Alameda-Contra Costa Transit District

STAFF REPORT

TO: Operations Committee
    AC Transit Board of Directors

FROM: David J. Armijo, General Manager

SUBJECT: Report on Ways to Enhance Safety for Bus Operators

BRIEFING ITEM

RECOMMENDED ACTION(S):

Consider receiving a report on ways to enhance safety for bus operators.

EXECUTIVE SUMMARY:

Although relatively rare, District operators do experience assaults from passengers and members of the general public. A review of the security data from 2013 identified an average of 2.5 operator assaults per month, with the majority of the assaults being spitting, verbal threats, or harassment.

The District has initiated several actions in recent months to improve safety for bus operators and the riding public, including a 50 percent increase in the number of bus boardings by Sheriff Deputies and initiation of a high-profile, community-based patrol unit operating in some of the higher crime areas within the agency's service area. The high-profile patrol unit increased from two deputies to eight deputies in February with support from a Federal COPS grant.

A broad range of measures exists to enhance operator safety, including technology, policing, operator training, physical barriers, internal policies and public outreach. The District completed a comprehensive review of transit industry techniques for enhancing safety. The most comprehensive documentation on protecting bus operators from passenger assaults was found in Transit Cooperative Research Program (TCRP) Synthesis 93.

The District currently uses many techniques identified in the report for enhancing operator safety, and staff is examining additional measures to improve operator safety and safety in general. To obtain additional feedback on the safety measures discussed in this report, staff provided a copy of this report to the Amalgamated Transit Union for review and will provide an overview of the key topics from this report at an upcoming Drivers Committee meeting.

BUDGETARY/FISCAL IMPACT:

There is no fiscal impact with this informational report; however, implementation of additional safety measures could result in minor costs for updates to existing safety practices or significant capital costs for fleet retrofitting (i.e., barrier costs of approximately $2000/bus).
BACKGROUND/RATIONALE:

Passenger assaults on bus operators are a concern to transit managers, bus operators, unions, and other transit passengers. Such incidents include aggravated assaults (involving weapons); kicking or punching; spitting; verbal threats/harassment; and throwing objects within the bus (including liquids). A review of the security data from 2013 identified an average of 2.5 operator assaults per month, with the majority of the assaults being spitting, verbal threats, or harassment.

The typical contributing factors related to physical and verbal assaults include passenger misconduct; nonpayment of fares; alcohol or drugs; school/youth-related violence; routes operating in high-crime areas; mental illness; service-related problems (such as delays and service reductions); gang-related violence; and weapons.

Security Initiatives: The District has initiated several actions in recent months to improve safety for bus operators and the riding public. In early 2013, the District initiated a program to increase by 50 percent the number of bus boardings by Sheriff Deputies. The increased visibility of the deputies provides a deterrent to crime by allowing the passengers on the bus to see the deputy and the interaction with the operator.

The District has also been working with the Alameda County Sheriff’s Department to increase the number of deputies patrolling buses, transit centers, and bus loading areas. Two deputies were added during the fall of 2013 as part of a high-profile, community-based patrol unit operating in some of the higher crime areas within the agency’s service area. The District also worked to expand this effort to eight Sheriff Deputies that will be supported by a Federal COPS grant.

In addition, the District completed an extensive review of transit industry techniques for improving the safety of operators. The most comprehensive documentation on protecting bus operators from passenger assaults was found in TCRP Synthesis 93. The TCRP report identifies techniques to improve operator safety. The District currently uses many of the techniques identified in the report, and staff is examining additional measures to improve operator safety. The following is a summary of the findings from the report.

Technology: Video surveillance is currently available on all AC Transit buses. The use of video surveillance has proven to be of great value when investigating reports of passenger disturbances, operator assaults, customer complaints, alleged injuries, illegal activities and accidents. Aside from providing critical data after the fact, cameras on District buses have a deterrent effect on those who might otherwise commit an infraction. In a recent survey, video surveillance was considered by survey participants to be the most effective technology in the prevention of operator assaults.

Radio communication is another tool used by transit agencies to assist operators. District operators have available three options to communicate with our Operations Control Center.
Request to Talk (RTI) is for routine business and communication; Priority Request to Talk (PRTI) is for those situations involving danger, the threat of danger, or a medical emergency; and the Emergency Alarm (EA) is used whenever there is a life threatening situation on or near the bus. The EA, when pressed, signals OCC to send the police to the location of the bus.

The District CAD/AVL (Computer Aided Dispatch/Automatic Vehicle Locator) system allows the OCC and/or law enforcement personnel to pinpoint the location of a District bus and arrive on the scene promptly, which is particularly critical when the EA is engaged by an operator.

**Policing/Security:** Transit agencies use local, county, or state police, or some combination thereof to provide security. Transit police departments are typically found in large (more than 1,000 peak buses) or midsize (250-1,000 peak buses) agencies operating in metropolitan areas. Policing is an effective bus operator protection method. Uniformed officers provide visible security and deter all types of crime, including passenger assaults on operators and other passengers.

AC Transit currently utilizes the contracted services of the Alameda County and Contra Costa County Sheriff's Offices. Uniformed officers are very effective in preventing operator assaults and other crimes. Since it is unrealistic for officers to ride every bus on every route, deputies use marked police vehicle patrols, directed patrols, uniformed boardings, and plainclothes operations. Uniformed boardings include a check-in with the operator and a walk through of the bus. In the past few months, sheriff's deputies have increased the number of buses boarded on a monthly basis to increase the police presence and security.

Officers are specifically trained to prevent crime and enforce the law; respond to incidents; and locate and apprehend criminals. Officers' visible presence on or around District buses deters operator assaults and other crimes, and enhances passenger perception of security. Further, flexible deployment is possible based on need and officers patrolling the system can interact with operators and the public to obtain potentially important information about incidents and those involved to gain better situational awareness.

As noted earlier, the District recently increased security by adding two additional Alameda County Sheriff Deputies as part of a high-profile, community-based patrol unit that is operating in some of the higher crime areas within the agency's service area, then expanded this program to include eight Sheriff Deputies that will be supported by a Federal COPS grant.

**Operator Selection and Training:** The bus operator position requires not only good driving skill and a good driving record, but also excellent people and problem-solving skills, and the ability to handle daily pressure, e.g. traffic, noise, continuous interactions with customers, etc. An operator skilled at and experienced in customer relations and in handling tense situations may be less likely to be the victim of an assault.
Customer service training is an important aspect of assault prevention because some incidents can be avoided through specific operator behaviors, e.g., maintaining a professional demeanor at all times and staying calm in stressful situations. A bus operator trained in de-escalation techniques can calm a hostile customer and help defuse a potentially violent situation. Customer service is within the direct control of the District and can have a significant effect on the likelihood of passenger assaults against operators and others.

Currently, extensive customer service training is provided by the Training and Education Department as part of its New Bus Operator (NBO) training and orientation. Customer service refresher training for current operators is also important in preventing operator and passenger assaults; the District currently offers such refresher training as a component of its annual CDL training for operators.

Customer service training reduces the likelihood of disputes between operator and customer; increases customer satisfaction; and enhances current safety measures by minimizing distractions and allowing an operator to focus on safe operations. The frequency and emphasis of training can be adjusted for operators requiring more training, such as one-on-one incident video viewing sessions with their Superintendents.

Policies: Many operator assaults occur over fare disputes/enforcement issues. In spite of operator training and relevant guidance provided in the Operator User Guide (state the correct fare, use good judgment, avoid arguments and give the customer the benefit of the doubt), operators occasionally get caught up in the moment, allow the situation to escalate and end up getting assaulted. District operators are expected to use their good professional judgment and to contact OCC for supervisory intervention in instances of repeat offenders and blanket refusals to pay. Operators are trained not to actively enforce collection to the point of causing an altercation. Fare box revenue is a vital component of the District's overall operating budget. However, aggressive enforcement of the fare policy can lead to disputes, altercations, and assaults.

Outreach: Some agencies have engaged in public and passenger awareness initiatives, including informing the public and passengers about the problem of operator assaults and what they can do to assist the agency and police in preventing the assaults. This might involve “passenger awareness” suggestions, a hotline to call with information regarding an assault, or announcing a reward for information leading to the arrest and conviction of anyone assaulting a transit operator.

Agencies may also undertake media campaigns to announce security initiatives e.g., video on the bus, increased police patrols, plainclothes law enforcement to discourage strong arm robberies, graffiti, etc. Agencies also adopt policies addressing crime and operator assault, including a statement of penalties for anyone assaulting an operator.
A public outreach campaign will increase public support for operators, and may serve as a possible deterrent to passengers who might consider assaulting an operator. Funds might be secured and made available to reward tips and information in instances of operator assault.

**Barriers:** Barriers have been installed by a few transit agencies to shield the bus operator from passengers and are believed to be useful in protecting bus operators against passenger assault. Partial and complete barriers have been used, and are being tested by some transit properties. The early adopters of operator barriers in the United States include Miami-Dade Transit and San Francisco MUNI.

Miami-Dade Transit reports a positive experience with barriers and believes the barriers have been very effective in protecting its bus operators against assault, even though it provides only partial protection. The enclosures used by Miami-Dade Transit cost approximately $1600 – $1900 per bus. The implementation of barriers at SF MUNI took place with the input of its operators. Barriers are installed on about 10% of SF MUNI’s fleet, including buses and light rail vehicles. No study has been done by MUNI with regard to the actual effectiveness of the barriers in preventing assaults.

Staff contacted bus manufacturers and found that fewer than 5% of new buses are currently being equipped with operator shields during the manufacturing process. The percentage estimate received from New Flyer was “in the low single digits,” while Gillig’s estimate was 0.5% (one half of one percent) for operator shields being installed during manufacturing.

**ADVANTAGES/DISADVANTAGES:**

The advantages of the safety measures outlined in this report include the Operators’ increased perception of security; decrease in operator assaults and the resulting trauma/Industrial Injury claims; and potentially fewer missed days by operators on assault or trauma status.

The safety measures outlined in this report do not have any disadvantages for employees or the District; however, implementation of barriers could result in feelings of confinement; glare/reflection; reduced ventilation; increased noise, and diminished customer service due to the barrier’s affect on communications.

**ALTERNATIVES ANALYSIS:**

This informational report is being provided to inform the Board of existing safety measures for bus operators and possible ways to enhance operator safety.

**PRIOR RELEVANT BOARD ACTIONS/POLICIES:**

None
ATTACHMENTS:

1: Summary - Transit Cooperative Research Program Synthesis 93; Practices to Protect Bus Operators from Passenger Assault

Department Head Approval: James Pachan, Chief Operating Officer
Reviewed by: Denise Standridge, Interim General Counsel
Prepared by: Christopher Beach, Director of Transportation
Practices to Protect Bus Operators from Passenger Assault

A Synthesis of Transit Practice

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Practices to Protect
Bus Operators from
Passenger Assault

A Synthesis of Transit Practice

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Note: Many of the photographs, figures, and tables in this report have been converted from color to grayscale for printing. The electronic version of the report (posted on the Web at www.trb.org) retains the color versions.

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PRACTICES TO PROTECT BUS OPERATORS FROM PASSENGER ASSAULT

SUMMARY

This synthesis report addresses the important issue of protecting bus operators from passenger assault. The key elements of the synthesis study included a survey of transit agencies with a 75% (66/88) response rate, profiles of security practices, and a literature summary.

Although serious crime in transit systems is relatively rare and constitutes a small percentage of overall crime, even one serious incident of violence can make media headlines and diminish the perception of security, especially if the crime is against the transit operator.

Assaults on operators have caused worker absence, productivity issues, and increased levels of stress for the victim and for coworkers. Minor incidents can be precursors to more serious violence against operators. Therefore, it is important that transit agencies address the issue of operator assaults before they become problematic.

“Assault” of a bus operator is defined broadly in this synthesis and includes acts of aggression that may or may not cause physical injury to the operator. Assault is defined as: Overt physical and verbal acts by a passenger that interfere with the mission of a bus operator—to complete his or her scheduled run safely—and that adversely affect the safety of the operator and customers.

Bus operator protection measures ranging from policing, personnel, and training to technology, information management, policy, and legislation were identified and explored in this synthesis study. Transit agencies face different challenges and problems, along with different sets of institutional, legal, and budgetary constraints; these issues typically are considered when agencies select and implement security measures. Some measures are more appropriate for preventing certain types of attacks. For instance, conflict mitigation training is appropriate for reducing assaults emanating from disputes, whereas barriers may be more useful in protecting the operator against spontaneous attacks. Some measures, such as emergency communications and vehicle location technologies, focus on improving incident response. Video surveillance is useful for deterrence as well as for identification and prosecution of assailants. Audio surveillance is especially useful in addressing verbal attacks and threats. Agencies have helped to enact legislation on enhanced penalties for operator assault and have established agency policies such as suspending service for violating transit agency rules. The characteristics of assailants also influence the protection method. If most are teenagers, a school outreach program may mitigate assaults. If gang-related assaults are increasing, close cooperation with local law enforcement could be key.

The synthesis survey requested respondents to describe their bus system and security characteristics; their policies on fare and rules enforcement; characteristics of bus operator assaults; and their assault prevention and mitigation practices, including training, hiring, use of officers and patrols, technology, and self-defense tools and training. The survey was distributed to 88 multimodal and bus-only transit agencies representing large, medium, and small U.S. agencies; the survey was also sent to several Canadian agencies and to one Chinese bus rapid transit system. Survey respondents represented large, medium, and small agencies and were geographically diverse. In general, the primary security provider for the respondents was
local, county, or state or provincial police; more than a third used a combination of security providers. Respondents that indicated having transit police departments were generally large or midsize agencies. Practically all agencies have a standard operating procedure in place for response to bus operator assaults. About half of the survey respondents stated that their local laws provided more severe punishments for assaults against bus operators than for some other assaults.

The following are highlights of the survey findings:

- **Assault characteristics**—The time period when bus operator assaults typically occur was evening/late night/early morning, followed by the afternoon peak period, and by school dismissal times. The assault type considered to be most problematic for agencies was verbal threats, intimidation, or harassment. The next most problematic assault type was spitting. All large agencies reported that they consider spitting to be problematic. Some agencies reported that assaults involving projectiles thrown at the bus and inside the bus were a concern. Because aggravated assaults that result in physical injuries can be preceded by minor assaults, even minor incidents need to be reported and closely monitored. Primary factors contributing to bus operator assaults were fare enforcement and intoxicated passengers or drug users, followed by rule enforcement other than fare enforcement, school/youth-related violence, and individuals with mental illness. Larger and midsize respondents were more likely to indicate that fare enforcement and intoxicated persons or drug users were contributing factors to operator assaults.

- **Fare enforcement**—Fare enforcement issues are important because a high percentage of assaults are instigated by fare issues, such as fare evasion, short pay, transfer disputes, questionable fare media, or the lack of valid ID for special fares. Agencies reported a variety of fare enforcement policies, ranging from conflict avoidance to zero tolerance. Agencies that practice a zero-tolerance approach instruct operators to enforce fare payment and codes of conduct strictly, in the belief that making exceptions can confuse and anger passengers. Agencies that instruct their operators to use their judgment on a case-by-case basis believe that the operator is the best judge of the situation.

- **Other rules enforcement**—Most agencies typically train their bus operators to enforce strictly those rules that coincide with state or local laws, such as weapons, narcotics, and liquor laws, whereas agency policies differ on less serious rules, such as no littering or no eating on the bus. As with fare payment policies, agency policies run the spectrum from conflict avoidance to zero tolerance.

- **Policing/security**—Many agencies use some type of policing and patrols on their buses, although they are limited by staffing and budgetary constraints. Visibility of officers through onboard or vehicle patrols was indicated as one of the most effective measures to deter assaults. Some agencies use plainclothes officers to target offenders on problematic routes.

- **Operator training**—Agency managers noted that a significant number of assaults may have been instigated by the behavior or action of the bus operator, and may have been prevented by the operator. Therefore, bus operator training is considered a very important measure: all responding agencies indicated that they provide customer relations training, and the majority stated that they provide conflict mitigation and diversity training. Self-defense training was provided by some agencies. It is interesting to note that the majority of agencies that provide self-defense training to their operators are located in states with more permissive (“shall-issue”) concealed firearms carry laws.

- **Onboard technologies**—Onboard technology measures included radio or phone communications, video surveillance, emergency silent alarms and panic buttons, and panic buttons connected with a headsign. Many also had automatic vehicle location (AVL) systems to track the location of their bus fleet, and some had audio surveillance. A few systems had real-time video streaming capability, with a few more planning to install this functionality. Several agencies reported using or testing operator barriers or partial enclosures on buses. None reported using full enclosures or compartments.
• **Workplace issues**—Issues experienced by bus operators or bus operations as a result of violence against bus operators included injury-related claims and increased anxiety and stress. Absenteeism, diminished productivity, and union grievances were also reported.

• **Effective measures**—Technology measures were mentioned most often as the most effective measures. Next most frequently mentioned were policing and personnel measures, followed closely by policy measures. The final category was training and human resource measures. In terms of specific measures, video surveillance, bus operator training, and officer presence and patrols were cited most often by the respondents. It can be noted that agencies do not rely on one or even a few of these measures but on combinations of these measures to protect their operators.

• **Additional comments**—Survey respondents emphasized the importance of operator behavior, attitude, and words, as well as the importance of customer service in preventing operator assault. One respondent noted that passenger disregard for agency rules "mirrors a larger problem of 'incivility' in society and disrespect for authority." The importance of supervisor involvement in resolving disputes was also noted.

Profiles of measures to protect bus operators were developed. Various transit agencies were contacted to obtain information on the following categories of operator protection measures:

- Technology and information management (chapter four);
- Personnel, policing, and training (chapter five); and
- Agency policies and legislation (chapter six).

Protective measure categories covered in chapter four are technologies including video surveillance, audio surveillance, AVL, Transit Operations Decision Support System (TODSS), emergency communications, DNA kits, and barriers separating the operator from passengers, as well as information management. Video surveillance has been in use by some agencies for years, and it is still considered one of the most effective measures against operator assault. Video surveillance is also viewed by agencies as a versatile and cost-effective solution for numerous other issues, including general crime, accident, and workers compensation investigations. Newer digital systems offer improved video quality, allow wireless uploads, and are easier to integrate with other systems, increasing their versatility.

- **Audio surveillance**—Verbal assaults can be precursors to physical assaults and can contribute to increased stress. Audio surveillance has been useful for agencies seeking to address verbal assaults against operators; it also facilitates the resolution of verbal disputes between the operator and passenger and provides a recording of verbal exchanges leading up to an assault. Audio surveillance has been implemented in conjunction with existing video equipment, although not as many agencies are using audio as video.

- **Reminders about video/audio surveillance**—Although agencies post signage to inform customers about video/audio surveillance, some passengers may not be aware of or have read the signs. Two agencies noted that their bus operators remind unruly passengers about the surveillance on the buses; these reminders have prevented disputes or conflicts from escalating into operator assaults.

- **Barriers**—Several agencies are using or testing operator barriers or partial enclosures on buses to deter or mitigate assaults. None reported using full enclosures or compartments. Miami-Dade Transit, one of the first two adopters of the security measure, reports that barriers installed in its bus fleet have been very effective in preventing operator assault, even though the barrier provides only partial protection. Agencies in the United States and Canada that have recently installed or are currently testing barriers have also been included in the profile study. These agencies have raised concerns related to customer service, operator comfort issues, glare and reflection, and noise.

- **Information management**—Crime management and analysis can help law enforcement identify trends and predict crime. For example, one of the larger transit systems in
Canada, Edmonton Transit System, uses a model incorporating hot spots and annual trends and patterns to forecast crime, and issues a daily crime forecast to its officers. Performance measures integrated into the system's adapted CompStat process are used to motivate officers and security personnel to perform desired security actions. These strategies, along with supplemental technologies (computer-aided dispatch or CAD system, records management system and security portal, trespasser tracker, scheduling software), have resulted in a 52% decrease in calls for service.

- **Transit Operations Decision Support System (TODSS)** improves the functionality of AVL and CAD systems. Although it is not currently widely utilized by agencies, it has the potential to address information overload experienced by dispatchers by managing and prioritizing data emanating from these systems.
- **DNA kits**—In London, bus operators are provided with DNA kits to collect samples when they are spat upon. The samples are compared against the U.K. national DNA database to identify and prosecute offenders. As in London, spitting is one of the most problematic assault types for U.S. and Canadian agencies, especially for larger agencies. Further research would be needed to determine how feasible this measure would be, particularly in terms of public acceptance and cost.

Chapter five covers personnel, policing, and training. With regard to **personnel**, the excellent bus operator selection systems developed by APTA and the Canadian Urban Transit Association (CUTA) and the importance of selecting an individual with appropriate experience and attributes are discussed. **Policing** techniques and practices and how they are being used by agencies are presented. Employing uniformed officers is considered a very effective measure against operator assault and other crimes. **Self-defense training and tools** provide bus operators with a protection measure that is available to the operator immediately during an attack. No matter how fast responders arrive on the scene, even a few minutes can be enough to cause significant injury to the operator. Agencies are concerned about liability issues and have also reported reluctance by some operators to carry self-defense tools; in states with more permissive weapons-carry laws and easier gun-acquisition procedures, operators may be more willing to carry self-defense tools to assure their security. Houston METRO is the only U.S. agency, as of the date of this report, that issues a self-defense tool—pepper spray—to its bus operators. One agency, Metro Transit in Minneapolis, offers pepper spray training to its operators who request it. Both agencies operate in states (Texas and Minnesota) that have permissive concealed firearms carry laws. Oleoresin capsicum, the main ingredient in pepper spray and pepper gel, irritates the skin, eyes, and upper respiratory tract. It is considered generally safer than other nonlethal tools and effective in subduing violent individuals. Questions, have been raised, however, regarding its effectiveness on individuals under the influence of narcotics and alcohol, and few scientific safety studies have been performed. Permitted concentrations and allowable use vary by state in the United States. Its use is not permitted in Canada. Agencies are more willing to provide self-defense training to their operators, although liability concerns still exist. Self-defense from a seated position, taught by Pierce Transit (Lakewood, Washington) and Calgary Transit (Alberta, Canada), and self-defense training provided by Transit Authority of River City (TARC, River City, Kentucky) to their bus operators, are included in the profiles for this chapter. Note that both Washington and Kentucky are permissive concealed-carry states and that Kentucky requires no license to open carry. Washington is considered an open carry friendly state; residents are permitted to carry firearms in plain sight in public without a license. **Customer service training** and **behavioral assessment training** profiles are also included in this chapter.

Chapter six covers legislation and agency policies. The primary legislation pursued by transit agencies has been increased penalties for operator assault. Almost half of U.S. states now have enhanced penalties for operator assault; transit agencies have worked with the Amalgamated Transit Union to support passage of this legislation to protect operators from passenger assault. Currently, no Canadian province has passed this type of legislation. Some transit agencies also have sought to change state or municipal laws to establish suspension-
of-service policies that would exclude rules violators from their transit system. Workplace violence policies are required under state and federal laws, and transit agencies usually establish workplace violence standards at least as stringent as Occupational Safety and Health Administration standards. Effective policies are explicit about reporting and incident handling, response, and follow-through responsibilities.

Fare issues are the source of many operator assaults by passengers, and fare payment policies can prevent payment from becoming an issue. Off-board fare payment eliminates the need for the operator to interact with passengers about fare payment and is offered by some bus rapid transit (BRT) systems. The MAX line in Las Vegas, a BRT system with off-board fare payment, reports a much lower operator assault rate for its BRT system than for regular bus service. Fare-free systems would be expected to have lower assault rates as well; however, anecdotal evidence indicates that service problems may be caused by overcrowding and may lead to a number of incidents. TCRP synthesis studies currently under way concerning off-board fare payment systems and fare-free systems may shed more light on these issues.

School and community outreach is a longer-term and indirect method of preventing operator assault. In particular, the direct effect of school outreach programs on operator assault is difficult to ascertain and may take years to realize. However, agencies that perform school outreach do so in the belief that familiarizing students with the public transportation system and bus operators will lessen the likelihood that students will at some point assault an operator or commit other crimes on their systems. Most programs target preteens or teenagers. Greater Cleveland Regional Transportation Authority, San Antonio VIA, and Edmonton Transit System have unique school outreach programs that are designed to accommodate very young children; VIA even has a program for pre-kindergarten children. Community outreach programs educate and familiarize the public with their transit agencies and workers, including bus operators; address areas of concern; and initiate or support community activities. These efforts typically enhance the agencies' public image, boost ridership, and strengthen their relationship with their ridership, diminishing the likelihood of operator assault. Rochester Genesee Regional Transportation Authority created a community foundation to provide financial assistance for transportation to youth-oriented groups or organizations and the Honor Foundation to help individuals with disabilities pay for their paratransit service if they are unable to do so on their own. These foundations are the first of their kind for U.S. transit agencies. Edmonton Transit System is noteworthy in regard to the number of community activities in which it participates or has initiated—an annual community fair, Donate-a-Ride program providing Edmonton's social services clients with free rides, Stuff-a-Bus campaign to collect food donations for Edmonton's food bank, a Read 'n Ride initiative to promote adult literacy, and a musical band that has also been designated the official band of the city of Edmonton.

Remaining seated policy—During some disputes, operators have challenged passengers by standing up or pursuing them, resulting in assaults. Agencies that have instituted the policy that operators remain seated while operating the bus have done so to mitigate these situations.

The following items were identified during the synthesis study as potential topics for further research:

Barriers—Barriers are new to many agencies in the United States and Canada. Reviews from agencies and operators testing the barriers have included concerns about glare and reflection, operator discomfort and claustrophobia, and customer service difficulties. Further research into barrier design can address these issues.

Behavioral assessments—A few agencies have indicated that they are providing behavioral assessment training to their bus operators to identify suspicious behavior and activity. Liability issues and questions about the effectiveness of this technique in other
transportation security uses have been raised. More research may be indicated to determine its effectiveness in identifying criminals and preventing crime.

**Operator perspective**—More research on the perceptions of security measures and policies from the operator perspective would assist agencies in developing measures and policies amenable to the operator.

**Self-defense tools**—More research into less-than-lethal tools appropriate for bus operators would help agencies. Effectiveness of self-defense tools against assailants, safety of the tools for the operator and passengers, and safety for the assailant in the bus environment are major concerns of agencies.

**Video content analysis**—Researchers are developing behavioral recognition algorithms that are being tested and used in subway and rail settings. Although further research and development of these algorithms is needed for their use in buses, they have the potential to recognize and even predict violent behavior and provide immediate alerts to the command center regarding dangerous situations. When an alert is received, the police or dispatcher may then communicate directly with the potential assailants.

**Workplace violence data**—The National Transit Database does not capture the true extent of workplace violence. This database does not accommodate the reporting of minor assaults that do not result in an arrest. Although an assault such as spitting or verbal insults may not cause physical harm to the operator, it can cause significant emotional distress. Research into an expanded database can help agencies identify emerging trends, incident types, perpetrators, and dangerous individuals and provide agencies with information to forecast violence against operators and other employees.