their routes. Additional service is needed to "cover" the remaining areas of the district.

AC Transit thus needs to determine where to operate bus lines to serve these lower demand areas. The SRTP incorporates route spacing and route structure criteria. The criteria are based on population density. Population density is very closely tied to transit ridership--the higher the density of an area, the greater the transit ridership.

Coverage and Population Density

The District's Network Design Criteria (p.9) calls for service allocation based on population density. AC Transit has therefore adopted a policy to provide more service in more densely populated areas. The population density of various areas can be seen on Map 4.

In the densest areas of the district, with population densities over 20,000 people per square mile (or roughly 30 people per gross acre), the service standard is a grid of routes spaced 1/4 mile apart. This means that ideally both north-south and east-west bus routes would be 1/4 mile apart. This is very close spacing, to serve a very dense population. East Oakland and Central Oakland are the only large areas of the district with this population density.

Substantial portions of the district have population densities between 10,000 and 20,000 people per square mile (15-30 people per gross acre). In these areas, the District seeks provide a grid of routes spaced 1/4-1/2 mile apart. Examples of these areas are the Berkeley flatlands, North Oakland flatlands; central Alameda, and Richmond flatlands.

In lower density areas, with population densities between 5,000 and 10,000 people per square mile (or 8-15 people per gross acre) the service model shifts. Rather than seek to provide a grid of routes, buses converge on a "focal point" (a BART station). The routes are designed to be 1/2 mile apart at the end of the route This model is used in the Hayward and Richmond/EI Sobrante areas. In Fremont-Newark, service radiates from the BART stations but also forms a partial grid because of the strongly gridded pattern of the streets.

Finally, in very low density areas below 5,000 people per square mile, the service standard spaces routes one mile apart. These densities are mostly found in hill areas of the district, such as Mission San Jose in Fremont and the Oakland Hills and in partially developed areas close to the Bay.  

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5 It is important to note that the density standards refer to situations where large areas or corridors meet a given density. There are several areas of the district where there are isolated pockets of higher density population surrounded by lower density areas. Because these pockets are small they cannot generate adequate ridership to support more frequent bus service. Parts of Downtown Oakland also appear to be low density on the map because they have small resident populations, but have a high density of jobs and services generating transit ridership.
C. **BART and AC Transit:** BART stations are the principal hubs of the East Bay transit system, for both bus and rail service. BART provides high speed heavy rail service to 21 stations in the AC Transit district, generally spaced some 2-3 miles apart (closer together in parts of Oakland and Berkeley). AC Transit provides extensive service to all BART stations in the AC Transit district, and virtually all AC Transit local buses serve at least one BART station. The systems’ contrasting characteristics show how they are complementary to each other. Because they largely serve different travel needs, BART and AC Transit together provide greater mobility for transit-oriented development than either does separately.

AC Transit and BART serve different types of trips. The average AC Transit trip is 3.1 miles, the average BART trip 12.2 miles. Because of the wide spacing of BART stations in most of the AC Transit district, BART is inconvenient for many shorter trips, particularly for trips that do not begin or do not end near a BART station. BART's high operating speeds are ideal for long trips.

The majority of transit trips that are wholly within the East Bay are taken on AC Transit. BART handles most of the transit trips from the East Bay to San Francisco. AC Transit Transbay service (mostly to San Francisco) is concentrated in corridors not within walking distance of BART. AC Transit has more than 3,000 pairs of stops (a stop in each direction) in the East Bay.

Passengers reach AC Transit and BART by different modes. Some 75% of AC Transit passengers walk to their bus stop. By contrast, 38% of BART passengers systemwide reach BART by driving alone, making driving alone the plurality mode of BART access (BART hopes to reduce this percentage).

Passengers use AC Transit and BART for different purposes. BART ridership is dominated by weekday commute trips, particularly to San Francisco, Downtown Oakland and Berkeley. Over 60% of all BART trips were to or from work, compared with 40% of AC Transit trips. School (at 33%) and shopping (10%) were the next most important destinations for AC Transit travelers, while on BART it was school (9%) and visiting family/friends. More of AC Transit's passengers than BART’s ride on weekends, especially on Sundays.

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6 During the years of highest BART usage, AC Transit Transbay service also served to relieve pressure on BART's capacity.
E. Faster Forms of Bus Service: Rapids and Bus Rapid Transit

One of the major challenges facing AC Transit is making our serving operate faster. On measures such as amount of ridership and amount of service provided, AC Transit compares well to most other Bay Area systems and to comparable systems nationally. However, average speeds for our buses have been falling, and AC Transit's average speed is 5-15% below that of comparable systems.

To speed up and improve trunk line service, and to increase trunk line ridership, AC Transit is beginning to develop "Rapids." Rapid type service has been very successful in Los Angeles and is being considered by a number of other cities.

Rapids provide fast, frequent service along trunk route corridors. The first Rapid is operating on San Pablo Avenue between Downtown Oakland and the city of San Pablo. Key characteristics of the Rapid include:

- More widely spaced stops, for faster operation
- Traffic signal priority (when needed) for faster operation
- Far side stops whenever possible to minimize waiting at signals
- Full low floor buses to ease boarding and alighting
- Shelters with information at Rapid stops
- Special Rapid signage
- "Next bus" informational displays indicating when the bus will arrive (to be implemented 2004)

AC Transit plans to upgrade other trunk lines to Rapid service when possible.

Beyond the Rapid, AC Transit is working with cities to plan Bus Rapid Transit (BRT) on Telegraph Ave. and International Blvd, operating from Downtown Berkeley to Bayfair BART in San Leandro. In addition to all the features of the Rapid, BRT is designed to have not only its own acronym, but true stations at stops and lanes on the street which are used solely by the bus (known as dedicated lanes). Thus Bus Rapid Transit will function very much like light rail, but at a very much lower cost using buses instead of train equipment. Bus Rapid Transit can provide more flexible service, because many bus routes can use portions of the dedicated lanes, then branch out into the community.

Bus Rapid Transit is quickly becoming an important transit option around the country. Los Angeles, Cleveland, and Boston have developed or are developing Bus Rapid Transit lines. Bus Rapid Transit lines have been proposed for El Camino Real between San Jose and Palo Alto in Santa Clara County, and for various corridors in San Francisco.
Context: Evaluating and Modifying Bus Lines

Evaluating the Performance of Routes: AC Transit frequently reviews the performance of its lines, especially the number of passengers they attract. When funds are available to expand service, we look for lines that justify more frequent service or longer hours. We also look at locations that need more transit service. When there is a fund shortfall, AC Transit evaluates which lines are performing poorly. These lines may have service reduced or be eliminated.

Transit service in North America almost never makes money. Indeed, fares on most transit services cover only a fraction of the system's operating costs. That ratio is known as the farebox recovery ratio. AC Transit's farebox recovery ratio is currently 21%, although it is higher for trunk lines and most Transbay lines, and lower for most crosstown lines, especially in low-density areas. The farebox recovery ratio is closely related to the number of people who board a bus during each hour of its operation, a ratio known as "passengers per revenue hour." AC Transit's planning is strongly influenced by the passengers per revenue hour on various lines and segments of lines. Lines with insufficient passengers per revenue hour may be reduced or eliminated.

New and Changed Bus Routes: AC Transit is often asked why it cannot change its route structure to accommodate a new development, or for other reasons. AC Transit modifies its route structure to reflect changing conditions in the district. For example, in June, 2003, despite the serious fiscal problems of the district, AC Transit has instituted the new line 19 serving the growing employment centers of West Berkeley, Emeryville, and West Oakland.

AC Transit can and has changed existing bus routes, but we cannot do so lightly. Passengers have a reasonable expectation that service they use will continue. We wish to provide that continuity as much as possible, particularly on trunk routes.

High Frequency Lines Need Multiple Destinations: There are serious limits to AC Transit's ability to add new lines in addition to the cost of doing so.

In most cases, a new line serving solely or principally a single destination—even a relatively large one—will attract few passengers. AC Transit's trunk lines and other major lines serve multiple destinations and communities along a single corridor, attracting riders making a variety of trips. For example, major destinations on line 57 (Macarthur) include Emeryville shopping centers, Macarthur BART, Kaiser Hospital, Oakland High School, Eastmont Town Center, Fairmont Hospital, Bayfair Shopping Center, Bayfair BART. To support frequent service, population densities in a bus corridor must generally exceed 10,000 people per square mile for two linear miles or more.

Sometimes AC Transit is requested to operate community service type lines that meander to reach multiple scattered destinations. These lines appear attractive because they serve many destinations. Unfortunately they rarely attract many passengers. The direct, frequent service offered by a trunk line also attracts more passengers than a less frequent, less direct community service style line. With few passengers, a new single-purpose line will require an even greater operating subsidy than usual, making it very difficult to institute without outside funding, particularly in times of fiscal stringency.

Build Where The Bus Already Is: For these reasons, AC Transit strongly recommends that cities and communities site major destinations in locations with strong transit service, rather than assuming that the transit system will be able to serve dispersed locations.
PART TWO--DESIGNING WITH TRANSIT
Chapter 3. COMMUNITIES AROUND TRANSIT: CENTERING PLANNING ON TRANSIT

Guide to this Chapter

Topic of this Chapter: Planning streets and land uses to make transit work better.

This Chapter is especially for: City Councilmembers, Planning and Transportation Commissioners, transportation and land use planners, developers

This Chapter makes recommendations affecting: General Plans, Area Plans, Redevelopment Plans, Specific Plans, Zoning Ordinances, facility siting, parking requirements and charges

Introduction

Creating a community that can be accessed by transit and walking is the focus of this chapter. It outlines key planning policies and practices necessary to develop a community where travel by walking, transit, and bicycling is practical and pleasant. Transit-supportive General Plan policies are included for some practices.

This Chapter of Designing With Transit considers three key planning questions:

- How can a community use land to support transit and be supported by transit?
- How can bus corridors be appropriately developed?
- How can parking policies support transit-oriented communities?

Chapter 2 described the structure of the East Bay transit system. This chapter discusses how to develop a community that takes full advantage of that system, including bus, rail, and ferry transit. This chapter describes how to structure land uses--housing, retail stores, civic buildings, etc.--so that they work with transit rather than against it. Structuring a community for transit means structuring it for walking--most people's favorite mode of transportation. When many important destinations are within easy walking distance of each other, they can be most effectively served by transit.

This chapter also includes transit-supporting General Plan policies from many Bay Area communities.

This type of transit-focused development is well suited to the East Bay. There are many walkable, densely built downtowns, main streets, and commercial corridors throughout the East Bay. BART stations have also reinforced many of these districts, from Hayward to Berkeley. The East Bay's historic centers have offices, stores, restaurants, apartment buildings, government buildings, movie theatres, hotels, and other activities.

The litmus test for transit-focused community planning is this question: "How does it feel getting around this community by transit and walking? Are the places I need to go easily accessible, or are they difficult and unpleasant to reach?"
SUMMARY OF COMMUNITIES AROUND TRANSIT POLICIES AND PRACTICES

Community Planning Policy 1
Develop Dense, Mixed Uses in Locations with Good Transit Access

Best Practice 1.1 --Cluster the community's densest uses where there is the best transit access.

Best Practice 1.2 --Develop transit-supportive uses--and avoid auto-oriented uses--in locations with good transit access.

Best Practice 1.3--Build projects to planned densities in transit-friendly areas. 

Best Practice 1.4--Avoid high intensity uses in locations with minimal transit service.

Best Practice 1.5--Locate special needs facilities in areas with good transit service.

Best Practice 1.6--Designate transit-friendly areas for denser development in key planning documents.

Community Planning Policy 2
Plan Bus Corridors to Maximize Their Transit-Friendliness

Best Practice 2.1--Develop the area within easy walking distance of a transit corridor with transit-supportive uses

Best Practice 2.2--Assure that residents on bus corridors can easily walk between neighboring uses.

Best Practice 2.3--On commercial strips, focus development at nodes

Community Planning Policy 3
Manage parking to Support Rather Than Control Community Planning

Best Practice 3.1--Provide Appropriate but not Excessive Amounts of Parking

Best Practice 3.2--Reduce Parking Requirements in Transit-Friendly Areas

Best Practice 3.3--Consolidate Parking Into Joint Lots and Structures

Best Practice 3.4--Charge fees to cover parking costs and generate funds for Other Modes
DISCUSSION OF COMMUNITIES AROUND TRANSIT POLICIES AND PRACTICES

Planning Policy 1
Develop Dense, Mixed Uses in Locations with Good Transit Access

A "transit-friendly" area is one where residents, workers, and other users of the area can meet their daily needs by using transit and walking. Transit-friendly areas have three core characteristics:

- High levels of transit service, from bus and/or rail lines;
- A mix of uses, especially basic retail uses;
- A network of safe and pleasant routes for walking around

Mixed uses are important to allow people in the area to conduct their activities by walking. For example, workers can walk to lunch. Residents can walk to a grocery store. Some locations have good transit access but no other services. Workers in single-use areas may resist taking transit because they feel "trapped" at their worksite. Residents may use transit for trips to work but drive for all other trips. 7(Walking routes are addressed in Chapter 4.)

Planning Best Practice 1.1
Concentrate dense uses in the locations with the best transit access.
To design with transit, a community's most intense uses should be in its most transit-friendly location. This practice applies whether the most intense use is a 40 story highrise or a 4 story apartment building. In this way, the land closest to transit is efficiently used, and the people in the biggest building can make use of the transit. Less intense uses near transit hubs waste this valuable land.

The characteristics of the location with maximum transit access will vary from community to community. In some communities, this location will be a BART station. In other communities, which do not have a BART station, the maximum transit location will be a transit center or an intersection where two or more trunk lines intersect. The Appendix to this Chapter discusses the transit accessibility of various East Bay locations.

General Plan Policy: Density Increases for Transit Hubs, Corridors:

Transit-Oriented Development Corridors and BART Station Area Nodes are areas designated by the City as generally suitable for higher residential densities, for intensive non-residential uses, and for mixed use; these areas are centered along existing or planned light rail transit (LRT) lines and/or major bus routes and at future Bay Area Rapid Transit (BART) stations. Transit-Oriented Development Corridor boundaries are not precisely defined but, in general, particularly during the early stage of intensification, the corridors are intended to include sites within approximately 500 feet of the right-of-way of the corridor's central transportation facility or within approximately 2,000 feet of an existing or planned LRT station.

(Transit-Oriented Development Corridors and BART Station Area Nodes, City of San Jose General Plan Land Use/Transportation Diagram).

7 Some types of uses, such as institutions and corporate campuses, are typically developed as single use facilities. Some of these facilities are located within walking distance of commercial areas and can therefore make use of those stores. Those that are not close to commercial areas can incorporate food service and convenience retail facilities to reduce the number of trips their workers need to make.
Denser, mixed use buildings are spreading to new locations such as Fremont

Planning Best Practice 1.2

Develop a mix of transit-supportive uses—and avoid auto-oriented uses—in locations with good transit access

Encouraging transit-supportive uses in transit-served locations key to creating transit-friendly areas. Table One outlines appropriate and inappropriate uses for transit-oriented areas. The appropriate uses are high density uses and uses which can easily be accessed by transit or walking. The inappropriate uses are lower density uses and those where access by car is usually dominant (not all types of land use are shown on the table).

Some uses are particularly suited to transit hubs. Locating civic buildings, such as City Halls and civic centers near transit hubs makes them accessible to all parts of the population. The City of Hayward took this approach when it built its new City Hall one block from Hayward BART. Major private office buildings have large numbers of employees who can commute by transit when it is nearby. Transit hubs are also a good location for multi-family housing—apartments, and condominiums, as well as for restaurants, and convenience-oriented retail uses. At convenience-oriented retail stores shoppers can buy items easily carried on foot and on transit, and where extensive comparison shopping is not required. Appropriate types of retail or service uses could include banks, cleaners, drug stores, and grocery stores.

Bringing a mix of uses together makes an area a destination, which in turn makes it more effective to bring bus service to it. Downtown Berkeley is a good East Bay example. The area contains a BART station and is adjacent to the University of California. Downtown Berkeley also includes the City's offices, County courts, Vista College, the main public library, the main post office, the recently expanded YMCA, a historical museum, movie theatres and live theatres. These uses are within a few blocks of each other, making it possible to focus transit on them.
Table One: Appropriate and Inappropriate Uses in Transit-Oriented Areas

<table>
<thead>
<tr>
<th>Appropriate Uses: Transit-Supportive and Higher Density Uses</th>
<th>Inappropriate Uses: Auto-Oriented and Lower Density Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Higher density housing:</em> Apartments and condominiums 40 units/acre or more around BART&lt;sup&gt;8&lt;/sup&gt; -- Townhouses, Apartments and condominiums 20 units/acre or more on trunk bus corridors</td>
<td><em>Lower density housing</em> below density thresholds single family detached houses on bus corridors; single family detached houses and townhouses in BART station areas.</td>
</tr>
<tr>
<td><em>Locally-oriented retail and services:</em> Groceries, drug stores, cleaners, small appliance repair shops, banks</td>
<td>&quot;Big box&quot; retail--e.g. warehouse clubs</td>
</tr>
<tr>
<td>Restaurants</td>
<td>Other large scale auto-oriented retail--e.g. furniture stores, lumberyards</td>
</tr>
<tr>
<td>Civic and Governmental Uses--City Hall, Civic Center</td>
<td>Auto-related uses: auto repair shops, car dealers and used car lots, car washes</td>
</tr>
<tr>
<td>Libraries and Museums</td>
<td>Drive through windows (e.g. at banks, restaurants, etc.)</td>
</tr>
<tr>
<td>Hotels, Bed and Breakfasts</td>
<td>Surface parking</td>
</tr>
<tr>
<td>Senior/community center</td>
<td>Warehouses</td>
</tr>
<tr>
<td>Special Needs facilities for blind, deaf, developmentally or physically disabled</td>
<td></td>
</tr>
<tr>
<td>Private offices</td>
<td>Mini-Storage/Self-storage buildings</td>
</tr>
<tr>
<td>Movie theatres and live theatres</td>
<td>Manufacturing uses with low density of employees per square foot.</td>
</tr>
<tr>
<td>Post offices and mailing facilities</td>
<td></td>
</tr>
</tbody>
</table>

Mixed use need not be limited to urban core environments but also can found in areas generally thought of as suburban. Downtown Walnut Creek is a location where transit service is weaker than the inner East Bay, but numerous uses close together and a strong pedestrian network make walking possible and enjoyable. San Jose's Santana Row project puts housing and a hotel inside an upscale shopping center, allowing for walking trips. (The Bay St. shopping center in Emeryville has shell space for potential future housing).

Making Mixed Use Meaningful

Mixed use areas are transit-friendly and encourage walking when the uses relate well to each other and are likely to be used at least partially by the same people. However, different uses can be located adjacent to each other that will do little to gain these benefits of mixed use. For example, if an apartment complex is adjacent to an office building, there will probably be little interaction between the two buildings, except for a handful of residents who may work there. Thus the two buildings could more accurately be described as "co-located," rather than as mixed use.

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<sup>8</sup> This recommended density is from BART's Transit-Oriented Development Guidelines
It is also important to avoid placing low intensity, transit-unfriendly uses on valuable sites near transit hubs. An important and frequently occurring example is big-box retail. Big box retailers usually present a huge, pedestrian-hostile face to the community. Their huge size may block streets that formerly went through. Shoppers, intending to buy large quantities there, arrive very heavily by automobile. Auto dealers also need large spaces and contribute little to transit-oriented streets. Low density industrial and warehouse uses also under utilize land near transit hubs, though there are some higher density manufacturing activities. Large lot single family housing near transit hubs is also inappropriate.

![Diagram of a Big Box Retailer Preempting a Site](image)

This big box retailer preempts a site within walking distance of a BART station

**General Plan Policy: Dense Development Near Transit:**

Encourage transit-oriented development; where appropriate, encourage intensive new residential and commercial development within 1/2 mile of transit stations or 1/4 mile of major bus routes.

(City of Hayward General Plan Transportation Element, Policy 10.1)

**General Plan Policy: Avoiding Low Intensity Uses Near Transit**

Development inconsistent with the objectives of the Transit-Oriented Development Corridors and Station Area Nodes, for instance low intensity uses (e.g., one and two story office buildings), low density residential, and auto related uses (e.g. surface parking lots, automobile sales lots, stand alone big box retail, etc.) should be avoided particularly within 2,000 feet of an existing or planned Light Rail Transit Station

(Development Parameters, Transit-Oriented Development Corridors, City of San Jose General Plan Land Use/Transportation Diagram)
Planning Best Practice 1.3
Build projects to the planned densities in transit-friendly areas

It is important to develop land around transit hubs to the actual densities permitted in a community's General Plan. Often a General Plan will allow a certain density, but actual projects are developed at far lower densities. In some cases, developers may not immediately see the market for higher-density housing and wish to build a quick project. It is important that communities consider their long-term benefit and maintain available land for denser housing. Some communities, such as Fremont, specify minimum as well as maximum densities in key areas, to limit this process of thinning out projects.

**General Plan Policy: Minimum Density at Transit Hubs:**
To achieve a variety of housing types, the City has designated locations where moderate and higher density development is appropriate. Criteria for the location of higher density housing include access to transit, proximity to commercial areas, proximity to a collector or arterial street, and as a transition use where maximum flexibility in site design is required. For those areas where higher densities are indicated on the General Plan Diagram, construction of housing at significantly lower densities than planned would not meet the City's goals. The City therefore establishes a minimum required density of development for all medium and high density uses …
(City of Fremont General Plan Land Use Element, Policy LU 1.9).

Planning Best Practice 1.4
Avoid high intensity uses in areas with minimal transit service.

Just as low intensity uses are inappropriate at transit hubs, high-intensity uses are inappropriate away from transit hubs and corridors. A high density apartment complex or major office building with little or no access to transit is inevitably a large traffic generator. At the same time, such a location forecloses the option of taking transit for the tenants or residents of such a site.

**General Plan Policy: Limit Development Intensities Away from Transit**
Preserve the low-density character of San Leandro's predominantly single family neighborhoods. Concentrate new multi-family development in the areas near the BART Stations and along major transit corridors such as East 14th Street
(Policy 2.05, Land Use Element, City of San Leandro General Plan)

This highrise is isolated from transit and other uses, assuring that most people who go thee will drive.
Planning Best Practice 1.5
Locate special needs facilities in areas with good transit service.

Some facilities provide services that generate a particularly high need for good transit. Examples include rehabilitation services for the disabled, or a training site for the developmentally disabled. Good locations for this type of facility are close to frequent transit service. For example the Albany center for the blind is served by trunk bus line 72 and is within walking distance of the El Cerrito Plaza BART station.

Unfortunately, some communities have relocated special needs facilities away from central locations with good transit service to remote locations that are almost impossible to serve effectively with transit. Sometimes it is assumed that AC Transit can simply create a new line to serve these facilities, but for the reasons discussed in Appendix 4, this is usually not possible or cost effective. This type of relocation should be avoided and communities should consult with AC Transit before siting these facilities.

General Plan Policy: Transit-Oriented Served Locations for Public Facilities and Services

Wherever possible, locate public and private institutional uses and community service centers that serve city residents or have a regional-service orientation on transit corridors so that they are accessible to public transportation and will not disrupt adjacent residential areas.

(Policy LU-15, Land Use Element, City of Berkeley General Plan)

Planning Best Practice 1.6
Designate transit-friendly areas for denser development in key planning documents.

It is important legally, politically, and economically that a community's intent to develop higher density housing in transit-friendly areas be reflected in key documents. These include the community's General Plan, Zoning Ordinance, Area Plan or Specific Plan (if applicable), and Redevelopment Plan (if applicable). Legally, showing a similar intended use for an area in these documents makes challenges more difficult. Politically, the community becomes aware that this is the intended use, making it harder for opponents to make credible claims that they were unaware of intensification plans. Economically, the documents send a signal to developers that this is what the community wants for an area and can help attract developers of appropriate housing types.
Planning Policy 2
Plan Bus Corridors to Maximize Their Transit-Friendliness

The value and importance of rail stations as foci for intensified development has become widely recognized. What is less widely recognized is the value of and need for development—especially housing (and neighborhood serving retail)—along and near major bus transit corridors. One of the most important messages of this handbook is that bus corridors—approximately 1/4 mile around bus lines—can and should become foci for transit-oriented development.

New development has occurred at a number of transit corridor locations away from BART stations. Examples include the 40th & San Pablo area in Emeryville; the 40th & Broadway area in Oakland, and near Telegraph & Dwight in Berkeley. These locations are transit-friendly because they combine multiple transit lines with nearby retail stores, including supermarkets. 9

AC Transit plans to improve our trunk lines to Rapid and Bus Rapid Transit levels of service (see Chapter Two). As service on these corridors improves, they will become all the more attractive and viable as locations for transit-oriented development.

Planning Best Practice 2.1
Develop the area within easy walking distance of a transit corridor with transit-friendly uses

The trunk line corridor is not just the street the bus operates on, but also the areas within 1/4 mile of that street. This represents an easy walk—generally estimated to be about 5 minutes—from the transit line. These 1/4 mile corridors are illustrated by Map 5. Side streets in transit corridors can provide opportunities for residential development in quiet, attractive settings within easy walking distance of the bus. These corridors incorporate surprisingly large amounts of land. Exclusive of areas around BART stations, the trunk and major bus line corridors in the AC Transit district encompass almost 25,000 acres, or almost 39 square miles.

This building in Oakland is one block off a transit corridor

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9 Cities without extensive rail transit systems have created transit-oriented developments around bus corridors. Vancouver, British Columbia is one of the most successful examples.
General Plan Policy: Mixed Use on Transit Corridors

Encourage mixed use projects containing ground floor retail and upper floor residential uses along major transit corridors. Such development should be pedestrian-oriented, respect the scale and character of the surrounding neighborhood, and incorporate architectural themes that enhance the identity of adjacent commercial districts.

(Policy 3.05, Land Use Element, City of San Leandro General Plan).

Planning Best Practice 2.2

Assure that residents on bus corridors can easily walk between neighboring uses

Placing residential and commercial uses close to each other is necessary, but not sufficient for easy walking between them. In many cases it is impossible, dangerous, or undesirable to walk from one to the other (see photo below). This is particularly true when development patterns incorporate long, unbroken walls around subdivisions, shopping centers, or other uses. One might be able to walk around the wall on the nearest street, except that overly long block lengths may mean that the nearest street is 800 or 1,000 feet away!

Some housing developments situated—like this one—next to a shopping center have pedestrian gates (often key accessed) that allow people to walk from the housing to the shopping center.

Residents cannot easily access these stores because of the wall between them and long block lengths.
Planning Best Practice 2.3
On commercial strips, focus development at nodes
Many East Bay communities have long, low density commercial strips along their main highways. It is sometimes possible for transit to serve residential development along these strips—depending on the density of housing in the area. However this type of commercial development is difficult to serve, and difficult for transit passengers to use, because of its low density, scattered character.

Many of these strips already have focal points where development is more intense—buildings may be taller or closer together, there may be more pedestrians on that section of the street. Often these occur where two major streets intersect, especially around intersections which were once important streetcar junctions. Some streets do not have these locations, but have the opportunity to develop them. Planners call these focal points “nodes.” Some plans identify nodes and detail specific policies for them. The El Cerrito General Plan identifies three nodes along San Pablo Avenue.

It is usually better for transit operations and transit passengers to concentrate commercial development, particularly local serving stores, at major nodes. Nodes at major cross streets are particularly helpful, as they allow crossing transit service. These nodes provide a good opportunity to introduce pedestrian-oriented design to otherwise unfriendly streets.
Planning Policy 3
Manage Parking as Part of an Overall Transportation Strategy

Parking, especially parking at commercial destinations is used as an alternative to transit. A plentiful supply of parking, especially free or extremely cheap parking, is a factor encouraging people to drive to their destinations. Parking availability is certainly not the only factor in travelers' mode choice, but is unquestionably one factor. It is very difficult to increase transit ridership in situations where parking is abundant, even when good transit is provided. A community that wishes to encourage transit-ridership (and walking and bicycling) will have to determine how it wishes to manage parking.

The key concept is that communities need to manage parking as part of an overall transportation strategy, rather than be managed by parking. Automobile parking is one of the modes of access to destinations. Parking is a supportive, ancillary facility for various types of land uses. People park somewhere in order to access a building or site. Parking is only one way to access a facility—from a public policy standpoint the least desirable way. Yet all too often parking often dominates planning rather than planning goals determining parking. The result is a landscape where parking becomes the dominant user of land, and the dominant shaper of the character of street, and automobiles are the dominant mode of travel.

In addition to improving transit, transit-friendly communities can implement a variety of strategies to reduce parking demand. Communities can set reduce excessive parking requirements, and recognize that high levels of transit service make reduced requirements reasonable. Communities can configure parking into consolidated lots and structures to reduce its negative impact on community form. Communities can avoid subsidizing parking, by charging parking fees to cover costs and to generate funds for transit and other alternative modes.
Planning Best Practice 3.1
Provide Appropriate But Not Excessive Amounts of Parking

Parking requirements are often discussed as if they are universal and unchanging, as if they were somehow absolutely determined somewhere. In reality, demand for parking varies from location to location, varies over time, and changes with the impact of public policies and traveler decisions. Therefore, communities should assure that parking provision is appropriate but not excessive (in some instances the appropriate amount of parking is none).

Excessive parking increases all of the impacts discussed above such as induced driving and excessive land consumption. Moderate parking supply can help support a positive feedback loop of more travel by transit and other modes leading to a lowered parking requirement and so on. Excessive parking helps drive a negative feedback loop where driving dominates and reinforces an auto-oriented environment, leading to more demand for parking leading to more driving etc.

Communities should carefully consider their own goals, experience, and transit network in setting parking requirements. Many "standard" parking requirements are based on suburban areas with minimal or no transit, and the assumption that virtually all users will drive alone to a facility. Parking requirements are also based on the idea that each use must have its own dedicated supply of parking. But there are often opportunities for uses with different parking demands to share parking. In West Berkeley, for example, a school--whose parking demand is during the week--will be sharing parking with a synagogue that has evening and weekend parking demand. In some cases, cities have set maximum parking allowances for projects, so that developers do not overbuild parking and undermine city policy goals.

Planning Best Practice 3.2
Reduce Parking Requirements in Transit-Served Areas

Studies have demonstrated that people who live and/or work in transit-friendly areas own and use cars less than people who live or work elsewhere. Communities can recognize and encourage this relationship by establishing lower parking requirements in locations with strong transit service. A number of cities in the Bay Area and nationally already provide for such reductions, including Oakland. The most straightforward method is to establish lower parking requirements in the basic zoning for transit-served areas. Another approach is to allow parking requirements to be lowered on a case by case basis through a Conditional Use Permit procedure.

General Plan Policy: Reduced Parking in Transit-Oriented Areas
Reduce parking demand through limiting the absolute amount of spaces and prioritizing the spaces for short-term and ride-share uses.
(Policy 16.5, Transportation Element, City of San Francisco General Plan)

10 Berkeley, for example, allowed both its Main Library and YMCA to expand based on analysis that there was adequate parking to satisfy the net increase in parking demand they could be expected to generate there.
Planning Best Practice 3.3
Consolidate Parking into Joint Lots and Structures

Many commercial corridors and districts have numerous adjacent or closely spaced parking lots, each of which serves only one or a few businesses. The lots together may provide more parking than the businesses require, or one lot can be jammed while the other lot is empty. Such parking lots take up most of the land in many of the district's newer commercial areas.

This condition can be improved by consolidating several lots into a single lot that serves multiple users and takes up less space, freeing up land area for sidewalks, landscaping, or additional development. These lots can have fewer driveways, reducing the potential for pedestrian conflicts. In cases where parking demand is high enough, lots can be consolidated into parking structures.

Include active uses, such as retail stores, on the ground floor frontage of parking structures, thereby contributing to the commercial corridor or district rather than detracting from it.

Planning Best Practice 3.4
Charge Fees for Parking to Cover Costs and Generate Funds for Other Modes

It is important that there be appropriate charges for automobile parking. As noted above parking is not free to create or maintain and the costs of doing so should be borne by the users of the parking. Otherwise the costs of parking are paid by all of the facility's users, whether they park there or not. People who take transit to the facility must pay a fare to get there as well as subsidizing drivers—a double burden. In some cases, parking fees can also be used to support alternative modes of transportation.

Charging for parking can also help establish the real demand for parking. Both common sense and economic analysis indicate that people will use more of a "good"—like parking—when it is free. Charging can thus help communities provide reasonable rather than excessive levels of parking.

Parking charges can also be used to influence travel patterns in a community. The City of Berkeley targets its public parking to shoppers rather than people commuting to work. The City's view is that people commuting to work have a greater opportunity to use transit than shoppers. Therefore their charges for short term parking—for less than two hours—are low, but rise steeply for longer term and all day parking.

11 Environmental and health advocates note the environmental, health, public safety, and other costs created by automobile driving. These are important considerations that illustrate the cost of driving to society, but are beyond the scope of this document.
Context: Transit Accessibility of Various East Bay Locations
The East Bay has a clear pattern of locations in the East Bay that are more and less transit-accessible. This pattern highlights the locations where development can be most transit-oriented. This page sketches out four general levels of transit accessibility, in order from most transit accessible to least. The higher the level of accessibility, the denser the development that can be accommodated. However, transit-oriented development as described in this chapter can function well down to the Trunk Bus Corridor level (level three).

Level One: Downtown Oakland Regional Transit Hub
Downtown Oakland is a unique focal point for transit in the East Bay. BART passengers at 12th St. or 19th St. can reach all but two BART stations without changing trains. AC transit provides frequent service on numerous corridors serving West Oakland, North Oakland, East Oakland, Alameda, Emeryville, Piedmont, and more distant communities. Capitol Corridor train service to San Jose and Sacramento is available at the edge of Downtown Oakland, as is ferry service to San Francisco. Downtown Oakland has developed as the highest density business district in the East Bay, and has a growing residential population as well.

Level Two: 19 remaining BART stations
The next most accessible locations are the other 19 BART stations in the AC Transit service area. The BART stations combine BART service, AC Transit service, and sometimes service by other systems and "shuttle" services. Access to more than one transit line allows station area residents to reach a variety of destinations, enhancing mobility in "transit villages." Some stations--such as El Cerrito del Norte and Fruitvale--are particularly important bus hubs.

Level Three: Trunk and Major Bus Transit Corridors
The next level of accessibility can be found along trunk/major bus corridors. These have frequent bus service reaching multiple destinations, usually including business districts and BART. In some cases they also have Transbay bus service. Overall access along these corridors is best in neighborhood-oriented commercial districts, and at intersections with other trunk routes and crosstown routes. Examples of this type of area include Solano & San Pablo in Albany, North Shattuck in Berkeley, and the Park Street business district in Alameda. As Map Three shows, large areas of the AC Transit District are within trunk/major route transit corridors.

Level Four: Crosstown Routes
The most limited level of transit accessibility is found at sites along crosstown bus routes away from trunk routes. These locations will be connected to a BART station and a trunk line bus route, but residents will have to transfer to reach more destinations. Some busy crosstown routes (e.g. Fruitvale Ave.) operate frequently, but many operate on 30 minute headways.

The Difficulty of Creating New Transit-Friendly Districts
The discussion above outlines the current transit accessibility of various areas. That accessibility in turn provides a framework transit-oriented development. But what about creating new transit-oriented centers? Some citizens and communities are interested in creating new transit-friendly districts. While older communities have inherited transit-friendly downtowns and neighborhood commercial districts, newer communities may feel that they do not have enough such transit-oriented areas. It is positive that communities aspire to support transit, but the difficulty of creating new transit-oriented areas should not be underestimated. For example, there are serious prospects for only two new BART stations in the East Bay, and it will be many years before they are built (if they are built at all). It will usually be more efficient and effective for communities to concentrate on developing existing transit-friendly areas, rather than seeking to create new ones.
CHAPTER 4.  
SAFE ROUTES TO TRANSIT: CREATING GOOD WAYS TO WALK TO TRANSIT 

Guide to the Chapter 

**Topic of this Chapter:** Developing a pedestrian network that allows passengers to easily walk to transit

**This Chapter is Especially For:** Transportation Commissioners, transportation planners, planners involved in development review, Traffic/Transportation Engineers

**This Chapter Makes Recommendations Affecting:** General Plan Transportation Elements, subdivision requirements, site plans, sidewalk and roadway plans and standards, traffic signal timing

**Chapter Introduction**
The previous chapter described key community planning policies to create a community that transit can serve effectively—a transit-friendly community. This chapter looks at how transit riders can get from places in those communities to transit. AC Transit passengers overwhelmingly reach the bus by walking to it. A recent survey of AC Transit passengers found that they were almost 8 times more likely to reach their first transit stop by walking than by all other methods (driving, being a car passenger, bicycling) combined.¹²

This Chapter addresses the following questions:
- How can communities make it possible for pedestrians to access them by walking?
- How can good walking access to transit be created?
- How best can pedestrian safety at roadways and driveways be achieved?

Some East Bay communities and neighborhoods are pleasant places to walk in, but many are not. There may not be a sidewalk or it may be so narrow that it does not feel like protection (and may be effectively impassible to the disabled). Clearly these are not environments that encourage people to walk to transit or anywhere else. There are many ways to make walking a pleasant and useful method of travel. Creating and widening sidewalks, creating new pedestrian entrances to facilities, and improving lighting are just some of the approaches for doing this.

This chapter recommends policies and approaches for creating a good pedestrian environment. However, it is not intended to be a manual of technical specifications for sidewalks and other pedestrian facilities.

AC Transit's recommendations for walkways and pedestrian facilities are made in the context of multimodal transportation planning, which is discussed more fully in Chapter 5. The multimodal approach seeks to improve pedestrian conditions without compromising appropriate bus operations. Conversely, there are many potential changes to streets that would improve bus operations but not degrade pedestrian safety--these are discussed in the next chapter. Our model is a street that is safe for pedestrians and functional for buses and other vehicle traffic. Such a street needs to operate at an adequate and predictable speed, but not necessarily the highest possible speed (high speed roads can discourage people from walking to the bus and thus reduce transit ridership).

The question to ask about the issues discussed in this chapter is "How would I feel walking to the bus stop? Would I feel safe? Would I enjoy the walk? Would I do it again?"

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¹² A small percentage of AC Transit Transbay and express bus passengers reach their bus by driving to park-and-ride facilities in areas where on-street service is not practical. The proportion of passengers doing this is expected to remain small.
SUMMARY OF SAFE ROUTES TOP TRANSIT POLICIES AND PRACTICES

Walking Policy 1
Develop networks that Provide Pedestrian Access to All Locations in a Community

Best Practice 1.1 Provide sidewalks on all blocks.
Best Practice 1.2 To maximize pedestrian access, make blocks part of a grid pattern connected to other streets
Best Practice 1.3 Where blocks are long or end in cul de sacs develop alternative pedestrian access.

Walking Policy 2 Create access to transit which is short, direct, safe, understandable and pleasant
Best Practice 2.1--Integrate transit stops into activity centers, usually on the street close to key buildings
Best Practice 2.2--Provide direct pedestrian access from activity centers to transit lines, without meandering routes, circuitous crossings, free vehicular turns, or changes of grade.
Best Practice 2.3--Provide adequate lighting and clear sight lines on sidewalks and pedestrian paths.
Best Practice 2.4--Make sidewalks and paths visually interesting and active.

Walking Policy 3 Site buildings to provide easy access to transit
Best Practice 3.1--Site buildings next to sidewalks, without excessive setbacks
Best Practice 3.2--Assure that buildings have entrances from the sidewalk

Walking Policy 4 Assure that pedestrian crossings of roadways and driveways are safe and easy to use
Best Practice 4.1--Provide sidewalks and pedestrian paths with safe crossings of major streets, installing traffic signals where necessary for pedestrian safety.
Best Practice 4.2--Minimize roadway crossing distances
Best Practice 4.3--Avoid excessively long signal cycles which delay pedestrians and may cause them to jaywalk.
Best Practice 4.4--Limit vehicle turning movements across active sidewalks and walkways.
Best Practice 4.5--Locate parking to minimize interference with pedestrian movements into buildings.
DISCUSSION OF SAFE ROUTES TO TRANSIT POLICIES AND PRACTICES

Walking Policy 1 Develop networks that Provide Pedestrian Access to All Locations in a Community

Walking Best Practice 1.1
Provide sidewalks on all blocks in a community..

Sidewalks are the fundamental building block for pedestrian travel. To allow pedestrians to safely reach all parts of a community, there should be sidewalks of adequate width on every block.

Recommended sidewalk width:

- Minimum -- 4 feet
- Recommended -- 6 feet
- Minimum to allow bus shelter -- 10 feet

Four feet is the minimum width most communities require to allow disabled access. Six feet provides a more comfortable sidewalk where two people can easily walk side by side. Bus shelter installation requires at least ten feet -- 4 feet for the sidewalk "path of travel" and approximately 6 feet for the shelter itself.

Walking Best Practice 1.2
To maximize pedestrian access, make blocks part of a grid pattern connected to other streets

For sidewalks to effectively reach all parts of the community, the pattern of blocks must facilitate easy pedestrian access. This requires relatively short blocks, of no more than 500 feet, so that pedestrians do not have to travel too far out of their way. It is important to minimize the walking distance to the street with transit, because the bus stop may be as much as an additional 500 feet along the street with transit.

Map 6 illustrates the difference that a grid pattern with appropriate block lengths can make. The maps show two areas in the AC Transit district. Residents of streets on the upper map can easily walk to the streets with bus service (darker lines) and to the BART station near the upper right corner of the map. They do not have to walk substantial distances out of their way to make these connections. Some midblock pedestrian connections not shown on the map provide additional walking options. Residents on the lower map, frequently have only one way in and one way out. There is transit service on the major streets in this area also, but many residents cannot access it easily. There are no midblock pedestrian connectors to provide supplemental access routes.

Redevelopment of shopping centers and other large sites can be an opportunity to create new streets. Often streets "T" or end at the back of shopping centers and do not provide access across the center. It may be possible to extend these streets when the site is redeveloped.

Urban renewal projects have sometimes created oversized "superblocks" by combining one or more existing blocks. The distance between streets thus becomes very long. Perhaps the country's most famous superblock project is the former World Trade Center site in New York City, which combined numerous blocks into a cold and forbidding superblock. The site will probably be redivided into a number of blocks. Superblocks are difficult and sometimes dangerous for pedestrians to cross, as they can create large empty areas. They also often unnecessarily interfere with traffic flow, in some cases including bus flow.
Walking Best Practice 1.3
Where blocks are long or end in cul de sacs develop alternative pedestrian access

Sidewalks along streets are generally the most effective and best used walkways for pedestrians. However, in some instances, communities have poor layouts of blocks that do not provide sidewalks in all locations where they are needed. Blocks may be excessively long, in some cases exceeding 1,000 feet. Streets may end in cul de sacs.

Where these conditions exist there are remedies short of building a new road through to reach the site. Midblock pedestrian connectors—walkways—can be developed. These are particularly useful for pedestrian-friendly commercial areas and as connectors to transit. The hillside paths in Oakland and Berkeley were initially developed to connect riders to the streetcar lines. Sidewalks can be extended from cul de sacs to nearby streets, allowing pedestrians and bicyclists to pass through while still shielding the street from auto traffic.

Photograph to be inserted-- A CUL DE SAC STREET CONNECTED
Walking Policy 2 Create access to transit which is short, direct, safe, understandable and pleasant

Walking Best Practice 2.1-
Provide direct pedestrian access from activity centers to transit lines without meandering routes, circuitous crossings, or unnecessary changes of grade.

Because pedestrian travel is relatively slow, pedestrians are very sensitive to the length of their trip. What may appear to be short detours from a driver's perspective can seem long to a pedestrian. Such deviations may cause her to stop walking or to walk in a dangerous manner-- e.g. pedestrians may cross a street illegally when the only legal route is excessively circuitous. For these reasons, it is important to direct paths for pedestrians to and from activity centers.

Directional signs for pedestrians may also be useful, particularly between major transit hubs, activity centers, and public buildings.

Photograph to be inserted-- MEANDERING SIDEWALK

Walking Best Practice 2.2-
Integrate transit stops into activity centers, usually on the street close to key buildings

Transit access at new developments needs to be safe, easy, and attractive. Site bus stops in or near active, central areas of complexes of buildings, not in remote locations. To effectively serve passengers, transit stops at major activity centers (e.g. shopping centers, business parks) need to be close to the buildings they serve. Bus stops which are far down an arterial street, behind a building or in a little used part of the site are difficult for riders to use and may seem (or be) dangerous. Bus stops should be as close to the main front entrance of a facility as traffic conditions allow.

Bus stops that are hidden in obscure locations also communicate a message to transit riders that they are unimportant--that the facility is not concerned about their ability to travel.

In general, it is best that the bus remain on the street that serves an activity center. Routing the bus off the street into a building complex will generally delay the bus more than can be justified. On-street bus stops are usually most appropriate and can work well if facilities are sited to be easily accessible to the street (see Best Practices 1.1 and 1.2).

Photograph to be inserted-A BUS STOP WELL SITUATED FOR THE USES IT IS SERVING
Walking Best Practice 2.3
Provide adequate lighting and clear sight lines on sidewalks and pedestrian paths.

A clear view of the path in front of him is a pedestrian's best defense against both crime and vehicle hazards. This requires clear sight lines along major sidewalks, which will also benefit disabled people using wheelchairs. It is important that light be provided from a relatively low height (12-14 feet), not only from high level "Cobra" lights designed to illuminate roadways. The Oakland Pedestrian Master Plan recommends lampposts every 50 feet along streets, every 30 feet along walkways and trails because they receive less other lighting.

Walking Best Practice 2.4--Make sidewalks and paths visually interesting and active
Since pedestrians are moving approximately 1/10 as fast as cars, they are very aware of their surroundings. Sidewalks adjacent to blank walls, large surface parking lots, or other visually boring features are unpleasant to walk along. Visually interesting sidewalks and walkways are more pleasant and likely to attract more users, making them safer. Depending on the context, there are a number of ways to make sidewalks more interesting--through the design of building facades, landscaping, public art, and other treatments.

This blank wall deadens an otherwise lively downtown area
Walking Policy 3 Site buildings to provide easy access to transit

Walking Best Practice 3.1
Site buildings next to sidewalks, without excessive setbacks

One of the easiest ways to make buildings more pedestrian and transit-friendly is to build the building as close as possible to the sidewalk. The walking distance that bus passengers have to travel should be minimized.

Large setbacks in front of buildings should be avoided, they just make it longer and more difficult for pedestrians and transit passengers to reach the building. Setbacks in front of retail and commercial buildings are generally understood as detrimental to the businesses in the building. Buildings close to the sidewalk tend to convey a positive urban or "main street" feel, while deep setbacks tend to connote sprawl and pedestrian-hostile development patterns. At the same time, modest landscaping and planting strips can add to a building's attractiveness and soften its hard edges without imposing undue burdens on pedestrians. (Parking is often interposed between buildings and sidewalks to the detriment of pedestrians. See Best Practices 4.4 and 4.5 for recommendations about making parking more pedestrian-friendly).

The deep setback of this building makes it harder for patients to walk to it.

Walking Best Practice 3.2--
Assure that buildings have entrances from the sidewalk

In some cases, building tenants seek to have building entrances opening onto parking lots rather than sidewalks. It is very important for easy pedestrian mobility that there be entrances to commercial buildings such as office buildings and stores directly from sidewalks. Without a sidewalk entrance, pedestrians are forced to pick their way across parking lots, which can be difficult or even dangerous. In some instances, a parking lot can also be accessed from the entrance at the sidewalk. If an entrance from the parking lot is unavoidable, there should still be a sidewalk entrance that is designed as the building's primary entrance.
Parking is included in this building, but access to stores is from the sidewalk
Walking Policy 4
Assure that pedestrian crossings of roadways and driveways are safe and easy to use

Pedestrians are in most danger when they cross roadways. Since pedestrians are vulnerable to injury from motor vehicles, it is critical to make crossings as safe as possible for pedestrians. In addition to assuring pedestrian safety, it is important to make crossings easy for pedestrians to use. Wide, difficult crossings can discourage pedestrians and reduce both the amount of walking and access to transit. Roadways should not be barriers dividing one section of a community from another.

Walking Best Practice 4.1
Provide pedestrian with safe crossings of major streets, installing traffic signals where necessary for pedestrian safety.

Pedestrians can be endangered where they must cross major roadways, and this is where the largest number of pedestrian-involved accidents tend to occur. One important way to improve pedestrian safety is to install traffic signals at major unsignalized pedestrian crossings.13 It is important that a community’s signal installation criteria consider pedestrian use and safety.

If a traffic signal is not feasible, other measures could include installation of crosswalks with in-pavement lights (sometimes called "Santa Rosa lights"). These lights, which flash when a pedestrian is in the crosswalk, can increase driver compliance with the requirement to stop when a pedestrian is in a crosswalk. "Zebra striping"--thick white lines painted across the crosswalk (in addition to boundary lines along the side of the crosswalk) can significantly increase the visibility of the crosswalk.

Crosswalks can also be made more visible by the use of special crosswalk paving and/or coloring. The material used should be smooth and easy to walk on, and preferably one that does not become too slick in the rain. Concrete is recommended over brick, because concrete is more durable.

Photograph to be inserted-- A CROSSWALK WITH IN PAVEMENT "SANTA ROSA" LIGHTS

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13 Stop signs are not an appropriate tool on arterial streets or other streets with bus routes. Stop signs create much more delay for buses than do traffic signals. They are also strongly disliked by bicyclists. Stop signs can help pedestrians and may be appropriate on secondary streets without bus routes.
Walking Best Practice 4.2--Minimize roadway crossing distances

Wide roadways are both physically difficult to cross and create a psychological "fence" effect for pedestrians (as well as reflecting excessive heat into the environment). Every effort should be made to minimize the width of roadways. Multi-lane arterial roadways are often larger than needed for traffic volumes and can be narrowed without compromising reasonable traffic flow (including bus flow). Communities narrowing roads must be careful not to narrow them so much that bus traffic is impeded. Roadways can be narrowed by widening sidewalks, thereby improving conditions for pedestrians walking along the arterial as well as for those crossing it. Such narrowing both improves conditions for pedestrians and reduces excessive vehicle speeds.

In some instances, it is not feasible to reduce overall roadway width. In these circumstances it can be helpful to reduce the pedestrian's effective crossing distance. Pedestrian bulbs extending from the sidewalk can shorten crossing distances. "Refuge islands" on medians where pedestrians can wait before crossing opposing traffic are another technique, although they may or may not be comfortable places to wait.

Pedestrian bulbs must be designed carefully so they do not interfere with bus movement. Pedestrian bulbs less than 40 feet long--the length of a bus--should not be placed adjacent to bus stops. If bulbs are installed next to bus stops, they should be lengthened so they are the full length of the bus (see discussion of bus bulbs in Streets Practice 5.2). If the bulb is shorter than the bus, it will block the bus from pulling fully into the curb, creating a safety hazard, particularly for disabled riders.

Diagram 2--APPROPRIATE TREATMENTS TO REDUCE CROSSING DISTANCE AT CORNERS

Walking Best Practice 4.3--Avoid excessively long signal cycles which delay pedestrians and may cause them to jaywalk.

A traffic signal cycle is the time it takes for the signals at an intersection to go through all their "phases" --not only green for each direction, but also any left or right arrows. The length of these signal cycles has been growing, especially on large suburban arterials. However, long signal cycles are inconvenient for pedestrians. Pedestrians may be tempted to jaywalk, to avoid having to wait through a long signal cycle. Minimize signal cycle lengths to facilitate walking.
Walking Best Practice 4.4--Limit vehicle turning movements across active sidewalks and walkways.

Pedestrians can be endangered where they must cross roadways and driveways with major turning movements, such as entrances to large parking lots. Pedestrians should be protected as much as possible from these conflicts. One way to do so is move driveways away from more active sidewalks and pedestrian locations. Placing driveways into a major facility on the side or rear of that facility will probably reduce conflicts with pedestrians.

The number of driveways crossing active sidewalks should also be limited. Walnut Creek, for example, has allowed only one driveway per block in new downtown commercial development. Consolidating parking lots together into joint lots and structures can also reduce the number of driveways.

Free right (and left) turns where vehicles can make a turn in a lane separate from the main travel lane raise similar, or even more difficult problems. Drivers often go through these free turns at high speed and do not necessarily carefully observe whether pedestrians are crossing them. In many instances, these free turns can be removed without causing undue traffic congestion.

Diagram 3--RECOMMENDED LOCATIONS FOR BUILDINGS’ PARKING AND DRIVEWAYS

Walking Best Practice 4.5--Locate parking to minimize interference with pedestrian movements into buildings.

Traffic in and out of parking lots can be a major source of "friction" or hazard to pedestrians. The previous chapter discussed the importance of minimizing the total amount of parking. Locating remaining parking where it will impact pedestrians least is also critical. Do not place parking between a building, especially a major activity center, and a bus stop.

Underground or below grade parking accessed by a single driveway will reduce parking’s impact on pedestrians. Above grade parking--such as parking on the roof of a commercial structure--will also have the beneficial impact of channeling cars up a single driveway. If parking is on the surface, parking in the rear of the building will allow pedestrians to access the front with less interference from cars. In some cases, parking to the side of a building while maintaining a pedestrian-oriented front entrance is acceptable. Parking in front of the building is the poorest approach, as it generally means that pedestrians will have to find their way among cars to reach the building.
This parking structure blends well with the walkable commercial street where it is located.
**Reference--Selected Pedestrian Safety Policies from the Oakland Pedestrian Master Plan**

Oakland, along with Portland, Oregon, is one of the few cities in the country to develop a plan to support pedestrian travel. The plan was created to highlight the importance of walking, provide guidance on key pedestrian issues and support the Mayor's goal of having walking trips replace auto trips. The plan sets out policies concerning pedestrians in Oakland, and provides specific guidelines on how to implement these goals. The policy framework set out by the plan, reproduced in part below, is appropriate for any of the communities in the AC Transit district.

<table>
<thead>
<tr>
<th>Goal 1: Pedestrian Safety--Create a street environment that strives to ensure pedestrian safety</th>
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<tbody>
<tr>
<td><strong>Policy 1.1 Crossing Safety:</strong> Improve pedestrian crossings in areas of high pedestrian activity where safety is an issue.</td>
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<tr>
<td><strong>Policy 1.2 Traffic Signals:</strong> Use traffic signals and their associated features to improve pedestrian safety at dangerous intersections.</td>
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<tr>
<td><strong>Policy 1.3 Sidewalk Safety:</strong> Strive to maintain a complete sidewalk network free of broken or missing sidewalks or curb ramps.</td>
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<thead>
<tr>
<th>Goal 2--Pedestrian Access: Develop an environment throughout the city--prioritizing routes to school and transit--that enables pedestrians to travel safely and freely.</th>
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<tbody>
<tr>
<td><strong>Policy 2.1 Route Network:</strong> Create and maintain a pedestrian route network that provides direct connections between activity centers.</td>
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<tr>
<td><strong>Policy 2.2 Safe Routes to School:</strong> Develop projects and programs to improve pedestrian safety around schools.</td>
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<tr>
<td><strong>Policy 2.3 Safe Routes to Transit:</strong> Implement pedestrian improvements along major AC Transit lines and at BART stations to strengthen connections to transit.</td>
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<tr>
<th>Goal 3--Streetscaping and Land Use: Provide pedestrian amenities and promote land uses that enhance public spaces and neighborhood commercial districts.</th>
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</thead>
<tbody>
<tr>
<td><strong>Policy 3.1 Streetscaping:</strong> Encourage the inclusion of street furniture, landscaping, and art in pedestrian improvement projects.</td>
</tr>
<tr>
<td><strong>Policy 3.2 Land Use:</strong> Promote land uses and site designs that make walking convenient and enjoyable.</td>
</tr>
</tbody>
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Chapter 5
STREETS WITH TRANSIT: MANAGING STREETS AND SIDEWALKS FOR TRANSIT

Guide to this Chapter

Topic of This Chapter: How to make the street and sidewalk system work for buses and bus passengers

This Chapter is Especially For: Traffic and transportation engineers, transportation planners

This Chapter Makes Recommendations Affecting: Street layouts, striping plans, sidewalk layouts, streetscape plans, signal timing plans

Chapter Introduction

Chapter Three describes how a community can become a vibrant mixed use place, closely linked to transit. Chapter Four discusses how to get the citizenry walking to the bus, by creating a pleasant, enjoyable system of sidewalks and paths. What the community needs after that is a set of streets for the buses to operate on and stop along. The streets and bus stops are where bus transit is actually provided. This chapter considers the basic requirements for having a functional, transit-supportive network of streets and stops.

Trains have tracks, buses primarily have the street. Unlike a track, a street is a generally "multimodal" environment. "Multimodal" means that bicycles, buses, cars, motorcycles, and trucks are all allowed to operate on the street and pedestrians are allowed to cross. Vehicles on the street are not only moving, but often also parked. The challenge for communities is assuring that people using any mode have safe, pleasant, efficient ways to travel through key corridors.

This chapter focuses on what is needed for bus transit in this multimodal East Bay environment. The details of how a bus travels and stops on a street can make an enormous difference in how well the bus line functions, and what passengers' experiences are. Apparently minor factors can determine whether a bus travels quickly or slowly, whether it moves through traffic smoothly or with difficulty.

Many of AC Transit’s discussions with communities are about street and stop related issues. Most communities strive to accommodate AC Transit while dealing with their own concerns. Many important bus routes have been transit corridors for decades. However, some streets have been managed so heavily for automobiles that buses and other modes suffer.

This chapter outlines the basic framework for on-street bus operations. It discusses how to work with AC Transit to designate a network of streets for transit. The chapter looks at streets and sidewalks as the place for an integrated system of routes and stops. The chapter also looks at:

- What are the characteristics of good transit streets?
- How can roads be made better for transit?
- Where should bus stops be?
- How should bus stops be set up on the road?
- How should bus stops be set up on the sidewalk?

The test for this chapter is what the experience on waiting for and riding a bus is like: "Do I feel safe at the bus stop? Is it a pleasant place to wait? Does the ride on the bus seem reasonably smooth and fast? Or is it strewn with needless obstacles?"
SUMMARY OF STREETS WITH TRANSIT POLICIES AND PRACTICES

Section 1--Streets

Streets Policy 1. Designate a network of streets--"Transit Streets"-- for buses to operate on
Best Practice 1.1 Approve the network in the General Plan or other document regulating streets.
Best Practice 1.2 Assure that Transit Streets have the appropriate characteristics for bus operations.
Best Practice 1.3 Assure that land use and development on key transit streets is transit-supportive

Streets Policy 2. Manage Transit Streets for Safe, Efficient Bus Operation
Best Practice 2.1 Assure that roads width is adequate but not excessive
Best Practice 2.2 Assure that travel lanes and curb radii are wide enough for buses
Best Practice 2.3 Assure that these streets have adequate street composition to support buses.
Best Practice 2.4 Assure that signal timing is supportive of bus operations.
Best Practice 2.5 Assure that any traffic calming methods on bus routes are compatible with bus operations

Streets Policy 3 Implement Priority Treatments for Transit on Key Corridors
Best Practice 3.1 Provide transit signal priority on trunk corridors when necessary
Best Practice 3.2 Reduce the amount of on-street parking if necessary to relieve congestion
Best Practice 3.3 Create Queue Jumper to Move Buses through Congested Intersections
Best Practice 3.4 Consider dedicated bus lanes for congested, high transit volume corridors.

Section 2--Bus Stops

Streets Policy 4 Identify Safe, Efficient, and Convenient Locations for Bus Stops
Best Practice 4.1 Site bus stops to balance speed and convenience concerns
Best Practice 4.2 Site bus stops in the best operational locations, usually on the far side of an intersection
Best Practice 4.3 Site bus stops where passengers are least likely to experience crime

Streets Policy 5. Locate Bus Stops Appropriately within the Right of Way
Best Practice 5.1 Provide a curbside bus stop in most instances
Best Practice 5.2 Install bus bulbs where they would facilitate bus operation and pedestrian movement.
Best Practice 5.3 Avoid bus pullouts (turnouts)
Best Practice 5.4 Design Transit Centers for effective, efficient operation

Streets Policy 6 Create safe, functional and legal bus stops with needed amenities
Best Practice 6.1 Make bus stops long enough for the number of buses likely to use them.
Best Practice 6.2 Paint the curb at bus stops red.
Best Practice 6.3 Clear sidewalks of clutter to provide clear space for shelters and bus stops.
Best Practice 6.4 Provide an ADA compliant bus boarding/alighting area of at least 8 feet by 5 feet.
Best Practice 6.5 Provide bus shelters with appropriate amenities
Context: Multimodal Transit Corridors--The Planning Framework for Transit-Friendly Streets

Multimodalism in the East Bay
As noted in the introduction to this chapter, the streets of the East Bay are "multimodal"--meaning that they carry cars, buses, bikes, etc. Many of the streets of the East Bay--especially in the older areas--were built with streetcar lines. However in the last half-century many East Bay streets were planned almost exclusively for motor vehicles, for cars.

Traffic engineering has historically sought to move cars, while a multimodal approach seeks to move people. The standard approach measures vehicle trips, while multimodalism measures person trips, whether those persons are in cars, on buses, on bicycles, etc. The person trip approach is sometimes described as a concern with "throughput," how many people can move through a corridor. Unfortunately, many analyses still measure vehicle trips rather than person trips.

Planning efforts are another indicator of progress on multimodalism, suggesting how much attention is being devoted to modes other than automobiles. In the last few years, bicycles have gained welcome attention. Cities and counties have developed Bicycle Plans, particularly once funding was tied to adoption of a bike plan. These plans typically designate routes--whether striped bike lanes or other facilities--and set standards for bicycle facilities. Oakland has developed a Pedestrian Master Plan, the only community in the East Bay to do so. Local plans for transit have also been rare, although the city of Alameda has adopted such a plan.

The net result is that most communities (and Caltrans) have moved towards more inclusive traffic engineering. But full multimodalism--streets, roads, and corridors managed to genuinely support all modes--has not been achieved. The purpose of this chapter of Designing With Transit is to further the process of integrating buses into multimodal planning.

AC Transit Routes: Focused on the Main Streets
Good multimodal planning is not just a slogan for AC Transit, but a vital necessity. The main streets AC Transit uses often are the most congested, support the most modes and are the most complex in their area. AC Transit's trunk routes and major routes often operate along major commercial streets, such as International Boulevard/E. 14th Street, Telegraph Avenue, and Shattuck Avenue. They operate along major through routes such as San Pablo Avenue (State Highway 123), Hesperian Boulevard, and Mission Boulevard (State Highway 238). Our buses also operate on dense, narrow streets such as College Avenue and Solano Avenue.

AC Transit's critical streets are parts of corridors for travel to certain communities. In some cases, there are alternative routes that travel through a corridor. In some cases, these parallel routes provide at least some traffic with alternative routes. For example, International Boulevard has parallel routes on the I-880 freeway and Foothill Boulevard. Similarly, bicycles may find alternative parallel routes on local streets. Berkeley's Hillegass Avenue Bicycle Boulevard provides a bike-friendly travel route on a street between College Avenue and Telegraph Avenue. Cars and bicycles may of course choose to stay on International or College, but they have the option to seek out an easier route.

Bus routes must generally remain on the main streets. Passengers know that the bus has been there historically, and have a reasonable expectation that it will remain there. The main streets provide longer distance through routes. Key destinations, especially retail and commercial uses,
are often found along the main streets. Residents of secondary streets would not necessarily appreciate having major through bus operations moved to their streets.

**Improving Multimodal Corridors for Transit**

AC Transit's trunk/major routes are thus embedded in major streets, which are themselves part of travel corridors. How should these corridors be designed and managed to support transit, without unduly compromising other modes? This Handbook assumes that bus transit will play a continuing and increasing role on the trunk and major corridors. It also assumes that the overall width of major East Bay streets is generally fixed. Therefore, we do not make recommendations that depend on roadway widening, although it may be appropriate to reallocate portions of the right-of-way to different uses.

We now suggest a series of practical approaches that will maximize the efficiency and effectiveness of transit on these corridors. Policy One discusses planning to support transit corridors. Policies Two and Three focus on physical facilities needed on the street while also including some recommended traffic management practices (e.g. signal timing). Policy Three addresses how transit corridors can be taken to a higher level of performance by implementing transit priority measures. Policies Four through Six shift the focus to the needs of bus stops.
DELAY OF BUS …
Penalizes passengers, communities, and AC Transit …

People often believe that the key factor in travel time for buses is how fast the bus can drive. Usually, however, various delay factors are more important. This is particularly true for buses that operate on crowded arterial streets and stop frequently, the context for most AC Transit trunk lines. This is one reason why AC Transit is having difficulty maintaining the travel speeds of its buses. But the problem is common throughout urban transit—a study in Los Angeles found that transit buses spent as much as 50% of their service hours not moving!

Bus delays annoy passengers and discourage them from riding the bus. They are also costly to AC Transit. In 2003, each hour of operation of an AC Transit bus costs $82. Since AC Transit has a fleet of some 800 buses, these costs can quickly add up. But if we were able to increase speeds, the savings could be put towards additional service. Key sources of delay include:

**Street-Related Delay**
- Waiting at traffic signals
- Slowed/stopped due to congestion
- Maneuvering from bus stops into and out of travel lanes

**Passenger-Related Delay**
- Passenger loading time
- Time paying fares

All of the Policies in this Chapter and many of the Practices are designed to improve bus travel speeds. Key Practices to improve bus travel time include:

- Assure that transit streets have the appropriate characteristics for bus operations (Best Practice 1.2)
- Assure that road width is adequate but not excessive (Best Practice 2.1)
- Assure that travel lanes and curb radii are wide enough for buses (BP 2.2)
- Assure that signal timing is supportive of bus operation (Best Practice 2.4)
- Assure that any traffic calming methods on bus routes are compatible with bus operations (Best Practice 2.5)
- Provide transit signal priority on trunk corridors when necessary (BP 3.1)
- Reduce the amount of on-street parking if necessary to relieve congestion (Best Practice 3.2)
- Space bus stops to balance speed and convenience concerns (Best Practice 4.1)
- Site bus stops in the best operational locations, usually on the far side of an intersection (Best Practice 4.2)
- Provide a curbside bus stop in most instances (Best Practice 5.1)
- Install bus bulbs where they would facilitate bus operation … (Best Practice 5.2)
- Avoid bus pullouts (turnouts) (Best Practice 5.3)
- Make bus stops long enough for the number of buses likely to use them (BP 6.1)
- Paint the curb at bus stops red (Best Practice 6.2)
DISCUSSION OF STREETS WITH TRANSIT POLICIES AND PRACTICES

Section 1--Streets

Streets Policy 1 Identify a network of streets for buses to operate on

Streets Best Practice 1.1 Approve a network of designated transit streets in the General Plan or other document regulating streets

Designated Transit Streets: It is important that AC Transit and communities identify together what streets buses will use. This is an ongoing process that changes over time, as routes and needs change. Nonetheless, it is also important to indicate a long term framework of streets for bus operations. Like the roadway network itself, the streets which buses operate on are likely to be generally stable over the long term, though the bus routes may change. A community can do this—in the General Plan or another document—by designating a network of streets for buses. Some cities call these streets Transit Priority Streets or Transit Preferential Streets.

In most areas, buses operate only on a small percentage of streets. In most situations, it is preferable to operate buses on arterials and collectors, which are designated as such in a community’s General Plan. Local streets may be used to access transit hubs such as BART stations, to reach major destinations, and at the ends of a route.

Berkeley designates a network of transit streets in its General Plan.
Streets Best Practice 1.2 Assure that the identified streets have the appropriate characteristics for bus operations

The designated street network should be adequate to meet transit service goals. Therefore the network should have streets with the following characteristics. The designated network should provide for bus operations on the following types of streets:

- Streets already being used by AC Transit (unless appropriate alternative streets are agreed upon by the jurisdiction and AC Transit).
- Streets which allow route spacing consistent with AC Transit Practices
- Streets which reach all major destinations in the community
- Streets which reach planned future destinations (e.g. a new ferry terminal)
- Streets which provide direct through routes with a minimum of turns
- Streets on which physical traffic calming is not planned
- Streets with the shallowest possible grades, in no case more than 10%
Streets Best Practice 1.3 Assure that land use and development on key transit streets is transit-supportive

The streets where trunk routes, major routes, and high ridership crosstown routes operate are key streets for transit. As such it is crucial that both street operations and land use on these streets support transit. Land uses on these should be transit supportive as outlined in Chapter 3--higher density housing, mixed use, neighborhood serving commercial. The streets should not be given over to auto-oriented uses such as big box commercial, auto dealerships and repair shops, or large surface parking lots. The layout or "urban design" of these properties is also important. Driveways onto key transit streets should be minimized, as these can interfere with both bus operations and pedestrians. Some cities have developed special zoning to support transit and pedestrian orientation on these streets, such as the C-17 zoning Oakland applies to College Ave. in Rockridge.
Streets Policy 2 Manage Transit Streets to Assure Smooth and Fast Bus Operations

Given that buses only operate on a minority of streets, it is all the more important that the traffic operations of those streets be optimized for buses to the greatest possible degree. Other than Transbay buses, almost all AC Transit buses operate on public streets with other traffic. Many of these corridors have high traffic volumes and are often highly congested. AC Transit's average bus travel speed has fallen from 14.2 miles per hour to 12 miles per hour in 15 years. This loss of speed frustrates riders, persuades some to choose other modes, and costs AC Transit millions of dollars annually for increased operating costs. It is also important that buses be able to move in and out of traffic easily, for speed, safety, and smoothness of ride.

The critical variable for average bus travel speed is not its cruising speed. Rather it is whether the bus can ever reach its cruising speed! Congestion at intersections, difficulty getting into and out of bus stops, and inappropriate signal timing and progression are among the major sources of delay for urban transit buses. These are issues which roadway managers can address and have a positive impact on bus travel, without setting excessive speed limits or widening roads.

For cities to implement Transit First policies and for buses to move at reasonable speeds, the needs of transit must be a central consideration in roadway design.

Streets Best Practice 2.1 Assure that road width is adequate but not excessive.

Bus operations require adequate road width. Buses cannot operate well on extremely narrow roads. The bus needs room to drive, to pull in and out of stops, to avoid parked and parking cars, and to maneuver around stopped vehicles. However, the specific road width is adequate will depend on traffic and parking volumes and conditions on a given roadway segment. In many cases, one travel lane in each direction will be adequate (particularly if it is a wide lane), in other cases that will result in undue delays.

Excessive road widths are also problematic for bus transit. The need to minimize the distance for pedestrians across roads is noted in Walkways Best Practice 3.2. Excessively wide roads also encourage excessively high speeds by some vehicle drivers, a potential hazard to buses. The high speed roads do not generally reduce bus travel time significantly, as the bus must stop and start frequently and cannot travel as fast as the speed limit.

Reductions in the number of lanes on a roadway can also be problematic for bus operations. Communities may restripe roads to provide space for a bicycle lane or to ease pedestrian crossings and improve the pedestrian environment. Reducing the number of lanes may cause congestion and delays, particularly at intersections with substantial amounts of cross traffic. Restriping a roadway from two travel lanes in each direction to one is a particular cause for concern. In some situations, however, like the restriping of Grand Avenue in Oakland for 3 lanes per direction to 2, there was no apparent negative impact. In other instances, creation of a two way center turn lane may rationalize turning movements and not therefore not negatively impact bus operations.

Before reducing the number of lanes for any reason, it is very important that communities review their plans in detail with AC Transit. It is also critical that traffic analyses of lane reductions evaluate their impact on buses specifically. Many standard analyses evaluate only the impact on cars, which can be quite different from that on buses. AC Transit must carefully evaluate the effect of these changes situation by situation.
Street Best Practice 2.2 Assure that travel lanes and curb radii are wide enough for buses.

In addition to having adequate capacity on the road as a whole, each lane of a transit street must be wide enough for safe bus operation. AC Transit's preferred lane width is 12 feet, although buses can operate safely in 11 foot lanes. These widths are also consistent with Caltrans standards for state highways. Curb radii should be adequate to allow buses to turn without crossing the centerline, see diagram below. However, corner radii should not be made larger than necessary for buses, so that the impact on pedestrian safety is minimized.

DIAGRAM 8--TURNING RADIUS TEMPLATE

Street Best Practice 2.3 Assure that these streets have adequate street composition to support buses.

The composition of streets with regular bus service should be strong enough to absorb the load of a bus. Communities should also prioritize pavement rehabilitation and reconstruction to streets with transit. A well-paved street provides a more pleasant ride for passengers and reduces wear and tear on the bus. 14

Street Best Practice 2.4 Assure that signal timing is supportive of bus operations.

Signal timing and progression is also very important for transit-friendly streets. Signals on these streets should be timed to allow reasonable, continuous, although not necessarily high speed, flow. It is more important to bus operations to reduce delays waiting for traffic signals than to be occasionally able to travel at high speeds. In most cases, 25-30 MPH speed limits will suffice. Good signal timing is necessary for all transit streets, in the next section we discuss priority treatments for key corridors.

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14 Most communities choose to install concrete bus pads. AC Transit is supportive of this practice, but it is designed to protect roadways from wear and tear, and is thus at the community's option.
Streets Best Practice 2.5 Assure that any traffic calming methods on bus routes are compatible with bus operations

As traffic volumes have increased, East Bay communities have become increasingly interested in "traffic calming" techniques. Traffic calming techniques are designed to reduce speeds, volumes, and/or erratic driving behavior. In the long run, these problems can only be solved by reducing the amount of automobile miles traveled. In the short term, there will continue to be resident pressure for traffic calming.

Most traffic calming techniques are designed to improve conditions on local streets, where most residents live, rather than on arterials. However, most bus routes operate on collector or arterial streets. Some cities, such as Berkeley and Oakland, have policies targeting traffic calming only to streets that do not have transit operations.

An important companion to traffic calming on local streets is traffic management on major streets—on collectors and arterials. Smooth, uncongested operation of collectors and arterials will help reduce traffic volumes on local streets, as fewer drivers seek short cuts.

Bus transit's need for smooth flowing traffic does not mean, however, that buses need high speed traffic. As discussed in the "Delay of Bus …" textbox, what buses need is often not higher travel speeds but fewer sources of delay like congestion, badly timed traffic signals, etc. Moderate but regular flow works well for buses.

There are therefore some traffic calming techniques that are appropriate for arterial and collector streets. Control of speeds through signal timing can be appropriate for transit streets. In some cases, installation of additional traffic signals or enhanced crosswalks (e.g. "Santa Rosa lights") may aid pedestrians. Traffic calming signage (e.g. Watch for Children) may be helpful. Properly designed sidewalk bulbs can also ease pedestrian crossings (see Section 3). Traffic calming programs must be carefully designed for their particular circumstances—with an understanding of what problem they are trying to solve. AC Transit urges communities to review proposals with us before proceeding with traffic calming on transit streets.

"Vertical deflection" methods of traffic calming—devices that slow vehicles by moving them up and down—should be avoided on bus routes. Devices that cause major vertical deflection of buses, such as speed humps, are definitely not appropriate for transit streets. Speed humps cause damage to buses and an unpleasant ride for passengers. If speed humps are installed on a street with a bus route, AC Transit may consider removing the route.

Some techniques that deflect traffic horizontally are also inappropriate. Diverters (often called "barriers") on a transit street would force a bus to divert and are clearly inappropriate.
Streets Policy 3. Implement Priority Treatments for Transit on Key Corridors

Bus ridership in the East Bay is heavily concentrated in a few key corridors. Many of these corridors are congested, particularly at major intersections. Getting buses through these congested areas and quickly along their route is key to maintain and increasing bus ridership. In many instances, techniques to prioritize bus transit are necessary. These techniques may involve traffic signals, traffic lanes or both. Experience both in the East Bay and other areas has shown that priority techniques can be implemented without causing significant delays for other traffic.

Streets Best Practice 3.1 Provide transit signal priority on trunk corridors when necessary.

Transit signal priority allows buses to receive green lights at more traffic signals, reducing delay. In simple terms, the system works by having an “emitter” on the bus automatically request an extension of a green light if the bus is approaching a signal that is about to turn red. The extension lasts only a few seconds, 10 seconds at the very most, but that is often adequate to get the bus through the signal. In some systems, the bus can request a shortened red light. The process is automatic and not operated by the bus driver. The extension of green time benefits all vehicle traffic on the main arterial that the bus is traveling on—including cars. This system does not use special bus-only signals.

Transit signal priority is being implemented for the San Pablo Rapid (but not local buses on San Pablo Avenue). The signal priority there will be evaluated in early-mid 2004. Signal priority has yielded significant improvements in bus travel time in Los Angeles, Seattle, and elsewhere. Transit signal priority is particularly important on congested corridors, like the streets where many of AC Transit’s trunk routes operate. Clearly, with implementation of signal priority it becomes even more important to place bus stops on the far side of signalized intersections.

Some fear that transit signal priority will delay cross traffic, but this has not proven to be the case. Studies in Los Angeles and Seattle have shown little or no delay on streets which cross the transit priority street. There are various reasons for this. If the cross street loses a few seconds in one cycle, it can be granted extra time on another cycle. Systems can have limits built in as to how frequently signal priority will be granted. Transit signal priority is thus conditional—not the absolute right of signal preemption sometimes given to public safety vehicles.
Streets Best Practice 3.2
Reduce the amount of on-street parking if necessary to relieve congestion.

On-street parking is not only attractive to drivers, it can also play a useful role in shielding pedestrians from traffic. On active commercial streets, on-street parking is usually permitted except as needed for bus stops and turns at corners. This approach is far better than keeping all lanes clear for high-speed driving. However, in circumstances where on-street parking unduly impedes bus operations, it can be helpful to prohibit parking along for a greater than usual distance from the corner.

Prohibiting on-street parking in key locations can improve the maneuverability of the bus and other vehicles, and the traffic flow of the street. Getting into and out of curbside bus stops is one of the most time-consuming operations for a bus. In urban areas, the bus must often maneuver past parked cars to get to the stop. If this becomes too difficult, the bus driver may simply not attempt to pull into the curb and may stop the bus on an angle with the back of the bus protruding into traffic. AC Transit policy instructs drivers not to do this, but they do not always comply.

In some instances, restrictions on parking near corners may not be sufficient, particularly under peak hour conditions. In these circumstances, an all-day or peak hour prohibition on parking in the parking lane may be useful. This technique is widely used, particularly on arterials that access a major employment area. Improving traffic flow on an arterial in this way can help coax shortcutting drivers off local neighborhood streets or can be the "carrot" accompanying the "stick" of neighborhood street traffic calming. Limiting parking does permanently or temporarily eliminate the calming effect on the sidewalk that parked cars provide.

Streets Best Practice 3.3
Create Queue Jump Lanes to Move Buses through Congested Intersections

Getting through intersections can be a major source of delay on congested arterials. Buses can lose several minutes at particularly snarled intersections. Queue jump lanes help buses move more quickly through an intersection.

To create a queue jump lane, parking is prohibited back from the intersection, at least as far as the usual length of the queue waiting for the light. It may be necessary to limit parking for several hundred feet. This lane is typically dedicated to buses and right turns only--cars can use it for right turns, but only buses can use it a straight through lane. If properly implemented, buses can save substantial amounts of time through use of a queue jump lane. A queue jump lanes has been created on San Pablo Avenue south of the El Cerrito Del Norte BART station.

**DIAGRAM 10--QUEUE JUMP LANE**

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15 There may be objections to parking prohibitions, and concern about lost business. However, in most locations, on-street parking is a minor part of the parking supply. In central business districts, consolidated parking structures and lots provide most parking spaces. Along commercial strips, most businesses have off-street parking lots for their customers' use. Publicity about other parking options (as well as transit) may be the appropriate response to these concerns.
Streets Best Practice 3.4
Consider dedicated bus lanes for congested, high transit volume corridors.

Parking restrictions and queue jump lanes respond to congestion at an intersection. Where congested conditions persist over long distances, and where bus volumes are high, more continuous treatments may be needed. Some form of dedicated or restricted bus lane may be appropriate. A dedicated lane is a lane which only buses may use. Light Rail Vehicles--such as those in San Jose--typically operate in dedicated lanes. Buses in dedicated lanes can provide many of the advantages of light rail.

San Francisco has an extensive network of curbside lanes restricted to buses (and right turns) only. Some of these lanes are restricted at all times, others only in the peak hour. Peak hour bus lanes can be used for general vehicle flow or parking in off-peak hours. Besides a bus only lane, another variation is a bus/high-occupancy vehicle (HOV) lane. Finally, the East Bay Bus Rapid Transit project is evaluating dedicated lanes in the center of the roadway to allow creation of "track" like conditions with center stations for the BRT. San Francisco uses this approach on some streets.
Chapter 5, Section 2--BUS STOPS

Streets Policy 4. Identify Appropriate Locations Along Bus Routes for Bus Stops

Communities and AC Transit must work together closely to identify and implement appropriate sites for bus stops. AC Transit seeks to locate bus stops where they will best meet both passenger and operational needs. Local officials are concerned about integrating bus stops into the buildings, sidewalks, and traffic patterns of their community. Bus stops are also important as "signposts" to the general public that bus service is available in a given location and along that street.

Streets Best Practice 4.1
Space Bus Stops to Balance Speed and Convenience Concerns

Bus stops are the locations where bus passengers board and alight from buses. Bus stops must therefore be convenient to the places where passengers wish to go. This might seem to argue for a great many bus stops, as close as possible to as many origins and destinations as possible. However, too many bus stops can unduly slow a bus' travel time, as it brakes to stop and maneuvers to and from the curb. Thus, convenience and speed must be balanced in siting bus stops.

Outside of downtown areas, AC Transit generally seeks to have bus stops approximately 1,000 feet apart, or slightly under 1/5 of a mile apart. This target has been set with the goal of increasing travel speed for AC Transit buses. This spacing means that passengers would have to walk no more than 500 feet along the street where the bus travels to the stop (in addition to any distance they walked to reach the bus' street). Stop spacing of 1,000 feet means that stops will generally be 2-3 blocks apart, although some suburban blocks are close to 1,000 feet long. Setting this target means that some existing stops, particularly low ridership stops, will be eliminated.

The 1,000 foot distance is a target which will be modified based on specific conditions, particularly the location of streets. Stops must be located at intersections, since AC generally does not establish mid-block stops. Other factors affecting the location of stops include the location of major destinations, transfer points, and terrain. In some cases, streets have long segments without sidewalks or locations where legal bus stops can be established.
Streets Best Practice 4.2
Site bus stops in the best operational locations, usually on the far side of an intersection

In general, AC Transit prefers bus stops on the far side of an intersection rather than the near side. This is particularly important at signalized intersections (and intersections likely to be signalized in the future). Far side stops reduce conflicts between right turning vehicles and stopped buses and eliminate sight distance deficiencies on approaches to an intersection. Far side stops also encourage pedestrians to cross the street more safely behind the bus rather than in front of it. Rapid buses also use signal priority to get through traffic signals so it is key that their stops be on the far side.

Along most routes, there is not a choice whether to locate bus stops in front of residential or commercial uses. However in some cases it is possible to make a choice. In this circumstance, if other considerations do not tip the balance, AC Transit would prefer to place a stop in front of commercial use rather than a residence.

There are situations where it is impractical or unsafe to locate bus stops on the far side. In these situations, near side stops are acceptable. For example: At intersections where there are two bus routes and one turns right, it may be best to locate the bus stop on the near side, particularly if there is substantial transfer activity between the buses.

Bus stop locations should be determined by passenger and bus operation needs. Bus stops are located on public right of way controlled by a city, county, or Caltrans and the public interest should be paramount. 16

DIAGRAM 5--WHY FAR SIDE STOPS ARE GENERALLY PREFERABLE

Streets Best Practice 4.3
Site bus stops where passengers are least likely to experience crime.

Safety from crime must be a consideration in siting bus stops. Most bus related crime occurs at bus stops, rather than on the buses themselves. Passengers waiting for buses are more vulnerable. However, stops with active uses around them, such as stores, schools, or other uses have been proven to have less crime than stops in the same neighborhood next to vacant lots or inactive uses. Thus while there is sometimes pressure to move bus stops away from active uses, it is important for passenger safety not to do so.

16 Business and neighboring property-owners sometimes view bus stops as a negative, arguing that they attract "undesirables." We are not aware of any evidence of bus stops generating problems, e.g. leading to an increase in crime. Bus stops can in fact provide additional people with "eyes on the street" increasing public safety. Bus stops are also a source of customers for adjacent businesses. Shelters and benches are often enhancements to street corners. In transit-oriented cities, bus stops adjacent to businesses do not seem to be viewed as a negative. In Vancouver, British Columbia, for example, there are bus stops served by multiple bus lines adjacent to the city's largest department stores.
Streets Policy 5. Locate Bus Stops Appropriately within the Right of Way

The specific location of a bus stop within the right-of-way is important to bus operations. A good bus stop location is one that is operationally safe and efficient for buses and is safe and convenient for passengers. Within those guidelines, the stop should be at the location where it causes minimum interference possible with pedestrian movements and other traffic (including bicycle traffic). The best place is usually right alongside the street's curb, although there are some exceptions for bulbs and transit centers.

Streets Best Practice 5.1
Provide A Curbside Bus Stop in Most Instances

The curb--the curb that continues along a street--is generally the most functional location for a bus stop. The curb is the location where buses can stop and start with least delay. Curbside stops also generally require the least modification to the street. Generally curbside stops will be in parking lanes, but they can also work in travel lanes without undue traffic delay on streets with multiple lanes in each direction and no curbside parking.\(^\text{17}\)

Streets Best Practice 5.2
Install bus bulbs where they would facilitate bus operation and pedestrian movement.

In congested conditions on higher volume routes, bus bulbs may be useful. At a bus bulb, the sidewalk is extended out across the parking lane to allow the bus to stop without having to pull into the curb. Such a bus bulb also provides a waiting area for passengers, and can relieve sidewalk congestion in the (unfortunately few) places where that is a problem. The bus stops briefly in the travel lane, then continues. It is often feared that this will slow traffic, but Federal Highway Administration studies show that bus bulbs actually speed up traffic. This is apparently because bus bulbs reduce the phenomenon of drivers stopping with the rear of the bus in traffic, thereby regularizing the flow. San Francisco has installed numerous bus bulbs in a highly successful program. If bulbs are installed, it is important that the bulb be at least as long as the buses that stop there, so the buses can pull up alongside it and board and alight from all doors (see also the discussion of pedestrian bulbs and bus bulbs in Walkways Practice 4.2).

DIAGRAM 10--BUS BULB TEMPLATE

\(^{17}\) Special difficulties can arise on suburban "boulevards" with through travel lanes in the center of the roadway separated by medians from frontage roads on the sides of the roadway. Some communities prefer to have buses operate and stop along the center lanes, with bus stops being located on the medians next to the center lanes. This approach is most efficient for bus travel. However, to stop in the center lane, communities must provide an ADA compliant bus stop waiting area (see Practice 6.4) and a crosswalk to and from the stop.
Streets Best Practice 5.3
Avoid bus pullouts (turnouts)

Bus pullouts are essentially the inverse of bus bulbs. And where appropriately designed bus bulbs are generally positive, bus pullouts are generally detrimental to bus operations.

At a pullout, the roadway is widened at the bus stop to put the bus into a special curb lane. Pullouts are not generally desirable for bus operations because they force the bus to pull farther into and out of the curb than would otherwise be the case. This slows the bus' operation, particularly when it seeks to reenter traffic. Pullouts are generally designed for the convenience of other vehicles, not buses.

Special cases where pullouts may be appropriate are unusually narrow roadways, such as those consisting of one unusually narrow travel lane (with no parking lane) in each direction. High speed roadways with no parking lanes may also be appropriate for pullouts—a Transit Cooperative Research Program report suggests them for roads where traffic speeds are 40 mph and above, but these are rare in the AC Transit District. Sometimes a turnout stop is required on narrow roadways within shopping centers. In some instances, pedestrian bulbs at either end of a short block may create a situation resembling a bus pullout between them.
Streets Practice 5.4
Design Transit Centers for effective, efficient operation

While most AC Transit bus stops are at on-street bus stops, some of the busiest bus stops are at transit centers. Transit centers are off-street locations designed for buses to pick up and drop off passengers and lay over at the end of their route. Transit centers are appropriate where multiple buses stop, and particularly where multiple buses lay over. Most of AC Transit's transit centers are at BART stations, but there are also transit centers at other locations such as Contra Costa College and Eastmont Town Center. Some cities--such as Union City (at the Union Landing shopping center)--have also designed their own transit centers in cooperation with AC Transit.

It is important that these transit centers be designed properly for both bus operations and passenger comfort and safety. AC Transit has developed a set of transit center design guidelines that are included as Appendix Two. The "sawtooth" layout is generally the most efficient for transit centers and is illustrated below.

It is important that transit centers contain an adequate number of bus bays for bus operations and ease of passenger use. A bus bay that serves as the stop for a single bus route is easiest for a passenger to understand. It also avoids the possibility of multiple buses needing to use the same bay at the same time. Passengers transferring from a train or another bus look at a given bus bay to see if the bus they wish to take is loading. Association a bay with a bus line also makes bus circulation patterns the clearest.18

The transit centers at BART stations are generally located close to the station entrance. This is critical to allow transit passengers to connect easily to trains, and to attract riders to bus transit (especially when other factors, such as the higher cost of using transit, serve as disincentives). If riders must walk long distances to reach trains they are more likely to not use the bus at all.

Unfortunately other would-be uses sometimes covet this "prime real estate". They argue transit centers consume valuable land and create "dead" space close to the station, and should therefore be kept as small as possible. This attitude overlooks the operational and passenger needs discussed above. It also neglects the "liveliness" of bus bays that deliver passengers to a station all day long, while automobile parking spaces almost always house only a single "dead" car for the entire day. In terms of passengers per square foot of station area land, transit centers are clearly more efficient than auto parking spaces.19 Nor is the hustle and bustle of what BART describes as "the hectic zone" immediately next to the station entrance ideal for transit-oriented residences. These are generally more attractive and enjoyable in quieter zones slightly away from station entrances.

Before any transit centers are built or modified, AC Transit, the community involved, and any other interested parties would have extensive discussions about the individual site.

18 The space available for transit centers can affect service patterns. It is often suggested that AC Transit buses at a given BART station should "pulse"--all arrive and depart at the same times, so passengers are aware of the pattern, connect best to trains easily transfer between buses. As of December, 2003, most AC Transit buses at Fremont BART pulse. A pulse pattern, however, requires a large number of bus bays, as each bus stop can only serve one line with no overlaps. Fremont has a relatively large transit center.
19 As a matter of scale, the largest transit centers occupy a few thousand square feet, while surface parking at BART stations can easily occupy 100,000 square feet (2.5 acres) or more.
Streets Policy 6. Create safe, functional, and legal bus stops with needed amenities

Policy 4 outlines how to structure a bus stop on the pavement (usually at the curb, sometimes with a bulb). This Policy describes how to make bus stops both functional for bus operations and pleasant for passengers. Bus stops are the first point of contact between the transit system and their passengers, so it is crucial that they work as well as possible. Insuring this requires a collaborative effort between AC Transit and local jurisdictions.

Streets Practice 6.1 Make bus stops long enough for the number of buses likely to use them.

In addition to the appropriate location, there are other important characteristics a bus stop must have. The stop must be long enough so that buses can not only stop there, but also get into and out of the stop easily. Adequate length bus stops make it more likely that the bus driver will actually pull into the stop, rather than leave the back of the bus protruding into the travel lane. The appropriate length for the bus stop will depend on the size and number of buses expected to stop there. On trunk lines and major routes, stops should be long enough to accommodate two buses stopping simultaneously. AC Transit recognizes that curb space is precious and highly competitive, so our standard is set at the minimum feasible level.

Trunk route stops with both local and Rapid or Limited service are likely to have two buses stop at once. Trunk route stops that also have other routes stopping there may well have two buses stopping at the same time. If it is likely that more than two buses will be stopping simultaneously, more than one bus stop with more than one bus "flag" (sign) should be designated. Peak activity locations such as Shattuck & Center in Berkeley or 14th & Broadway in Oakland often have three or four buses stopping simultaneously.

AC Transit's current overall standard for a stop with a straight curb is as follows:
Where one 40 foot bus at a time is expected, 60 feet minimum for near side stops
65 feet minimum for far side stops
Where two buses may stop simultaneously 100 feet minimum

These requirements are illustrated in the following stop layout templates

DIAGRAM 11--NEAR SIDE BUS STOP TEMPLATE DRAWING
DIAGRAM 12--FAR SIDE BUS STOP TEMPLATE DRAWING

PHOTOGRAPH to be inserted--BUS STOP WITH ADEQUATE LENGTH

Streets Practice 6.2 Paint the curb at bus stops red.

It is important that the curb alongside the bus stop be painted red, to prevent cars from parking there. This red curb is also useful in keeping the travel lane clear. If cars are parked in a bus stop, then the bus will be forced to stop in the travel lane. This practice interferes with other traffic and is inconvenient and dangerous for passengers, especially disabled passengers.
Streets Practice 6.3 Clear sidewalks of clutter to provide clear space for shelters and bus stops.

Sidewalks on transit streets often get cluttered with newsracks, utility and light poles, trees, and other features. While each has its place, it is important and legally necessary to keep sufficient clear space for bus stops and shelters. These items should be kept away to the maximum degree possible from the entire length of the bus stop, so that the overhang on a bus pulling out of a stop does not hit them. Newsracks and other items can be located on the building side of sidewalks or along areas away from bus stops.

PHOTOGRAPH to be inserted-- CONSOLIDATED NEWSRACKS

Practice 6.4 Provide an ADA compliant bus boarding/alighting area of at least 8 feet by 5 feet.

The first requirement is that the bus stop be physically accessible to all riders. Under the ADA Accessibility Guidelines (ADAAG) which implement the Americans with Disability Act, there must be a paved boarding/alighting area of at least 8 feet by 5 feet for passengers. The area must be at least 8 feet deep from the curb and 5 feet along the curb. This is a valuable safety rule for passengers generally. ADAAG also requires a minimum path of travel (sidewalk) clear of obstructions to and from this boarding area at least 3 feet wide. Many cities use 4 feet or even 6 feet as their standard.

It is important to note that AC Transit's older buses and our new "Van Hools" require different ADA boarding areas. The older buses have their wheelchair lifts at the front of the bus. They therefore require the 8 foot by 5 foot area at the front of the bus stop, just behind the bus pole. The Van Hools use a center ramp for disabled access and therefore need their ADA pad 24 feet back from the front of the bus (or the bus pole).

Based on the 2003 bus deployment plan, some bus stops will be served only by Van Hools, some only by conventional buses, and some by both. Many trunk line stops will be served by both--for example line 72 will use Van Hools on the Rapid and conventional buses on the locals. It is best to create ADA boarding areas for both types of buses, because this provides greater flexibility for bus operations as bus deployments change.

DIAGRAM 13-ADA COMPLIANT BOARDING/ALIGHTING AREA

Streets Practice 6.5 Provide bus shelters with appropriate amenities

A pleasant bus stop includes a bus shelter for protection from sun or rain. At a minimum there should be a bench to wait at. A fully equipped shelter will include places to sit--and possibly leaning rails, a map of area AC buses and schedules for those buses. A telephone that can at least make outgoing calls is still useful, because not all passengers carry cell phones (blocking incoming calls eliminates many of the crime-related uses of phones). Because of the cost of maintaining shelters, AC Transit's current policy is to work with advertising supported shelter providers who agree to maintain the shelters and meet minimum standards.
It is particularly important to provide amenities at heavily used bus stops. AC Transit has not adopted a formal set of standards for appropriate facilities and various types of stops. However, a set of standards was used to define appropriate levels of improvement along the San Pablo Corridor. Four levels of stop were defined based on ridership: A/B, C, D, and E. The most heavily use stops would receive the greatest improvement, while E stops with very limited use would only receive a bench. An "A" stop is illustrated below.

PHOTOGRAPH to be inserted--SAN PABLO AVENUE BUS STOP

APPENDICES to be inserted