



# Transportation Planning Capacity Building (TPCB) Peer Program

## City of Fresno Peer Exchange on Bus Rapid Transit

### *A TPCB Peer Exchange*

<b>Location:</b>	Fresno, California
<b>Date:</b>	May 21, 2013 – May 22, 2013
<b>Host Agency:</b>	City of Fresno
<b>Peer Agencies:</b>	Community Transit (Everett, Washington) Greater Cleveland Regional Transit Agency (GCRTA) (Cleveland, Ohio) Lane Transit District (LTD) (Eugene, Oregon) OmniTrans (San Bernardino, California) National Bus Rapid Transit Institute (NBRTI)
<b>Federal Agencies:</b>	Federal Highway Administration (FHWA) Federal Transit Administration (FTA) Volpe National Transportation Systems Center (Volpe)



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## Introduction

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This report highlights key recommendations and best practices identified at the peer exchange on Bus Rapid Transit (BRT), held on May 21 and May 22, 2013, in Fresno, California. This event was sponsored by the [Transportation Planning Capacity Building \(TPCB\) Peer Program](#), which is jointly funded by the [Federal Highway Administration](#) (FHWA) and [Federal Transit Administration](#) (FTA), and developed with assistance from the National Bus Rapid Transit Institute (NBRTI). Additional information about the TPCB Program is available on page 16.

## Background

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### What is Bus Rapid Transit?

First implemented in Curitiba, Brazil, in 1974 and introduced in the United States in the early 2000s, BRT is an innovative approach to traditional, urban public transportation that merges the efficiency of light rail systems with the flexibility and affordability of bus systems. BRT systems typically rely on advanced technologies, infrastructure, and operational investments that improve upon regular bus services.

The following rail-like features of BRT vehicles, which distinguish them from conventional buses, facilitate speedy boarding, reduce dwell times at stations/stops and maintain shorter system headways include:

- Multi-door boarding;
- Low floors;
- Spacious interiors;
- Standing room;
- High capacity; and
- Off-board fare collection.

Additionally, advanced physical and operational features of BRT systems assist BRT vehicles in navigating traffic congestion and in maintaining appropriate spacing and headways regardless of traffic. BRT infrastructure differs from conventional bus infrastructure in the following aspects:

- Station spacing;
- Station permanence;
- Dedicated right-of-way (ROW);
- Transit signal priority (TSP); and
- Right-of-Way enhancements such as bus bulbs, boarding islands, and curb realignments.

Ultimately, BRT systems achieve the capacity, efficiency, and frequency of light rail systems without incurring the lengthy construction periods and higher capital and operational expenses inherent to light rail. Due to high performance standards, BRT systems tend to have greater operating costs per hour and/or per mile than comparable regular route services; however, BRT systems also tend to have higher ridership per hour and lower costs per trip and/or per *passenger* mile (i.e. the cost of carrying one passenger one mile) than comparable regular route services. Thus, BRT systems may be more productive and cost-efficient than conventional bus systems.

The high-capacity, high-performance, and low-cost qualities of BRT make it an attractive option to public transportation agencies throughout the world, though each BRT system is unique. The characteristics listed above do not typify every BRT system, and this section does not identify every BRT innovation. The NBRTI website (accessible at <http://nbrti.org>) and Appendix D of this report lists additional resources for more information about BRT systems.

## Overview of the BRT Peer Exchange

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### Why BRT?

As described in the previous section, the high-capacity, high-performance qualities of BRT make it an attractive option for public transportation agencies throughout the world, including in the City of Fresno (Fresno). Fresno's 2007 Downtown Transportation and Infrastructure Study (DTIS) (<http://www.fresno.gov/NR/rdonlyres/46E037A5-7C80-4A5A-935D-DCE67B77A230/0/FresnoBRTMasterPlan20080617.pdf>) identified transit, particularly BRT, as an increasingly important mode for accessing Downtown Fresno. Fresno recognized BRT as a key strategy for:

- Supporting transit-oriented development (TOD) and sustainable communities;
- Enhancing accessibility and connectivity of Downtown Fresno;
- Accomplishing Federal, State, and local objectives for congestion management; and
- Achieving Federal and State air quality standards.

As an active member of the Fresno County Council of Governments (COG), Fresno participated in the 2008 Public Transportation Infrastructure Study (PTIS) to identify transportation and land use strategies to reduce vehicle miles traveled (VMT) and to improve mobility choices for greater Fresno County residents.

The PTIS (<http://www.kimley-horn.com/Projects/fasttrackfresnocounty/>) and component BRT feasibility study identified three potential BRT corridors within the City of Fresno; based on the Fresno City Council's selection of a locally preferred alternative (LPA) that included all three corridors, the study recommended that Fresno pursue funding for the Blackstone Avenue and Ventura Avenue/Kings Canyon Road BRT corridors, which merged into the Blackstone/Ventura/Kings Canyon corridor.

The Blackstone / Ventura / Kings Canyon corridor supports high ridership (about 7,200 boardings per day) and serves a growth area projected to gain an additional 55,000 residents between 2010 and 2025.

Figure 1 provides a map of the Blackstone/Kings Canyon corridor(s).

### Why a BRT Peer Exchange?

In December 2010, Fresno received a \$48 million Very Small Starts grant from the Federal Transit Administration (FTA) for the Blackstone/Ventura/Kings Canyon BRT project. Fresno Area Express (FAX), the transit provider for the City of Fresno's Department of Public Transportation, is the Blackstone/Ventura/Kings Canyon BRT project lead. Given the potential for BRT to catalyze economic development and land use changes, Fresno requested a peer exchange to provide guidance to FAX in managing the project and to assist staff across the city's departments in understanding:

- Challenges of developing, integrating, and implementing BRT;
- Best practices in designing and operating BRT;
- Long-term financial sustainability of BRT; and

- Performance measures for BRT.

### Who were the peers?

Representatives from four public transportation agencies served as peers in the BRT peer exchange. The Federal Transit Administration, the City of Fresno, NBRTI, and the Volpe Center collaborated to identify relevant peer agencies based on the peer agencies' ability to discuss the following topics:

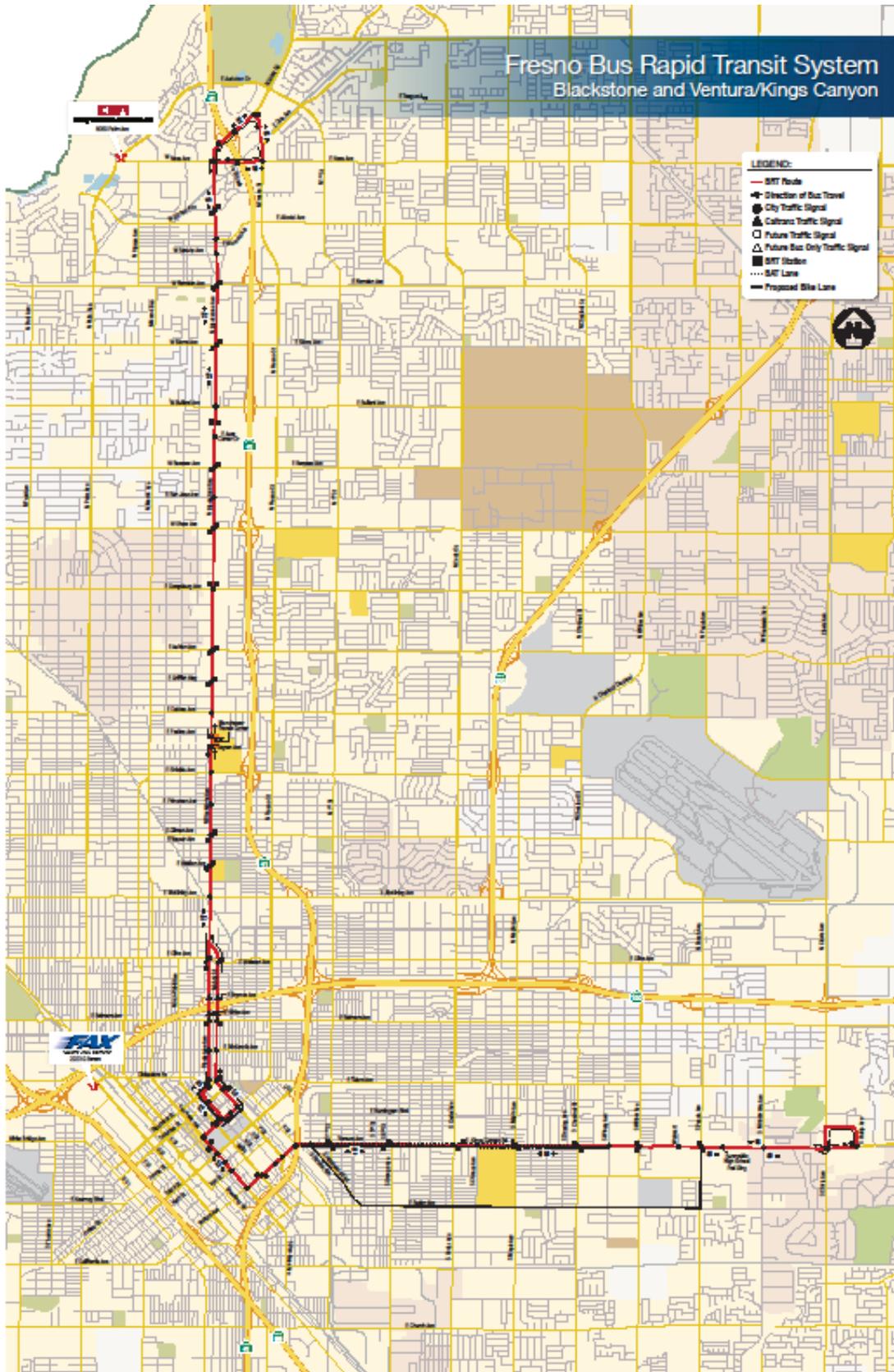
- BRT system design and operation;
- Regulatory and funding environment;
- Population and area characteristics of BRT service area(s);
- Travel behavior within BRT service area(s);
- Economics of BRT service area(s); and
- Community characteristics (e.g., housing market) of BRT service area(s).

Four geographically diverse agencies were selected as peers for their experiences implementing BRT, their ability to address key BRT issues of interest to Fresno, and challenges and opportunities at various stages of service implementation. At the time of the peer exchange, OmniTrans had completed approximately 70 percent of construction for its BRT service, sbX, which is scheduled to begin operations in 2014. In contrast, the other peer agencies already had a history of BRT operation. [Table 1](#) below lists the agencies, their dates of revenue service and the peers from each respective agency:

**Table 1: Peer Agency Characteristics**

Agency	Location	BRT Service	BRT Operation Start Date	Peer
<b>Community Transit</b>	Everett, WA	Swift	2009	<b>June Devoll</b> , Manager of Strategic Planning & Grants
<b>Greater Cleveland Regional Transit Agency</b>	Cleveland, OH	HealthLine	2008	<b>Michael York</b> , Deputy General Manager of Operations
<b>Lane Transit District</b>	Eugene, OR	EmX	2007	<b>Tom Schwetz</b> , Planning & Development Director
<b>OmniTrans</b>	San Bernardino, CA	sbX	2014	<b>Milind Joshi</b> , sbX Program Manager

Figure 1: Fresno BRT Map



## Key Recommendations, Lessons Learned, and Best Practices

During the Fresno BRT Peer Exchange, the peers delivered presentations and led discussions about their relevant experiences and lessons learned in planning, delivering, and operating BRT systems. Appendix B of this report details the agenda and specific discussion topics. In accordance with the agenda and the exchange proceedings, the key recommendations, lessons learned, and best practices fit into the following five categories:

1. Planning & Implementation;
2. Planning & Project Delivery;
3. Integrating Planning & Operations;
4. Integrating Land Use; and
5. Financial Planning.

### Planning & Implementation

#### *Engage, update, and educate internal and external audiences early and continuously*

In discussing public outreach and communications, the peers stressed the importance of developing and sending a concise and consistent message in response to “why BRT?” All four peer agencies designated a single spokesperson (either a staff person or consultant) to handle all media relations, including social media, to ensure consistency and accuracy of any public messages. Each peer agency invited its public relations and/or marketing team to regular design and construction meetings to maintain an accurate and current message. Even if there was no status update, the spokesperson could communicate that fact. One peer strongly advised Fresno, “don’t go dark” with public outreach, even if there is no new information.

Based on the peers’ experiences, it is equally important to engage internal and external stakeholders, including State Department of Transportation (DOT) partners, elected officials, local business owners, and agency staff. The peers recommended that Fresno document all stakeholder meetings so that there is a record of what each partner, agency, or staff person agrees, decides, or commits to do. The peers also recommended targeted outreach strategies for business owners along the BRT corridor, such as conducting door-to-door visits before construction activities begin so that the business owners are aware of potential construction impacts; patronizing affected businesses during construction; and assisting the businesses to develop new marketing strategies for BRT passengers. For effective internal coordination and information sharing, the peers recommended regular interdisciplinary meetings and agency-wide briefings. Agency staff can be effective advocates, or “ambassadors,” for BRT projects, but they must first understand the project and “why BRT?”



**Figure 2: Yellow rub rails, formerly known as “curb bumpers,” facilitate precision docking at a Swift BRT station. Photo courtesy of Community Transit.**

When engaging internal and external stakeholders, agencies must be aware of any potential language barriers as well as be sensitive to any potential misinterpretations. For example, Community Transit designed its Swift stations to include rub rails for precision docking. The rub rails were initially named “curb bumpers,” but the agency renamed the station features because the bus operators associated “bump” with collisions and poor driving.

Finally, a key strategy to promote a new BRT system is to showcase the vehicle and station prototypes to internal and external stakeholders as tangible evidence that “BRT is coming to town!”

Community Transit designed the Swift vehicles to meet present and future needs, utilizing the real estate of longer buses to provide amenities that attract choice riders and to accommodate future growth.

### *Consider long-term operations and maintenance requirements when designing vehicles*

Greater Cleveland Regional Transit Agency and Community Transit encouraged Fresno to think strategically and to work with the bus manufacturers when considering design innovations. Greater Cleveland Regional Transit Agency (GCRTA) worked closely with the bus manufacturer New Flyer to develop an innovative, rail-like Rapid Transit Vehicle (RTV) that has served as a model for other BRT systems across the country. Among several other features, GCRTA designed a special docking arm based on in-service vehicles in Germany, England, and Australia, but the manufacturer only agreed to produce the docking arm if GCRTA assumed full liability for the front axle to which the docking arm is attached. Two

of the other peer agencies, OmniTrans and Community Transit, modeled their vehicles on GCRTA's RTV with slight modifications to fit the operations and maintenance requirements of their own systems; [Table 2](#) below compares the peer agencies' vehicles.

In addition to determining the appropriate length, capacity, fuel type, and number of doors, it is necessary for an agency to also specify the type of doors, location of doors, use of the articulated joint area (e.g., for seating, standing, or storing bicycles), boarding height, precision docking elements, on-board cameras, and on-board fare collection. It is important to solicit input early in the process from operations and maintenance personnel in determining the vehicle specifications, as it may be necessary to modify the maintenance, fueling, washing, and parking facilities to accommodate the new vehicles. OmniTrans emphasized the importance of ensuring ongoing operation and maintenance activities of existing facilities while the agency makes modifications to those facilities. OmniTrans also recommended including any design staff or contractors in discussions regarding the vehicle to ensure compatibility between the on-board transit signal priority (TSP) transponder and the TSP system, for example.



**Figure 3: Rear-facing wheelchair positions on GCRTA's Rapid Transit Vehicles.** Photo courtesy of Greater Cleveland Regional Transit Agency.

Table 2: Peer Agencies' BRT Vehicle Features

Agency	Length	Capacity	Fuel	Boarding	Features
<b>Community Transit</b>	62'	43 seats 60 standees 3 – 5 bicycles	Diesel-electric	3 doors	Passive restraints for wheelchairs enable disabled passengers to load/unload in 28 seconds, handholds in articulated joint area accommodate standing passengers, and on-board bicycle racks hold 3 bikes with room for 2 additional bikes.
<b>GCRTA</b>	63'	47 seats 53 standees 2 bicycles	Diesel-electric	5 doors	Bridge plate at each door meets the level boarding requirements of the Americans with Disabilities Act (ADA) of 1990; rear-facing wheelchair positions enable disabled passengers to back in; docking arm connected to front axle allows for precision docking; and DriveCam and/ or SmartDrive technology records 9 to 12 seconds of video before and after an abrupt change in speed or direction to document incidents.
<b>LTD</b>	63'	47 seats 53 standees 3 bicycles	Diesel-electric	4 doors	Bridge plate at each door meets the level boarding requirements of the Americans with Disabilities Act (ADA) of 1990; rear-facing wheelchair positions enable disabled passengers to back in; and docking arm assists precision docking.
<b>OmniTrans</b>	60'	41 seats 65 standees 4 bicycles	Compressed Natural Gas (CNG)	5 doors	

***Consider implications of warranty periods***

Agencies should carefully consider the warranty periods in establishing contract terms with contractors and manufacturers for their BRT vehicles, stations, and station components such as the ticket vending machines and real-time monitors, particularly if there is a gap between delivery and operation. For GCRTA, the warranty on its vehicle began at the time of delivery, though OmniTrans was able to negotiate with New Flyer to begin the warranty period (except for the engines) at the same time as revenue operation. Community Transit was able to negotiate with the ticket vending machine vendor to store the machines until ready for installation, with the warranty period beginning

at the time of installation. The peers agreed that such negotiations would be advantageous for an agency.

## Planning & Project Delivery

### *Maintain an appropriate level of oversight throughout the project*

The peers noted that the initial selection of project contractors is extremely critical, as is the need to maintain strong management oversight by agency staff. OmniTrans cautioned that hiring a big-name firm does not guarantee a quality product or a smooth process. Even with strong contractors, there is no substitute for the agency's project managers having an appropriate level of oversight, particularly during the design, ROW acquisition, and construction phases. GCRTA stressed the importance of contract management oversight.

### *Compile a risk register and revisit it often to mitigate risks and to adjust cost estimates*

OmniTrans shared its best practices for conducting a project risk assessment. At the beginning of the sbX project, OmniTrans created a risk register, or a spreadsheet categorizing various potential risks, such as ROW acquisition, utility relocation, contractual issues, etc. Staff from across the agency brainstormed the range of potential risks. For example, OmniTrans' human resources division considered the issue, "what if the agency project manager left halfway through the project?" Staff then considered the worst-case scenario outcomes of those risks occurring (i.e., the potential cost impact) and the probability of those risks occurring. OmniTrans categorized those risks with a probability of 90 percent or higher as "potential costs" and those risks with a probability less than 90 percent for monitoring. For each risk, OmniTrans had the option of transferring it to the contractor (and consequently paying a higher bid price); avoiding/eliminating it (such as through design); reducing/mitigating it; or accepting the potential costs of it occurring. Even though an agency may identify or realize new risks every day, it is not efficient to analyze those risks on a daily basis. Instead, OmniTrans convenes a one-hour risk assessment meeting every month to reassess risks with a probability of 90 percent or higher: if a particular risk is realized, then OmniTrans re-categorizes it as a change order request or as a contingency. OmniTrans recommended that Fresno establish and follow a change order process to avoid any delay costs.

## Integrating Planning & Operations

### *Demonstrate financial viability of BRT*

Despite the economic environment in which the peer agencies first implemented and operated BRT services (GCRTA began BRT operations in October 2008 and Community Transit began BRT operations in November 2009), the peers cited financial statistics and survey results in support of either maintaining or expanding their BRT service(s). [Table 3](#) below highlights the differences between two peer agencies' BRT and conventional bus services, according to a few key metrics.

**Table 3: Comparison of BRT and Conventional Bus Performance**

Metric	LTD			GCRTA		
	Bus	BRT	Savings	Bus	BRT	Savings
Cost per vehicle mile	\$9.99	\$13.21	(\$3.22)	\$9.72	\$11.82	(\$2.10)
Cost per passenger mile	\$0.78	\$0.73	\$0.05	\$0.97	\$0.71	\$0.26
Cost per unlinked passenger trip <sup>1</sup>	\$3.19	\$1.91	\$1.28	\$4.14	\$1.81	\$2.33
Cost per revenue hour	\$130.27	\$155.42	(\$25.15)	\$122.41	\$83.18	\$39.23
Passengers per revenue hour	40.85	81.26		32.68	62.64	

Source: 2011 National Transit Database (for LTD) and 2012 National Transit Database Annual Report Submittal (for GCRTA)

In 2011, Lane Transit District (LTD)'s BRT system, EmX, cost \$25.15 more to operate per revenue hour than LTD's regular bus service, but EmX carried nearly twice as many passengers per revenue hour. An on-board survey revealed that EmX choice riders were using the service for a variety of trip purposes, such as errands during lunch, which they previously had made via car. Because EmX is LTD's most productive service, it was easy to justify a BRT system expansion through the addition of a third EmX route. Lane Transit District's annual transit investments are governed by a service policy that requires the agency to invest 75 percent in productive services (e.g., BRT), 20 percent in coverage services (e.g., rural routes), and 5 percent at the discretion of the Board of Directors.

Similar to LTD's survey results, Community Transit found that 14 percent of Swift passengers did not previously make the trip that they made via Swift. Like EmX, Swift represents Community Transit's most productive service. In 2012, Swift had the highest ridership of Community Transit's 48 routes and the lowest cost per passenger excluding commuter routes.

The Greater Cleveland Regional Transit Agency's BRT system, the HealthLine, allowed the agency to improve bus service along the Euclid Avenue corridor at a lower cost than traditional bus service. Prior to the HealthLine, GCRTA operated the #6 bus on the Euclid Avenue corridor. The #6 was the agency's highest ridership route and by converting from regular to BRT service, GCRTA reduced the number of buses in the corridor from 23 to 16 because of greater service efficiency. Greater Cleveland Regional Transit Agency's overall operating expenses decreased despite the BRT vehicles' higher per-mile operating cost reflected in Table 3. In addition to reducing operating expenses, implementation of HealthLine increased the bus mode share:



**Figure 4: Passengers boarding an EmX bus.** Photo courtesy of Lane Transit District.

<sup>1</sup> The number of passengers who board public transportation vehicles. Passengers are counted each time they board a vehicle no matter how many vehicles they use to travel from their origin to their destination (i.e., transfer).

- 48 percent of HealthLine passengers previously used other GCRTA bus services, including the original #6 bus service (and of those riders, nearly half of them used the HealthLine more frequently than they had used the #6 bus);
- 16 percent shifted from driving alone;
- 13 percent shifted from riding rail;
- 8 percent would not have made the trip previously;
- 6 percent previously made the trip via miscellaneous means; and
- 9 percent did not indicate how they made the trip prior to the HealthLine's implementation.

HealthLine's implementation was consistent with GCRTA's TransitStat goals of reducing agency costs, increasing service quality, and improving overall management.

***Develop appropriate security measures and fare collection and enforcement policies***

Off-board fare collection is popular for BRT systems because it aids in maintaining short dwell times; however, off-board fare collection introduces new operational challenges including fare enforcement, maintaining off-board (and often exposure to inclement weather) ticket vending machines, and collecting payments from ticket vending machines. To maintain shorter dwell times, Community Transit opted to rely exclusively on off-board fare collection following a cost-benefit analysis that revealed the agency would otherwise need to operate two additional Swift buses to maintain its stated goal of 10-minute headways. Additionally, Community Transit had a goal of 10-second dwell times, which would not be possible to achieve with on-board fare collection. Community Transit and LTD installed the same machines, modeled after electronic parking meters. Community Transit employs a two-person maintenance team for the Swift stations that performs all maintenance, including proper operation of the ticket vending machines. If one of the two vending machines at a station is out of service, then the maintenance personnel repair it the next time they visit that particular station, but if both vending machines are out of service at any given station, they repair those machines immediately and check for potentially larger, system-wide issues.

For additional security, GCRTA installed cameras to monitor station area activity, particularly near emergency call boxes and vending machines, and established a Memorandum of Agreement (MOA) with security units from Cleveland Clinic, Cleveland State University, and the Cleveland Police Department.

Greater Cleveland Regional Transit Agency approached fare collection differently, relying on off-board fare collection from 6:00 a.m. to 10:00 p.m. (pictured in [Figure 5](#)) and on-board fare collection from 10:00 p.m. to 6:00 a.m. During the 6:00 a.m. to 10:00 p.m. operating hours, GCRTA has 30 full-time equivalent (FTE) fare enforcement officers who monitor proof of payment. Based on the costs of training, uniforms, etc. for the fare enforcement officers, GCRTA recommended offering full-time positions to increase employee retention and to avoid the costs of frequent turn-over of staff. GCRTA also recommended consulting the courts and legislature in determining appropriate fare enforcement policies and methods, as State statutes may vary in permitting the issuance of a citation versus a ticket.



**Figure 5: Ticket vending machines at a HealthLine station.** Photo courtesy of Greater Cleveland Regional Transit Agency.

Conventional buses with on-board fare collection typically empty their fare boxes at the end of each day when they return to the bus garage, so agencies have a regular schedule and central location for collecting fares. With off-board fare collection, agencies must retrieve the fares from each station along the route. Ticket vending machine technology may assist agencies in tracking the amounts collected at each station and in establishing collection schedules, though the peer agencies said they revised their collection schedules based on actual accumulation.

Community Transit originally planned to collect the fare from each Swift station daily, but found that a

weekly collection is sufficient for most stations, except at the two termini stations, which require collection every other day. In 3.5 years of service, Community Transit has not had any incidents of theft from or vandalism of ticket vending machines, though in anticipation of both, OmniTrans has required that its general contractor maintain liability of each station and its components, including the ticket vending machines, prior to project completion, when all stations are turned over to the agency simultaneously.

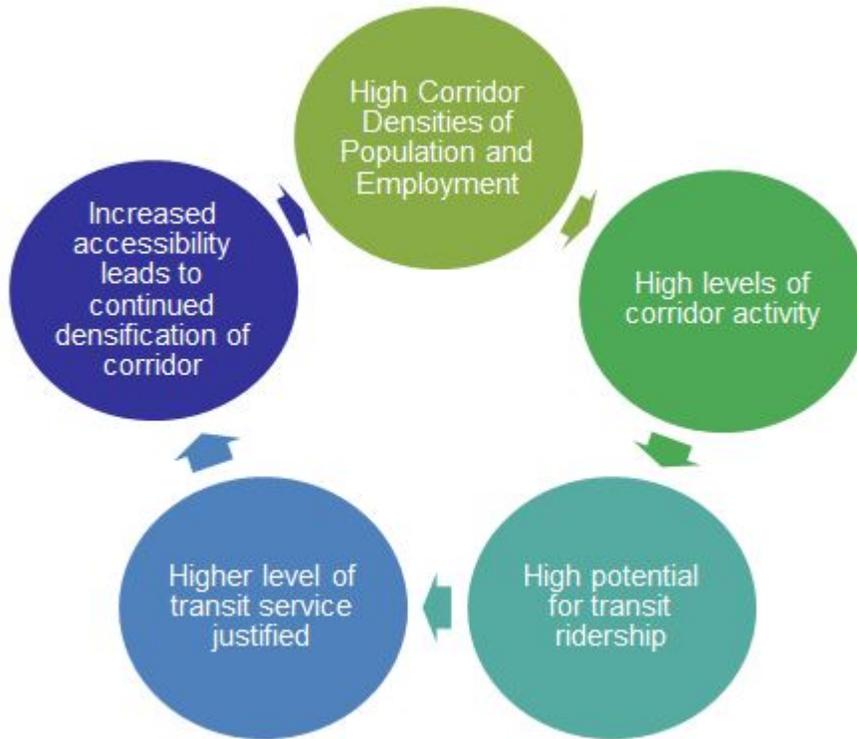
## Integrating Land Use

### *Identify corridors with high ridership potential*

As demonstrated in Figure 4 below, BRT and Transit Oriented Development (TOD) are complementary, if not interconnected planning strategies: BRT supports the ‘T’ in ‘TOD’ by serving high-capacity transit corridors. For some agencies that operate BRT systems, their sole purpose is to provide public transportation services. For example, Community Transit is exclusively a transit agency and the Swift project was motivated by transportation needs and goals, not by land use or economic revitalization goals. Regardless, the five municipalities in which Swift operates exercised their land use authority and independently initiated major planning studies of the BRT corridor to change the land use, densities, and incentives around each Swift station within their jurisdiction.

In contrast to Community Transit’s experience, GCRTA, as a member of the Northeast Ohio Areawide Coordinating Agency (NOACA), which is the local metropolitan planning organization (MPO), partnered with six local community development organizations to deliver the HealthLine project, which was motivated both by public transportation goals and by urban renewal goals. Of the total \$200 million project cost, approximately half was dedicated to “building face-to-building face” reconstruction, including streets, street lights, sidewalks, and utilities. To accommodate BRT and to encourage private development, the cities included the HealthLine in their Master Plan documents and adopted new zoning ordinances consistent with BRT as well as offered tax abatements and no-interest loans to projects.

Figure 6: Circle of Accessibility



Source: Tom Schwetz, LTD

## Financial Planning

### *Create value in establishing new connections*

Since completion of the \$200 million HealthLine project, GCRTA has witnessed over \$5 billion of investment in the corridor through residential, commercial, and medical redevelopment and infill development. According to a study by the National Bus Rapid Transit Institute (NBRTI) released in September 2012, the economic multiplier effect of BRT is not unique to Cleveland. In Cleveland, Pittsburgh, and Boston, NBRTI found that proximity to BRT stations in those cities had a positive effect on residential property values and sales prices ([http://otrec.us/images/uploads/OTS2012\\_Perk.pdf](http://otrec.us/images/uploads/OTS2012_Perk.pdf)). Based on Cleveland's experience, OmniTrans projected the economic potential of its sbX system as 1:10, where each dollar invested in BRT is expected to generate \$10 of economic activity in the community.

The potential for positive economic impacts of BRT is not surprising. Lane Transit District discussed the significant value of transportation in providing access to land use. When compared to other transportation modes, such as costlier light rail services, BRT has a stronger market power because of its speed and reliability; its permanent infrastructure; and concentrated consumer and labor access, which increases ridership.

## Next Steps

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Following the peer exchange, the City of Fresno identified the following action items for the Blackstone/Ventura/Kings Canyon BRT project:

1. Revise the project communication plan to reach a broader segment of the community and to improve the volume and timeliness of the information disseminated to both internal and external stakeholders;
2. Enhance the BRT Project Team, originally established by the City Manager's Office in early 2013, to include another engineer and a procurement specialist;
3. Establish the Project Manager as the single point of contact responsible for overseeing construction;
4. Provide dedicated phone lines (in English and in Spanish) for public comments;
5. Contact business owners along the corridor on a regular basis throughout the project;
6. Determine BRT vehicle specifications and issue a procurement bid for the vehicle manufacturer;
7. Evaluate options for ticket vending machines, emergency call boxes, and security cameras;
8. Evaluate the maintenance requirements of station construction materials and finishes;
9. Implement a Service Implementation Team composed of drivers, mechanics, and support staff to participate in reviewing policies and practices, training exercises, and outreach activities;
10. Continue sharing lessons learned with peer agencies.

## About the Transportation Planning Capacity Building Program

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The [Transportation Planning Capacity Building \(TPCB\) Program](#) is a joint venture of the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) that delivers products and services to provide information, training, and technical assistance to the transportation professionals responsible for planning for the capital, operating, and maintenance needs of our nation's surface transportation system. The TPCB Program website ([www.planning.dot.gov](http://www.planning.dot.gov)) serves as a one-stop clearinghouse for state-of-the-practice transportation planning information and resources. This includes over 70 peer exchange reports covering a wide range of transportation planning topics.

The [TPCB Peer Program](#) advances the state of the practice in multimodal transportation planning nationwide by organizing, facilitating, and documenting peer events to share noteworthy practices among state DOTs, MPOs, transit agencies, and local and Tribal transportation planning agencies. During peer events, transportation planning staff interact with one another to share information, accomplishments, and lessons learned from the field and help one another overcome shared transportation planning challenges. More information about the Peer Program, including the application, is accessible at the TPCB Peer Program website ([www.planning.dot.gov/peer\\_app.asp](http://www.planning.dot.gov/peer_app.asp)).

## Appendices

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### Appendix A: Acronyms

The following acronyms appear in the body and appendices of this report:

ADA	Americans with Disabilities Act of 1990
BRT	Bus rapid transit
CNG	Compressed Natural Gas
COG	Council of Governments
DOT	Department of Transportation
DTIS	Downtown Transportation and Infrastructure Study
FAX	Fresno Area Express
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FTE	Full-time equivalent
GCRTA	Greater Cleveland Regional Transit Agency
ITS	Intelligent Transportation System(s)
LPA	Locally Preferred Alternative
LTD	Lane Transit District
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
NOACA	Northeast Ohio Areawide Coordinating Agency
NBRTI	National Bus Rapid Transit Institute
PTIS	Public Transportation Infrastructure Study
ROW	Right-of-Way
RTV	Rapid Transit Vehicle
TOD	Transit-Oriented Development
TPCB	Transportation Planning Capacity Building
TSP	Transit Signal Priority
VMT	Vehicle Miles Traveled

## Appendix B: Agenda



TRANSPORTATION PLANNING  
CAPACITY BUILDING PROGRAM (TPCB)

**Federal Transit Administration (FTA)**  
**Federal Highway Administration (FHWA)**

### Agenda for the City of Fresno Bus Rapid Transit (BRT) System Peer Exchange

**Location:** Fresno COG, Sequoia Room, 2035 Tulare St., Fresno

**Date:** May 21, 2013 – May 22, 2013

**Length of peer exchange:** two days with a pre-event webinar preceding the exchange

**Times:** Proposed times for on-site peer exchange are in Pacific Daylight Time (EDT is three hours later)

**Host Agency:** City of Fresno

**Topics of Focus:** BRT Planning and Project Delivery, Operations, and Land Use and BRT

**Dress Code:** Business casual

**Facilitator:** Terry Regan, Volpe Center

**Peers:**

- June Devoll, Manager of Strategic Planning & Grants for Community Transit;
- Tom Schwetz, Planning & Development Director for Lane Transit District;
- Michael York, Deputy General Manager of Operations for Cleveland RTA;
- Milind Joshi, sbX Program Manager for OmniTrans

**FTA Representative:** Eric Eidlin

**FHWA Representative:** Jermaine Hannon

**Pre-Exchange Corridor Tour: Monday, May 20 (tentative)**

Time (PST)	Topic	Lead Presenter
5:00 p.m.	Guided Bus Tour of Fresno's Blackstone/Kings County BRT Corridor  Meet in lobby of Holiday Inn, 1055 Van Ness Avenue	FAX (Ken Hamm and John Downs)

**Day 1: Tuesday, May 21 at Fresno Council of Governments**

Time (PST)	Topic	Lead Presenter
8:30 a.m.	<b>Welcome and Overview</b>  FTA and FHWA staff welcomes attendees, review the agenda, describe documentation/follow-up, and establish ground rules for discussions.	FTA, FHWA and Facilitator
8:40 a.m.	<b>City of Fresno Welcome and Goals</b>  Fresno welcomes participants and opens the exchange. Provides context	Host (Bruce Rudd)

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	on what motivated the peer exchange request and Fresno's goals for the day.	
8:50 a.m.	<b>Peer Agency Introduction and Goals</b> Brief summary (less than 5 minute) of their respective BRT system.	Peers
9:15 a.m.	<b>Session 1: Planning &amp; Implementation for Bus Rapid Transit (Overview)</b> <i>What are the steps and efforts an agency must take during the planning process for a bus rapid transit system?</i> <ul style="list-style-type: none"> <li>• Coordination among public and private agencies (MOUs)</li> <li>• Public outreach and communications</li> <li>• Organizational Structure</li> <li>• Establishment of performance management plan</li> <li>• Personnel Training</li> <li>• Realistic Ridership expectations (shifts from existing service)</li> <li>• Facility Needs</li> <li>• Fare Structures</li> <li>• Operational plans/Issues</li> <li>• BRT Vehicle experiences/suggestion</li> </ul> <b>Question and Answer Session (15 minutes)</b> <b>Highlights and Lessons Learned (5 minutes)</b>	Peers (led by Milind Joshi)
11:00 a.m.	<b>Fresno Council of Governments</b> Fresno COG discusses the MPO's transportation plan as it relates to its transit oriented development (TOD) program, policies and guidelines	MPO (Kristine Cai)
11:10 a.m.	<b>Break</b>	
11:20 a.m.	<b>Session 2: Planning and Project Delivery</b> <i>What are the steps and efforts an agency must take as a BRT project moves from planning through environmental review, design, and procurement? What are specific lessons learned?</i> <ul style="list-style-type: none"> <li>• Commissioning public artwork and integrating into the project development process</li> </ul> <b>Question and Answer Session (15 minutes)</b>	Host, peers (led by Tom Schwetz), and MPO

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	<b>Highlights and Lessons Learned (5 minutes)</b>	
12:15 p.m.	<i>Lunch</i>	
1:15 p.m.	<p><b>Session 3: Integrating Planning and Operations for BRT</b></p> <p><i>What was the impact of BRT on ridership and local services? Has BRT helped reduce the demand on the corridor in general? What are the lessons learned? Key elements of the discussion fall in two categories:</i></p> <p><b>Technical Considerations</b></p> <ul style="list-style-type: none"> <li>• Scheduling</li> <li>• Transfer service</li> <li>• Mode split</li> <li>• Coordination with traffic operations</li> <li>• Coordination with existing transit services</li> <li>• Identification of possible modifications needed</li> <li>• How are ITS technologies integrated into the system to improve planning and operations?</li> <li>• Fare collection/enforcement</li> <li>• BRT vehicle and station safety/security</li> </ul> <p><b>Process Issues</b></p> <ul style="list-style-type: none"> <li>• Developing a Corridor Management Strategy</li> <li>• Long-term financial viability</li> <li>• Integration into regional concept for transportation operations</li> <li>• Identifying opportunities for linkage between regional operations collaboration and regional planning</li> <li>• Responding to labor union concerns</li> </ul> <p><b>Question and Answer Session (15 minutes)</b>  <b>Highlights and Lessons Learned (5 minutes)</b></p>	<p><b>Host, peers (led by Michael York and June Devoll), and MPO</b></p>
2:30 p.m.	<i>Break</i>	
2:45 p.m.	<p><b>Small Group Discussions</b></p> <p>Audience divided into groups depending on areas of focus:</p> <ol style="list-style-type: none"> <li>1. <i>Communications/public outreach with June Devoll</i></li> <li>2. <i>Operations and Maintenance with Mike York</i></li> <li>3. <i>Financial Planning and Fiscal Constraint with Milind Joshi</i></li> </ol>	<p><b>Peers and Facilitator</b></p>

Time (PST)	Topic	Lead Presenter
	<p>4. <i>Land Use and Project Delivery with Tom Schwetz</i></p> <p>5. <i>Performance Measures with Terry Regan</i></p> <p>Each group brainstorms and discusses whether strategies described above by peer agencies can be implemented in Fresno.</p> <p><b>Report OUT</b></p>	
4:15 p.m.	<b>Wrap-up and charge for day 2</b>	<b>Terry Regan</b>
5:00 – 5:45 p.m.	<p><b>Walking tour of:</b></p> <ol style="list-style-type: none"> <li>1. Downtown BRT stop at Mariposa and Van Ness</li> <li>2. High speed rail station location</li> </ol>	<b>Host (Elliott Balch)</b>

**Day 2: Wednesday, May 22 at Fresno Council of Governments**

Time (PST)	Topic	Lead Presenter
8:30 a.m.	<p><b>Welcome, Review of Day 1 and Charge for Day 2</b></p> <p>Welcome, review of agenda, and recap of previous day discussion</p>	<b>FTA and Facilitator</b>
8:45 a.m.	<p><b>Session 4: Land Use and Bus Rapid Transit</b></p> <p><i>Where or how has BRT been integrated into development? What zoning changes or incentives were created to change the landscape along the corridor to boost ridership? How did you use the BRT investment to leverage development along the corridor?</i></p> <ul style="list-style-type: none"> <li>• City of Fresno overview of land use efforts (zoning changes, etc.)</li> <li>• Citywide or targeted zoning changes (peer perspective)</li> <li>• Incentivizing Transit Oriented Development</li> <li>• BRT attractiveness to choice riders</li> <li>• Economic impacts of BRT (on land values and employment)</li> </ul> <p><b>Question and Answer Session (15 minutes)</b>  <b>Highlights and Lessons Learned (5 minutes)</b></p>	<b>Host (led by Elliott Balch and Keith Bergthold), peers (led by Tom Schwetz and Michael York), and MPO</b>
10:15 a.m.	<b>Break</b>	
10:30 a.m.	<p><b>Session 5: Financial Planning and Fiscal Constraint</b></p> <p><i>Ensuring that the capital needs for the project as well as future needs fit</i></p>	<b>Host, peers (led by Milind Joshi), and MPO (Kathleen</b>

<b>Time (PST)</b>	<b>Topic</b>	<b>Lead Presenter</b>
	<p><i>within a financially constrained plan and TIP. Distinction between capital funding and operations funding. Identifying operating costs and funding needs as part of the annual budget process.</i></p> <p><b>Question and Answer Session (15 minutes) Highlights and Lessons Learned (5 minutes)</b></p>	<b>Healy)</b>
<b>12:00 p.m.</b>	<b>Lunch</b>	
<b>1:00 p.m.</b>	<p><b>Session 6: How to Measure Success</b></p> <p><i>How are you measuring the impacts of BRT investment on the corridor? What types of measures should be used to determine progress in implementation and operations of the BRT program? How should the BRT program be integrated into a regional system? What regional initiatives have been undertaken to move to a performance based planning process?</i></p> <p><b>Question and Answer Session (15 minutes) Highlights and Lessons Learned (5 minutes)</b></p>	<b>Terry Regan</b>
<b>2:00 p.m.</b>	<b>Open Discussion on Key Topics</b>	<b>Terry Regan</b>
<b>3:15 p.m.</b>	<b>Wrap-up &amp; Follow-up Actions (45 minutes)</b>	<b>Terry Regan</b>

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## Appendix D: Resources

### General Resources

National Bus Rapid Transit Institute: <http://www.nbrti.org/>

Federal Transit Administration: <http://www.fta.dot.gov/index.html>

Applicable ADA Requirements: <http://www.fta.dot.gov/civilrights/12325.html>

National Transit Database: <http://www.ntdprogram.gov/ntdprogram/>

### Case Studies and Best Practices

Accelerating Bus Rapid Transit: A Resource Guide for Local Leaders:

[http://www.iscvt.org/who\\_we\\_are/publications/Resource-Guide-Bus-Rapid-Transit-v1.pdf](http://www.iscvt.org/who_we_are/publications/Resource-Guide-Bus-Rapid-Transit-v1.pdf)

The BRT Standard 2013: [http://www.itdp.org/documents/BRT\\_Standard\\_ENGLISH\\_pub.pdf](http://www.itdp.org/documents/BRT_Standard_ENGLISH_pub.pdf)

### Land Use Impacts of BRT

Land Use & Property Value Impacts of BRT: [http://otrec.us/images/uploads/OTS2012\\_Perk.pdf](http://otrec.us/images/uploads/OTS2012_Perk.pdf)

### Fresno BRT Resources

Fresno County PTIS: <http://www.kimley-horn.com/Projects/fasttrackfresnocounty/>

Bus Rapid Transit Master Plan: <http://www.fresno.gov/NR/rdonlyres/46E037A5-7C80-4A5A-935D-DCE67B77A230/0/FresnoBRTMasterPlan20080617.pdf>

FastTrack Fresno County: <http://www.kimley-horn.com/Projects/fasttrackfresnocounty/index.asp>

Fresno DTIS: <http://www.fresno.gov/NR/rdonlyres/46E037A5-7C80-4A5A-935D-DCE67B77A230/0/FresnoBRTMasterPlan20080617.pdf>