APPENDIX E

DETAILED CASE STUDIES

TABLE OF CONTENTS

CASE STUDY SUMMARY

This document summarizes the results of eleven case studies conducted as part of Task 9 and Task 12 of *TCRP B-38: Guidelines for Providing Access to Public Transportation Stations*. In total, more than 70 people were interviewed for the case studies, including staff from transit agencies, local jurisdictions, Metropolitan Planning Organizations (MPOs), and state departments of transportation. Table 1 summarizes the interviewees for each case study. In addition, all eleven transit agencies were visited in person by members of the research team to collect data and better understand local conditions.

Table 1 Summary of Case Study Interviewees

Case Study Agency	Interviewees	
BART	• Val Menotti, BART • Jeff Ordway, BART • Kevin Hagerty, BART • Maureen Wetter, BART • Cory LaVigne, AC Transit	• Tina Spencer, AC Transit • Kathy Kleinbaum, City of Oakland • Kathy Livermore, City of San Leandro • Wendy Silvani, Emery-Go-Round
LA Metro	• Alexander Kalamaros, Metro • Ashok Kumar, Metro • Stewart Chesler, Metro • Jesse Simon, Metro • Robin Blair, Metro	• Lynne Goldsmith, Metro • Tham Nguyen, Metro • Walt Davis, Metro • Susan Harrington, Caltrans
MARTA	• Ted Tarantino, MARTA	• Darryl P. Connelly, MARTA
MBTA	• Joseph Cosgrove	
Metro-North	• Daniel O'Connell, Metro-North	• Linda Corcoran, Metro-North
New Jersey Transit	• Vivian Baker, NJ Transit • RJ Palladino, NJ Transit • Tom Marchwinski, NJ Transit • Brent Barnes, NJ DOT	• Cindy Solomon, City of Rahway • John Hagerty, Town of Woodbridge • Marta Lefsky, Town of Woodbridge
OC Transpo	• Colin Simpson, City of Ottawa • Colleen Connelly, City of Ottawa	• Chris Brouwer, City of Ottawa
RTD Denver	• Jeff Becker, RTD • Bill Sirois, RTD • Jesse Carter, RTD • Robert Rynerson, RTD	• Errol Stevens, RTD • Mac Callison, City of Aurora • O'Neill Quinlan, RTD Board (former) • Mike Flarety, City of Englewood.
Sound Transit	• Scott Kirkpatrick, Sound Transit • Mike Williams, Sound Transit • Leonard McGhee, Sound Transit • Rebecca Roush, Sound Transit • Kate Lichtenstein, Sound Transit • Matt Shelden, Sound Transit	• Val Batey, Sound Transit • Mark Johnson, Sound Transit • Greg Walker, Sound Transit • Tony Mazzella, City of Seattle • Sara Robertson, City of Seattle

Case Study Agency	Interviewees	
TriMet	• David Unsworth, TriMet • Eric Hesse, TriMet • Jilian Detweiler, TriMet • Joe Recker, TriMet • Young Park, TriMet	• Colin Maher, TriMet • Tony Mendoza, Metro • John Mermin, Metro • Wendy Hemmen, City of Milwaukie
WMATA	• John Magarelli, WMATA • Mark Kellogg, WMATA • Patrick Schmitt, WMATA • Matthew Zych, WMATA • Krys Ochin, WMATA • Robin McElherny, WMATA • Scott Peterson, WMATA	• John Dittmeier, WMATA • Kristin Haldeman, WMATA • Wendy Jia, WMATA • Richard Stevens, Fairfax County • Charles Kines, Montgomery County • David Aspacher, Montgomery County • Gary Erenich, Montgomery County

The results of the case studies presented in this document will be used to inform the guidance developed through the TCRP B-38 research project, particularly through Task 10: Present Improved Methods. As such, overall conclusions drawn from the case studies are presented in the body of Task 10 Working Paper #4; this appendix simply presents the case studies themselves, without general discussion.

Each case study is organized into five primary sections:

- *Theme* – This section briefly describes in two to three paragraphs the overall content and key messages of the case study.

- *Lessons Learned* – This section summarizes lessons derived from the case study that may be generalized to other agencies. The lessons learned will play a key role informing the results of Task 10.

- *Background* – This section provides information that is not necessarily-related to access, but that is important context for understanding the remainder of the case study. This section also provides a summary table of basic information for each case study (e.g., urban area size, total route miles, etc.).

- *Process* – This section provides detailed information regarding the transit agency's access planning programs, policies, and actions. The section is organized around the 10-step process described for access planning in the Interim Report. However, the research team condensed the process to eight steps following initial review of the case study results, to more accurately reflect actual planning experiences. Figure 1 shows this 8-step process.

Figure 1 Access Planning Process Flow Chart

No single case study covers all eight steps, to allow each case study to focus in more detail on specific aspects of a transit agency's practices. Considered in total, however, the case studies comprehensively cover each step of the process shown in Figure 1. Table 2 summarizes the process steps covered for each case study.

Table 2 Case Study Topic Area Summary

Case Study Transit Agency	Process Step							
	1	2	3	4	5	6	7	8
BART			✓			✓	✓	✓
LA Metro			✓		✓			
MARTA			✓			✓		
MBTA	✓		✓	✓				✓
Metro-North	✓	✓						✓
NJ Transit		✓	✓			✓	✓	✓
OC Transpo		✓	✓			✓		✓
RTD Denver			✓				✓	✓
Sound Transit	✓	✓	✓	✓				
TriMet	✓	✓	✓				✓	✓
WMATA	✓	✓	✓	✓	✓	✓	✓	

- *Example Applications* – This section provides example applications for each transit agency, detailing how the agency's process is applied in practice. While the process section of the case studies describe agency-wide practices, the case applications typically focus on specific stations at which access improvements have successfully been made. Background information is provided for each station, including summary statistics and an aerial with a half-mile buffer around the station highlighted, in addition to a detailed description of local access issues.

NOTE: Unless otherwise noted, all images and photographs in the case studies are from the transit agency being studied.

Bay Area Rapid Transit (BART)

Using Policy and Data to Drive Access Decisions

THEME

Bay Area Rapid Transit (BART) has one of the most well-developed transit station access planning programs in the United States. The program's policy basis is the agency's 2003 Station Access Guidelines, which identify an access hierarchy prioritizing low-cost, high-capacity modes (in order of priority: pedestrian, transit, bicycle, drop-off, and park-and-ride), and describe planning principles for each mode. This framework allows BART to effectively work with the numerous local jurisdictions, transit agencies, shuttle operators, and other stakeholders located within its service area, and to apply a consistent process to stations system wide.

The policy framework is supported by an extensive data collection program and set of analysis tools. In particular, BART's 1998 and 2008 Passenger Profile Studies provide a wealth of data, including access mode shares at each station and station-area economic profiles. These studies provide the data necessary to set realistic goals for serving access needs and shifting them toward more sustainable and less costly modes. BART has also developed several analytic tools to help inform decision making, including a spreadsheet model to trade off costs and benefits between TOD and parking scenarios and ongoing development of a ridership model sensitive to the factors that drive access decisions.

LESSONS LEARNED

- Developing Station Access Guidelines provides value in supporting collaborative planning efforts. At the same time, Guidelines must remain flexible to be successfully applied.
- Timely data on access mode characteristics is critically important for effective service and facility planning. Periodic intercept surveys of access modes and preferences supports trend-tracking and provides objective information for planning and decision making.
- Locally-developed tools are useful for predicting and analyzing access mode utilization in response to service and facility changes.
- Rapid transit agencies need effective means of understanding and coordinating with other local transit agencies and shuttle service providers to assure riders seamless services.
- It is important to address tradeoffs between TOD and park-and-ride facilities from all perspectives (e.g., the developer, rapid transit agency and local community). Balancing these interests may require subsidies.

BACKGROUND

Urban Area:	San Francisco, California
Urban Area Population:	4.2 Million
Service Area Population	0.8 Million
Year Started:	1972
Total Route Miles:	104
Number of Stations:	43
Park-and-Ride Spaces:	46,000
Daily Ridership:	330,000
Maximum Distance from CBD:	30 miles

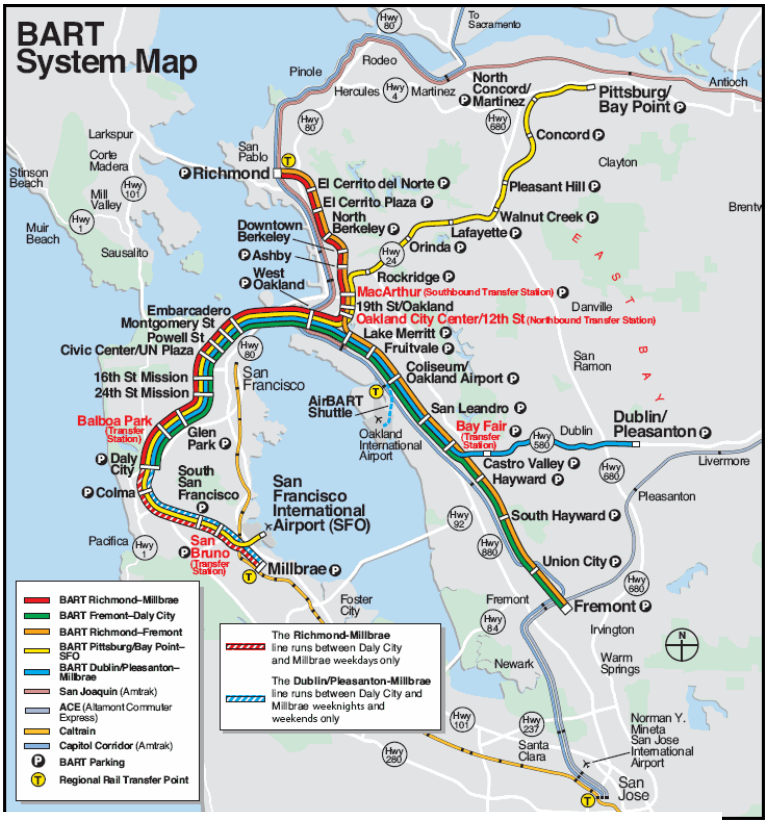
BART operates the heavy rail system in the San Francisco Bay Area. BART is a truly regional system, with stations in 22 separate jurisdictions, and no more than eight stations in any single jurisdiction. BART depends on multiple local bus systems and over 50 shuttle services to provide feeder service to its stations. As a result, station access planning for BART is necessarily a collaborative process with a different set of stakeholders at each station. BART operates approximately 47,000 parking spaces at 32 stations, and park-and-ride access accounts for approximately 39 percent of all BART origin trips. Parking is provided in both surface lots and parking garages.

PROCESS

Step 3. Develop Objectives and Principles

Station Access Program

BART's station access planning program falls under three sections of the planning department, and activities are coordinated through the Executive Management Group. Access planning at BART is funded through the agency's operating budget. Over the past several years, approximately 25 percent of parking revenues have been allocated to the station access program. However there is no guaranteed or dedicated source of funding for access planning.



BART System Map

Projected operating budget shortfalls, and a need for massive capital reinvestment, put future funding for access facilities in jeopardy. In addition to direct agency funding, BART actively pursues grant opportunities to improve access.

Station Access Guidelines

BART's 2003 Station Access Guidelines form the basis for station access planning activities. The document provides access guidelines intended to help BART optimize access to stations for all modes, and has three major components:

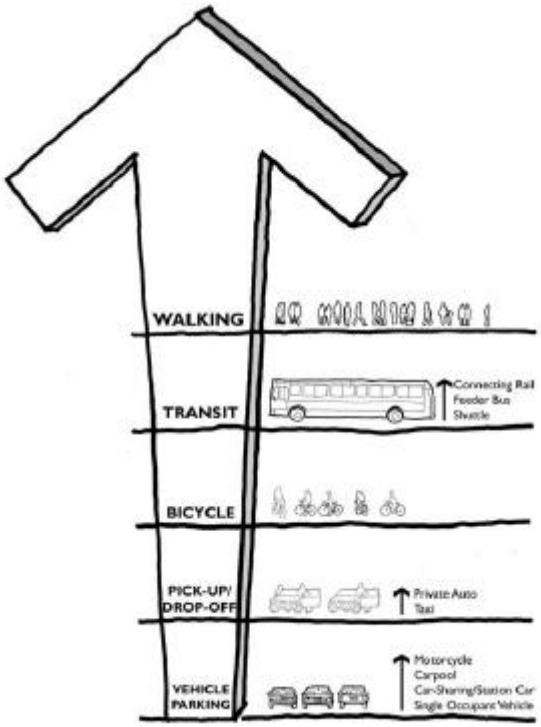


Exhibit 1-1 BART Access Hierarchy

- Chapter 2 describes an access hierarchy directing BART to prioritize low-cost, high capacity modes. Chapter 2 also sets system wide access mode targets based on past performance and the desire to shift access to modes located highest on the hierarchy. For instance, the Guidelines target a system-wide reduction in drive-alone access from 38 percent in 1998 to 31 percent in 2010.
- Chapters 2 and 3 relate each access mode to BART and regional policy, and provide detailed information on key planning considerations for each mode (e.g., pedestrian routes should be direct, minimize driver search time for parking spaces, etc.).
- Chapter 4 addresses the inevitable conflicts associated with attempting to accommodate all modes, including competition for space and direct conflicts amongst modes. The document identifies three guiding principles for negotiating these conflicts: (1) position in the hierarchy of access modes; (2) cost per new rider (i.e., prioritize the most cost-effective improvements); and, (3) local context, including recognition that park-and-ride will remain the primary access mode for many suburban stations for the foreseeable future.

Parking Policy

BART operates over 46,000 parking spaces at 32 stations, and according to its 2008 passenger survey 39 percent of BART patrons park-and-ride, either driving alone or carpooling. However, due to BART's commitment to encouraging non-auto access and limited opportunities to develop new parking, BART does not plan any significant parking expansions apart from parking associated with new station construction. Rather, with half of BART's parking facilities full by 8:30 a.m., the focus is on better management of existing parking demand through a variety of paid-parking programs.

Until 2002, parking at all BART stations was free. The first paid parking was monthly reserved parking, which allows passengers to purchase guaranteed parking near the entrance to a station until 10 a.m. on weekdays. Monthly parking fees vary from station to station within a range of $30.00 to $115.50 based on demand. The number of spaces set aside for monthly reserved parking under current authorization cannot exceed 25 percent at East Bay stations and 40 percent at stations located on the west side of the San Francisco Bay (the "West Bay stations"), with the remainder available on a first-come, first-served basis. Despite the intent to set price based on demand, as of November 2010, there are waiting lists to purchase monthly parking permits at approximately two-thirds of BART stations, indicating the difficulty of implementing a purely "market-based" pricing strategy.

In 2005, the Board of Directors approved several new parking programs designed to enhance revenues, including criteria-based daily weekday parking fees at selected stations. The criteria for implementing daily weekday parking fees are (i) parking at such stations is filled three or more days a week and at least 15 percent of the parking spaces at such station are sold as monthly reserved parking or (ii) the local government jurisdiction requests that the District implement a daily fee. Twenty-three stations currently have daily parking fees, which range from $1.00 (the fee at 20 of the 23 stations) to $5.00 at West Oakland.

Parking fees are a significant source of revenue for BART, with approximately $12 million generated in Fiscal Year 2009 (over one-third of overall non-fare revenues).

Transit Oriented Development Policy

BART actively encourages TOD and is heavily involved in promoting development around its transit stations. Over half of BART stations currently have TOD projects in some stage of planning or construction. The agency's Transit Oriented Development Policy and associated Guidelines provide the basis on which TOD planning and development around BART stations is undertaken. Access plays a central theme in BART's TOD design guidelines and is based on access principles developed in the Access Guidelines (e.g. direct connections, security, and simplicity).

Securing replacement parking for TODs has been a major challenge. Traditionally, BART has required one-to-one parking replacement for TODs, that is, developers must replace any surface parking lost to development with parking (typically structured) elsewhere on the site. The high costs of providing this parking had stalled TOD plans at several stations, or the need to subsidize costs of replacement parking. BART's Board relaxed the replacement parking policy, and a net reduction in parking spaces of up to 25 percent is now allowed to secure TOD. Concurrence of the Board is required in each case, and achieving this approval remains challenging. To support this process BART developed a unique spreadsheet-based tool to evaluate ridership and fiscal tradeoffs associated with various parking replacement scenarios (see Step 6 discussion of tools).

California's Proposition 1C, funding to construct affordable housing near public transit has provided a source of revenue to address replacement parking issues as well.[1] Proposed redevelopments at MacArthur, San Leandro, and South Hayward stations have all received Proposition 1C funding, which will help to pay for replacement parking. For instance, San Leandro's Proposition 1C grant will provide $10.3 million to construct a replacement garage for BART.

In addition to potential ridership and revenue impacts associated with reducing parking through TOD, there are often community concerns about parking spillover as well. BART is interested in participating in a parking benefit district pilot, in which parking revenues within a station area would be returned to a benefit district to fund local improvements. Such an approach may provide incentives for communities to accept plans that might increase spillover parking within surrounding areas, but so far there are no interested communities.

Bicycle Access Program

BART is actively engaged in improving bicycle use to its stations. The 2002 Bicycle Access and Parking Plan formed the basis for the bicycle access program. The plan is a component of BART's Station Access Guidelines and provides the agency with the strategies necessary to enhance the attractiveness of the bicycle as an access mode. Currently, BART provides many station amenities for cyclists, including bicycle racks, bicycle lockers, and bike stations.

BART allows bicycles on most trains with the exception of peak-direction rush-hour trips, but recent increases in the number of bikes are reducing the ability of the system to accommodate bikes on-board transit vehicles. Currently, less than half of BART riders arriving by bicycle park their bikes at the station, with the remainder bringing their bikes on-board. BART's bicycle parking programs are designed to encourage more riders to park their bikes at their origin stations.

BART's goal is to maintain a hierarchy of bike parking facilities, recognizing that a variety of parking types are required to meet users' needs. Bicycle racks are provided at stations in both covered and uncovered locations.

BART also has considerable experience installing and operating bike lockers at its stations. Lockers were originally rented on an annual basis to customers. However, this system led to long wait lists for locker reservations, while actual utilization of individual lockers was only 20 to 25 percent. To increase efficiency, BART implemented an electronic SmartCard system, where lockers are rented by the day on a first-come, first-serve basis. Nearly 300 lockers are available through the electronic locker program.

In addition to bike lockers, there are Bike Stations located at three BART stations (Fruitvale, Downtown Berkeley, and Embarcadero). These stations provide free, attended bike parking

[1] State of California program to provide subsidies to transit oriented development projects; among other things, funds can be used to pay for replacement parking.

during operating hours, and in some cases have repair and rental facilities available. While popular, finding sufficient operating funding for Bike Stations is difficult, resulting in limited expansion opportunities. To fund bicycle parking, BART aggressively pursues grant opportunities through the regional Metropolitan Planning Organization (MPO) and other sources.

Station Access Studies

In addition to system wide planning and policy efforts, BART has a coordinated program to develop detailed station access plans for individual stations. While the critical issues to address differ by station, each plan incorporates a review of local plans and policies; stakeholder outreach; an assessment of opportunities and constraints by access mode; and recommended improvements. BART's overall goals for station access plans are to improve the experience of riding BART, to maintain a safe, attractive station environment, and to support and sustain BART operations with revenue from development.

Access plans for many stations were completed in 2002 and 2003, after the Board of Directors initially directed BART to perform a series of access studies. However, BART has continued to fund additional station-specific access studies as critical issues arise. For instance, the 2008 MacArthur BART Station Feasibility Study was developed to inform the station-area redevelopment process (see MacArthur Station Example Station below).

Step 6. Predict Outcomes and Apply Criteria

To support its access programs, BART has developed a variety of innovative predictive tools. Of particular interest are its spreadsheet tool to assess TOD scenarios and its Direct Ridership Model (DRM).

TOD Evaluation Spreadsheet

BART's TOD Evaluation spreadsheet is a method for testing the impacts of alternative station development scenarios, with an emphasis on assessing the trade-offs between providing commuter parking and encouraging transit-oriented development.[2] The model was developed for planning applications to develop an objective method for considering impact of lost parking capacity through transit-oriented development in BART station areas.

The model assesses both the impact of the development scenario on transit ridership and the financial impact to BART. Ridership impacts include both lost riders from reduced parking and new riders gained through transit-oriented development. Financial impacts include changes in

[2] Willson, Richard and Val Menotti, "Commuter Parking Versus Transit-Oriented Development: Evaluation Methodology," *Transportation Research Record*, Number 2021, pp. 118-125 (2007).

parking revenue and the ability of new development to pay for itself through rent. Thirteen total model inputs are used, including current access mode shares, parking costs, elasticities, and land values. BART has used the tool to evaluate potential parking replacement options for several proposed station development projects. Portions of this tool were incorporated into the Transit Station Access Spreadsheet tool developed as part of the TCRP B-38 project.

Direct Ridership Model

BART has worked extensively with consultants to update its travel demand forecasting model to allow it account for changes to station access features (e.g., pedestrian accessibility, bike parking, and TOD). The result is its Direct Ridership Model (DRM), which is based on analysis of nearly 100 variables on ridership outcomes based on the results of BART's 2008 passenger survey. The model uses linear regression and provides ridership estimates for four access modes (walk/bike, drop-off, park-and-ride, and feeder transit). Walking and biking were combined due to the lack of sufficient data to construct a significant bike access model.

Step 7. Tradeoffs, Negotiation, and Choice

Because of BART's role as a regional agency, it must coordinate with transit agencies, private shuttle services, developers and local jurisdictions on a daily basis to develop access improvements. Each of these groups may have differing objectives on a given project. For instance, connecting transit agencies may be most interested in obtaining the maximum number of bus bays as close to the station entrance as possible, while developers may wish to locate buses farther from the station due to concerns about the noise and aesthetic impacts of buses. The process for conducting these negotiations and reaching an amenable choice varies between projects, as BART is often not the lead planning agency.

The examples described below provide more information on the range of engagement processes used by BART for various projects. For instance, the developer prepared the Environmental Impact Review for MacArthur Station, while the City of Oakland led the access study; the City of San Leandro led planning for TOD at the San Leandro Station; and AC Transit led planning for a redesign of the Coliseum Station as they were the grant recipient. This procedural diversity makes BART's clear description of its policy goals even more important to ensure consistent outcomes in station improvement projects.

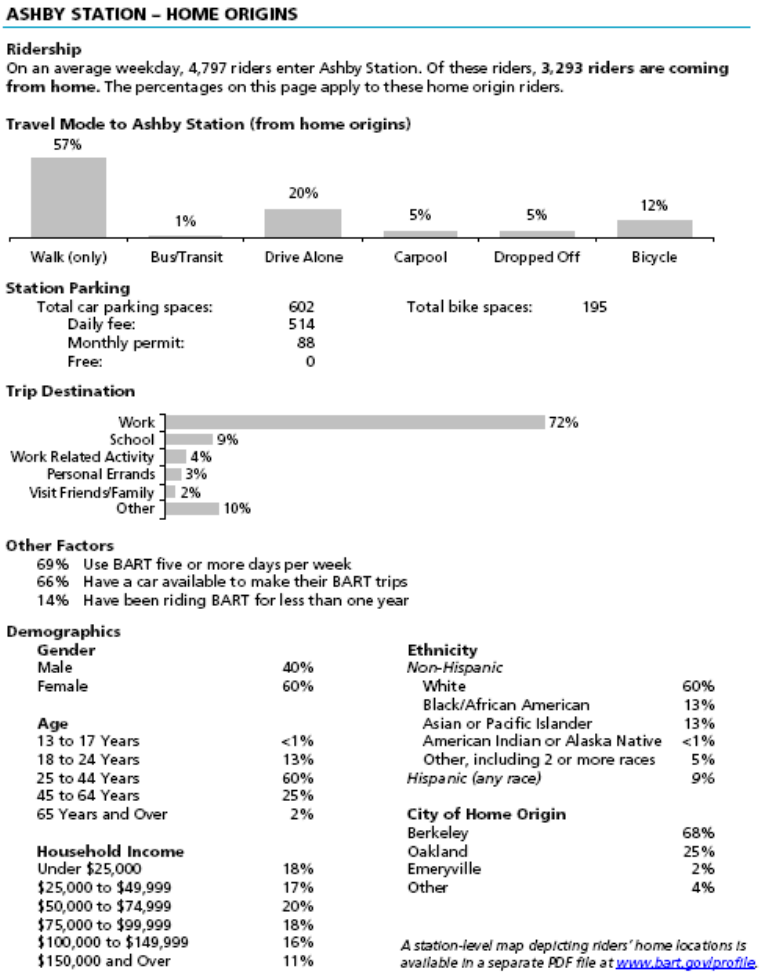
Step 8. Implementation and Monitoring

To support its access program, monitor its effectiveness, and develop evaluation tools, BART collects a wide-range of useful data on access patterns.

Surveys

BART's 2008 Station Profile Report summarizing the results of its 2008 passenger survey provides a wealth of data to BART to support access planning efforts and assess whether it is achieving its goals.[3] The 1998 passenger survey complements the 2008 survey, allowing for trends over the past decade to be assessed. The 2008 survey collected data from over 50,000 BART riders through mail-back surveys and includes information on access mode, egress mode, trip purpose, vehicle ownership, and demographics.

Of particular importance to access planning is that the large sample size allows the data to be summarized at a station level. This allows BART to produce individual summaries for each station in the system with access mode and other travel data to inform BART planning and prioritization efforts. Access trip origins are geocoded to support GIS mapping to understand access patterns and support planning activities. The figures here show example summaries for the BART Ashby Station.



ASHBY STATION – HOME ORIGINS

Ridership
On an average weekday, 4,797 riders enter Ashby Station. Of these riders, **3,293 riders are coming from home.** The percentages on this page apply to these home origin riders.

Travel Mode to Ashby Station (from home origins)

Station Parking

Total car parking spaces:	602	Total bike spaces:	195
Daily fee:	514		
Monthly permit:	88		
Free:	0		

Trip Destination

Other Factors

69% Use BART five or more days per week
66% Have a car available to make their BART trips
14% Have been riding BART for less than one year

Demographics

Gender		**Ethnicity**	
Male	40%	*Non-Hispanic*	
Female	60%	White	60%
		Black/African American	13%
Age		Asian or Pacific Islander	13%
13 to 17 Years	<1%	American Indian or Alaska Native	<1%
18 to 24 Years	13%	Other, including 2 or more races	5%
25 to 44 Years	60%	*Hispanic (any race)*	*9%*
45 to 64 Years	25%		
65 Years and Over	2%	**City of Home Origin**	
		Berkeley	68%
Household Income		Oakland	25%
Under $25,000	18%	Emeryville	2%
$25,000 to $49,999	17%	Other	4%
$50,000 to $74,999	20%		
$75,000 to $99,999	18%		
$100,000 to $149,999	16%		
$150,000 and Over	11%		

A station-level map depicting riders' home locations is available in a separate PDF file at www.bart.gov/profile.

Ashby Station Rider Profile

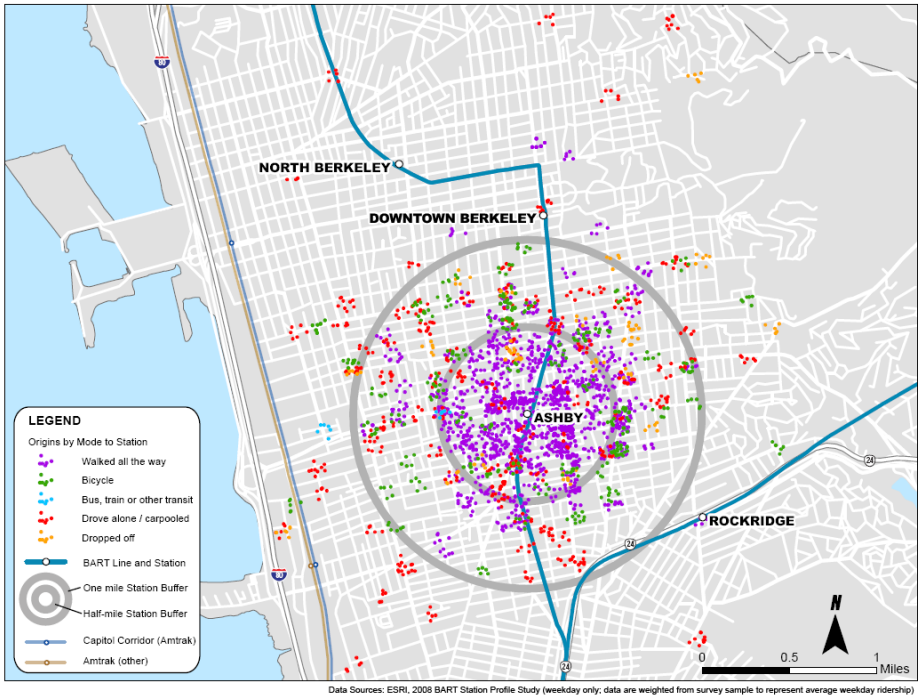
Parking Studies

To complement its implementation of parking fees at many stations, BART has completed or assisted in a number of studies to assess the impacts of parking fees on ridership. Overall, these studies have shown minimal impacts of pricing due to high overall demand. For instance, BART examined station ridership for a two-week period before and two-week period after parking fees at were implemented at the first ten stations within the system in 2005 and 2006. This analysis showed a negligible change in overall ridership: across the ten stations, average weekday ridership changed by only .04 percent, with no station experiencing more than a 2 percent decrease in boarding.

[3] http://www.bart.gov/docs/StationProfileStudy/2008StationProfileReport_web.pdf

BART also sponsored a study by UC Berkeley researchers that performed license-plate and mail-back surveys following parking fee implementation at three stations. The study showed no evidence that that the fees altered access modes to BART stations, although the arrival patterns of park-and-ride patrons did become flatter (i.e., the lot became full later in the day after the fees were implemented).

Ashby Station: Home Locations of BART Riders by Mode



Map of residences and access modes for Ashby Station

BART has experienced only one case where increased parking fees resulted in a significant drop in ridership: a parking fee increase from $2.00 to $3.00 at Daly City in 2009. After 14 months of monitoring, the fee was reduced to $2.00 again in 2010.

Overall, the data collection and monitoring that BART performed in conjunction with its parking pricing programs has eased concerns of negative impacts from the Board of Directors and allowed daily parking fees to be extended to over two thirds of BART stations with parking. Moreover, because of the potential for additional revenue generation and the limited observed impacts to ridership, the Board of Directors is interested in moving toward even more market-driven parking price strategies in the future.

Shuttle Systems

Twenty-three percent of egress trips from BART are made via shuttles which is up from 19 percent in 1998, making understanding and planning for shuttle use an important component of BART's access program. However, the over 50 separate shuttle systems provide service to/from BART stations make it difficult to monitor and plan for shuttle activity.

To address the lack of data on shuttle systems and their patrons, BART partnered with the Bay Area Clean Air Partnership (BayCAP) to inventory shuttle services and conduct rider surveys of shuttle users connecting to BART service. The survey was designed to provide BART planners with a standardized, carefully defined approach to gather key customer information. The survey included seven shuttle programs to capture the range of shuttle programs serving BART stations.

Through BayCAP, BART also collected data on the types of service, fares, funding sources, and ridership for over 50 shuttle systems.

EXAMPLE APPLICATIONS

Coordinating with Local Transit: The Case of AC Transit

BART is a rail-only transit agency, and connections at stations are provided by a variety of local transit operators. Transit access (commuter rail, feeder bus, and shuttles) ranks second on BART's access hierarchy (after pedestrians), and planning for system coordination is a high priority. AC Transit is one of the largest bus-only transit operators in the country with over 230,000 daily riders and service to approximately 20 East Bay BART stations, making coordination between AC Transit and BART critical for access to East Bay Stations.

However, despite the high rank of transit in BART's access mode hierarchy, transit access to BART fell from 23 percent in 1998 to only 15 percent in 2008. Potential reasons for this decline include service cuts by bus operators, increased popularity of (and supporting facilities for) cycling as an access mode, and continued lack of a coordinated fare structure between BART and other transit agencies. In addition, recent extensions of BART have been in suburban areas that tend to be auto-oriented (e.g., Dublin, Millbrae).

Coordination between BART and AC Transit occurs in a number of different ways, and primarily centers around two issues: station design and bus access; and fare reciprocity. On the first issue, AC Transit's primary goal is to have as many bus bays as possible located as close as possible to the station entrance. In the past, AC Transit has received FTA grants for BART station enhancements to improve bus access. These have included a reconfiguration of the Coliseum and San Leandro BART stations to create bus bays. BART and AC Transit worked together closely on the designs of these stations.

One challenge for AC Transit is to ensure that adequate bus transfer facilities are provided in station-areas TOD. Many developers continue to prefer buses to be located away from the front-door of developments due to noise and aesthetic concerns. This led to a design for the Fruitvale Transit Village, which AC Transit considers subpar because the bus transfer facility is not integrated into the development. However, more recent station planning efforts have effectively engaged AC Transit from the outset. These efforts were part of technical advisory committees for TOD planning at both the MacArthur and San Leandro stations. Through this involvement, AC Transit was able to influence the ultimate designs and ensure that adequate bus transfer facilities are included in the station designs.

The other primary barrier to connections between BART and other transit providers is fare coordination. Fares are currently not coordinated with fares for local transit operators, which is seen as a barrier to improving the quality of feeder transit access. BART and AC Transit participated in developing a coordinated electronic fare medium (the Translink smart card) that works on multiple transit systems throughout the Bay Area. Coordinated fare structures are not

included in the initial roll-out but may be a potential future phase of the project. Developing a coordinated fare structure that facilitates transferring between transit providers, however, will require revenue sharing agreements between agencies that may be difficult to develop.

MacArthur BART Access Improvements and TOD

Station Name:	MacArthur
Location:	Oakland, California
Station Type:	Intermodal Transit Center
Year Opened:	1972
Distance from CBD:	2 miles
Parking Spaces:	600
Feeder Transit:	5 AC Transit routes, Emery-Go-Round shuttle
Bike Parking:	Racks and 40 electronic lockers
Employment:	3,230
Population:	9,460
Daily Boardings:	7,800

Source: © 2011 Google

The MacArthur BART Station is located in northern Oakland in the median of the Route 24 freeway. The station includes a 600-space surface parking lot adjacent to the station entrance and is served by several bus lines. It is also the main terminus for the Emery-Go-Round shuttle, a free service that which carries approximately 4,500 daily riders, most of whom transfer to BART at MacArthur Station. Access to the station is balanced between all modes, with the following access mode shares according to the 2008 BART survey:

- Walk – 35%
- Drive-alone – 27%
- Transit – 15%
- Bike – 8%
- Car-pool or drop-off – 13%

Both the City of Oakland and BART have considered the station's parking lot a prime location for TOD since the early 1990s, due to its location across from the BART station and direct access to three of BART's five lines. This interest culminated in the City's selection of a development team in 2004 to perform the necessary environmental review through the California Environmental Quality Act (CEQA). Because of BART's prior experiences that CEQA review typically focuses too heavily on roadway improvements at the expense of promoting alternative modes, BART also required the City to complete a parallel Access Feasibility Study in addition to the CEQA review.

The MacArthur Access Feasibility Study was completed in 2008 and is intended to provide a blue-print to guide access improvements over time. The Access Feasibility Study considers the

needs of each primary access mode based on BART's Station Access Guidelines, prioritizes recommended improvements into three tiers based on feasibility, and estimates the costs and benefits of each improvement. Recommended improvements include reserved car-pool parking, shelters at shuttle stops, improved wayfinding, and establishing a parking benefit district in the residential areas surrounding the station.

The Access Feasibility Study also analyzes the potential impacts of various replacement parking scenarios with TOD concepts. Using the TOD-parking spreadsheet tool described above, the Study estimated both the ridership increase expected from the development and the decrease expected from the loss of parking. This analysis showed that a TOD with 675 units would generate 850 new daily trips, while a loss of 50 percent of on-site parking and assumed loss of all on-street parking (through the residential parking permit) would reduce BART ridership by 840 daily trips. This analysis was used to justify the potential loss of some parking to the BART Board, resulting in the ultimate approval of an 85 percent parking replacement ratio.

Through the Access Feasibility Study and EIR, numerous aspects of the project's design were modified to satisfy stakeholder needs, and many recommendations from the Access Feasibility Study are included in the developer agreement. Access-related components of the approved project design include:

- Shelters for shuttle patrons near the entrance to the station;
- Replacement parking for 400 of the existing 600 BART parking spaces, with a commitment to park an additional 110 BART patrons on the site (e.g., through shared-parking agreements);
- Reconfiguration of the existing station frontage road to better accommodate shuttle services;
- Funds to institute a residential parking permit program based on community concerns regarding spillover BART parking; and,
- Commitment to find space to locate a high capacity bike parking facility.

San Leandro

Station Name:	San Leandro
Location:	San Leandro, California
Station Type:	Suburban Neighborhood
Year Opened:	1972
Distance from CBD:	9 miles
Parking Spaces:	1,270
Feeder Transit:	Served by 5 AC Transit routes
Bike Parking:	Racks and 20 electronic lockers
Employment:	6,350
Population:	7,700
Daily Boardings:	5,300

Source: © 2011 Google

The San Leandro BART station is located approximately a half-mile from downtown San Leandro. The station includes almost 1,300 surface parking spaces in several lots, as well as a bus transfer facility with approximately 10 bus bays. Access to the station is primarily via auto, with the following access mode shares according to the 2008 BART survey:

- Drive-alone – 48%
- Walk – 23%
- Car-pool or drop-off – 21%
- Transit – 7%
- Bike – 3%

Over the past several years, the City has developed a detailed and ambitious Downtown TOD Strategy through a grant from the Metropolitan Transportation Commission (the regional MPO). The San Leandro BART Station is a major focus of the strategy (the other major focus is along a proposed BRT route). To develop the strategy, the City formed both a Technical Advisory Committee and Citizens Advisory Committee to work through details and reach consensus. The EIR for this strategy was completed in 2007, and included many components that would typically be included in a station access plan.

One issue that was particularly controversial for the public was the replacement parking for the BART station. Because of concern over patron's access to non-auto modes to reach BART, the Citizens Committee pushed hard for full replacement parking. The approved TOD Strategy called for only 50-75 percent replacement, however, based on market analysis and parking demand. However, due to the receipt of $24 million of Proposition 1C funds to support station-area development, current plans are to provide full replacement parking as desired by the community.

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Los Angeles County Metropolitan Transportation Authority (Metro)

Experimentation and Options

THEME

The Los Angeles County Metropolitan Transportation Authority (Metro) operates one of the largest and most heavily used public transportation systems in the United States. Several of the Orange Line's 14 stations, including North Hollywood and Warner Center, have plans for station-area transit-oriented development (TOD) and expect zoning changes from local jurisdictions to support them. Metro also operates bus ways on two freeways in Los Angeles County. In particular, the El Monte Bus Station on the San Bernardino Freeway (I-10) is a unique example of a planned joint-development at a bus station, and involves the state DOT the state DOT (Caltrans), City of El Monte, developer, and Metro.

Three documents guide joint development access and service issues: Metro's *Joint Development Policies and Procedures* (revised October 2009), Metro's *Parking Policy* (July 2003), and *Transit Service Policy* (September 2009). These documents represent best practice strategies and contain guiding principles. However, there are no specific guidelines and performance measures for station development since each station site is different. These documents are used to reflect the desires of the Metro Board in the approval process.

LESSONS LEARNED

- Good pedestrian access is essential. From an urban design perspective, the pedestrian access system should extend the "reach" of the station environment.
- Access issues and improvement strategies are generally consistent across line-haul modes, and Metro does not distinguish between line-haul modes in their policies.
- Bicyclists vary considerably in their characteristics and trip purposes. A variety of strategies and parking types are needed to encourage bicycle access to transit while minimizing the number of full-size (i.e., non-folding) bikes that are brought onto transit vehicles. Development of a Bicycle Strategic Plan has been important to Metro's success in achieving this.
- Metro plays an active role in fostering development around rapid transit stations and working closely with communities and developers.
- Adequate parking for transit riders is essential. When transit oriented development takes place, more rather than less parking is often provided. Parking changes are made only where they will not inhibit ridership.

- Joint development often limits bus layover facilities, thus reducing the bus capacity of a site. Therefore, it is important to maintain and/or increase the number of bus layover spaces for joint development projects.
- Transit agencies with significant joint-development opportunities benefit from policies that establish desired outcomes and evaluation criteria for proposed developments.
- Successful joint-development requires frequent inter-agency coordination, as joint-development almost always requires approval from at least two agencies (the transit agency and local jurisdiction), and often more (e.g., redevelopment agencies, state departments of transportation, etc.).

BACKGROUND

Urban Area:	Los Angeles, California
Urban Area Population:	11.8 M
Service Area Population:	8.6 M
Date started:	20 years
Total Route Miles:	Heavy Rail – 16 BRT – 15 Light Rail - 62 Express Bus – 2 freeway based express bus facilities totaling 23 miles in length
Number of Stations:	Heavy Rail – 16 BRT – 14 Light Rail - 56 Express Bus – 10 freeway stations
Park-and-Ride Spaces:	16,524 at rail and BRT stations
Daily Ridership:	340,000
Maximum Distance from CBD:	Heavy Rail – 13 miles BRT – 25 miles

Key characteristics of the Los Angeles area and of the region's rapid transit system are shown in the above table. LA Metro operates two subway lines (32 route miles and 16 stations), three light rail lines (55 stations), the Orange Line BRT (14 stations), and a comprehensive network of express bus, Metro Rapid, and local bus lines. It is actively planning additional rail lines, and new separated right-of-way BRT.

The Los Angeles urbanized area is one of the largest in both population and area in the United States, and has the highest urban area population density in the United States. It contains corridors of high density development, many urban and suburban centers, and extensive regional sprawl. Despite being largely developed, both the urban and suburban areas continue to

grow. Rail transit lines operated by the Pacific Electric existed until the early 1960s. It was reestablished in 1990 with the opening of the Blue Line between downtown Los Angeles and Long Beach. Since then, Metro has made considerable strides incorporating subway, light rail, bus rapid transit on dedicated right of way, and express buses into the urban fabric.

LA Metro system map

Recognizing that the LA metropolitan region will continue to be automobile-oriented, Metro strives to provide sufficient parking with new station development. Park-and-ride fees are implemented at 11 high demand stations, while the remaining facilities remain free to commuters. However, the newly developed Orange Line BRT and its future expansion, both in suburban areas, are focusing less on park-and-ride facilities and more on walk access and connecting buses. This is also the case for the Red Line subway.

PROCESS

Step 3. Develop Objectives and Principles

Access Policies and Programs

Metro does not have any official station access guidelines; however, Metro did adopt a Parking Policy in 2003 to provide guidance on parking management. In addition to addressing parking facilities, the Parking Policy states that Metro shall seek to improve access to transit by non-auto modes through improved bicycle, walking, and transit connections. While Metro anticipates the need for additional parking at many of its parking facilities, access planning for the planned extension to the Orange Line BRT focuses on walk-up and transfer access. This is due to low utilization for several park-and-ride facilities built as part of the existing Orange Line. Metro's Parking Policy provides the framework for managing parking supply and it is by the Board on a case-by-case basis. The number of spaces and type of parking is ultimately determined by the local jurisdiction, Metro, and the developer. Metro generally strives to maintain at least as much station-oriented parking at new development as currently exists at a station, and it will often pay the up-front costs to provide structured parking in association with joint-development projects

(often underground in major urban areas), with the intent of recouping those costs through the development and developer.

Similar to the Parking Policy, the Metro *Joint Development Policies and Procedures* also outlines policies to encourage projects that improve station access by alternative modes, where appropriate. Once projects have considered alternative modes of access, they are encouraged to provide new or additional park-and-ride facilities (except at Downtown Los Angeles stations). Most of these policies are encouraged, but not mandated. Metro prepares development guidelines specific to each development based on their desires for individual sites.

Park-and-Ride Facilities

Metro provides approximately 16,500 parking spaces at 35 stations on its rail and BRT system (not including spaces at the Harbor Transitway or El Monte Bus way). However, a number of facilities are owned by other agencies (primarily Caltrans) and in some cases are privately owned. Most park-and-ride facilities are free. Metro attempts to inventory parking usage annually. Of the 35 stations, 15 stations have parking demand above 90 percent. Stations located at the end of lines often function as feeder bus terminals (e.g., El Monte) and generally operate near parking capacity.

At 11 high-demand stations, paid monthly reserve parking is available for a fee of $20.00 to $39.00. Reserved spaces are only a small portion of total spaces at these lots, and the remaining spaces are available for no charge. Where stations have high demand for reserved parking, additional reserved parking spaces are being added. Some stations offer only paid parking.

The Parking Policy indicates that parking will likely remain a key component of access to Metro stations for the foreseeable future. It provides several strategies that should be pursued at stations where parking utilization is 90 percent or higher. These include pricing programs, and looking for simple opportunities to increase supply (e.g. re-striping). According to the Policy, implementation of pricing should only be considered where:

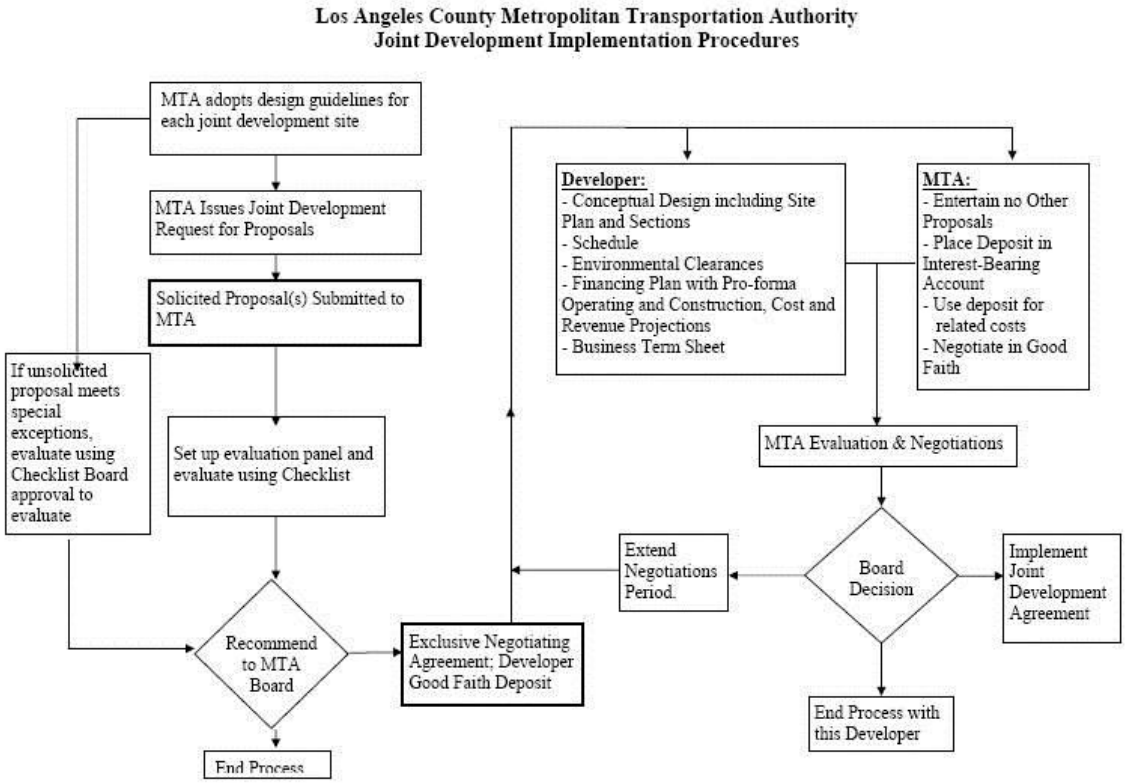
- no significant loss in ridership will occur;
- parking revenues will exceed management, operational, and capital costs associated with implementing parking charges;
- parking spillover into adjacent neighborhoods will not be severe; and,
- parking rates are generally competitive with the adjacent parking facilities.

The Policy also calls for examining options for better integration of land use and transportation to improve access to transit facilities and working with state and local jurisdictions to change ordinances that improve local parking control (e.g., establishing parking benefit districts, reducing or eliminating employee parking subsidies, etc.) near transit stations. Metro is currently conducting a study to examine shared-parking opportunities and short- and long-term parking supply options.

Transit-Oriented and Joint Development

Development at Metro Stations is initiated through competitive solicitations in cooperation with the Community Redevelopment Agency of the City of Los Angeles (CRA/LA), while working closely with the relevant municipalities in Los Angeles County. The joint development process varies for each site and depends upon project managers, involved municipalities, developers, community involvement, and local demographics. While some project managers may use a charrette process within the Metro organization to address the needs of operations planning, other project managers may use alternate processes. In the development of stations, developers generally lease the land from Metro and do not own it. In short, Metro's Joint Development Program encourages comprehensive planning and development at transit stations, thereby reducing auto use and increasing transit ridership by connecting the transportation network to multiple land uses. Metro's development of their land adjacent to transit stations provides them with revenue that can then be reinvested into Metro's transportation projects. These funds are used for improvements throughout the network and often result in improved facilities at the developed stations.

The *Joint Development Policies and Procedures* were adopted in May 2005 by the Los Angeles County Metropolitan Transportation Authority, and most recently revised in October 2009. Joint development is a "property asset development and management program" developed to ensure the most appropriate development occurs at Metro property, including coordination among local agencies/jurisdictions in planning that encourages and improves transit use. The document's structured guidance places increased emphasis on collaboration with local jurisdictions and community members to fully realize transit potential within and adjacent to new developments. A key access concept from the document states that "LACMTA will prepare development guidelines specific for each joint development site that articulate the intensity and type of land uses that LACMTA desires for that site as well as any desired transit and urban design features." A flow chart describing the joint development process is provided in the adjacent figure.



Creating Successful Transit-Oriented Districts in Los Angeles: A Citywide Toolkit for Achieving Regional Goals, a document developed by the Center for Transit-Oriented Development (CTOD) and sponsored by Caltrans and Metro, identified findings and recommendations associated with successful TOD in Los Angeles. Some of those key findings include:

- The City, Metro, and other stakeholders need more inter-agency and inter-departmental coordination to maximize support for TOD;
- Transit agencies should define a successful TOD to better benchmark progress;
- Many community groups and neighborhoods support TOD, but are often left out of the process; and,
- Regulatory changes are needed at the city level such as parking requirements among others.

Some key recommendations from the study include:

- Support partnership and collaboration through better coordination with transit agencies and local jurisdictions during planning process;
- Modify future parking requirements to reflect the reduced automobile dependency;
- Coordinate existing and future funding sources to promote more effective planning and implementation; and,

- Investing in improved nearby connections through intermodal bus and shuttle transfers, and improved pedestrian and bicycle facilities.

Planning for new extensions to the BRT (Orange Line) and rail system (Expo Line) have not assumed any zoning changes that would foster TOD as part of the California environmental process. This strategy expedites the planning process, but it means that future ridership would not reflect TOD in station areas. However, Metro anticipates that TOD will occur at many of the station areas once the lines are complete. Zoning changes associated with future TOD will need a separate environmental review.

Metro is currently planning for a large TOD at the El Monte Bus Station terminal of the San Bernardino Bus way. Planning for the station began in 2003, and is expected to be completed in 2013. When complete, the development will include approximately 2,000 residential units as well as new retail development. The TOD is being funded in part through a state grant to provide affordable housing near public transportation. The project will include development of several parking lots, some of which are owned by Caltrans, with lost parking spaces replaced through structured parking.

Bicycle Policies

Metro's bicycle program is guided by its 2006 Bicycle Strategic Plan. This plan focuses on integrating bicycles with both rail and bus transit. The plan identified a total of 167 bike-transit hubs in the region on which to focus resources; many of these hubs were at rail, BRT, and express bus stations. The plan also includes a description of audit procedures for evaluating obstacles for bicycle access with an accompanying audit table (also available electronically from Metro) and a toolbox of bicycle facility design measures that address the purpose of each facility, where to use it, and guidelines (photos and diagrams also included).

To support bike to transit access at these hubs, Metro has conducted approximately 20 station-specific bike access plans, but ultimately relies on individual jurisdictions to ensure that bike access is a priority. This strategy has been somewhat successful; for instance, the City of Long Beach recently completed a Pedestrian and Bicycle Access Study to its light rail station complementing Metro's Bicycle Strategic Plan.

Bicycles are allowed on all Metro rail and BRT services, except during peak hours. There are currently no official limits to the number of bikes per car; however, Metro is dealing with large increases in bicycles on-board vehicles in recent years resulting in some overcrowding.

Data on bicycle usage on the system is based on a cyclist survey conducted as part of the Strategic Plan. This survey included over 2,000 cyclists, many of whom were contacted directly at high bicycling locations to increase participation of minority and low-income communities. The survey showed that low-income bicyclists were more likely to bike to transit, and that many of those who bike to transit require use of their bikes on both ends of their transit trip, requiring them to bring their bicycles on-board transit vehicles.

To deal with increasing numbers of bicycles on the system, Metro is promoting both bicycle parking to encourage patrons to leave bicycles at stations when possible and use folding bikes for those passengers that do bring their bikes on-board. Metro is in the early stages of a program that will partner with CalStart, a local company that promotes green technology, to promote folding bikes and potentially subsidize folding bikes for transit passengers.

To ensure secure bike parking at stations, Metro provides bike lockers at many stations, which are rented on a semi-annual basis. There is currently a wait list for lockers at many locations, and Metro recently increased the number of bike lockers to approximately 500. However, Metro's experience is that actual utilization of the lockers is very low (i.e., many people that rent lockers use them only infrequently).

To increase utilization of bike parking, Metro is actively looking for new ways to provide attractive bike parking. This includes an early attempt to move toward electronic hourly rental of lockers in 2003, but found that the available technologies were expensive and required considerable maintenance. Metro has also recently piloted an unmanned bicycle storage module with electronic entry at the Covina Metrolink station. The facility cost approximately $100,000 to install. Metro is currently monitoring use to determine whether such facilities make sense in other locations as well.

Bike parking at Metro Red Line station
Source (Kittelson & Associates, Inc.)

Covina bike parking module
Source (Kittelson & Associates, Inc.)

Step 5. Rich Set of Appropriate Options

While general parking policies and joint development guidelines have been established, there is a lack of detailed parameters in terms of station development. Due to the size of the Metro service area and the many types of available rapid transit (subway, light rail, commuter rail, freeway bus way, dedicated right-of-way bus rapid transit), a one-size fits all approach would not work well for the region. Although well developed access guidelines and documentation could provide general areas of focus, Metro believes that each site represents unique challenges. Furthermore, with stations located in a high number of municipalities (there are 89 municipalities in Los Angeles County), established guidelines are less appropriate when

municipalities have different perspectives of future development. Completing developments and access design on a case-by-case basis gives Metro unique abilities and experiences with multiple redevelopment scenarios.

A recent initiative by Metro calls for extending the station environment into the fabric of the surrounding City. For instance, in the redevelopment of Union Station, wider pedestrian crossings, canopies, renewed development adjacent to the property, and an improved sense of comfort were all incorporated. Furthermore, while parking remains a vital aspect at many stations, it is frequently designed as a secondary, less visible use (interior garage or underground garage).

EXAMPLE APPLICATIONS

El Monte

Station Name:	El Monte
Location:	El Monte, CA
Station Type:	Bus way
Year Opened:	1976
Distance from CBD:	12 miles
Parking Spaces:	1,196 (under construction); 1,683 (October 2012)
Feeder Transit:	22 connecting bus lines
Bike Parking:	Bike racks and 20 bike lockers
Employment:	5,700 jobs
Population:	4,900

Source: © 2011 Google

The El Monte Transit Center, currently being reconstructed, is located approximately 12 miles east of downtown Los Angeles in the City of El Monte. The station is currently the busiest bus station west of Chicago, and serves the El Monte Busway and local and commuter bus access, while accommodating Metro, Foothill Transit, and El Monte Trolley Company services. The center services as the eastern terminus for express buses using the San Bernardino Freeway (I-10) priority vehicle lanes (formerly a busway). Located on the San Bernardino Freeway (I-10), the circular bus terminal is a major park-and-ride transit center facility with 1,196 parking spaces. Access features are oriented heavily toward automobiles with two large surface parking lots adjacent to the station. Medium-high density development around the station and high levels of

employment encourage pedestrian use, but many large arterial streets, the San Bernardino Freeway, and rail lines in the area make pedestrian access from outside the site very challenging.

Existing El Monte station

The El Monte Transit Center has three property owners: the City of El Monte, Metro, and Caltrans. In addition to the transit center building and multiple bus stop and lay-over areas, the site contains a Metro administrative office building and parking garage, a Metro maintenance garage, Metro bus yard, and park-and-ride facilities. Some of the parking facilities are owned by Caltrans.

Planning work, primarily by the City of El Monte, has been continuing for several years now with the future development of a transit village. The project is scheduled for completion in 2013. The transit village will be completed as a partnership between the City, Metro, Caltrans, Community Redevelopment Agency, and the Developer and is being funded in part through a state grant to provide affordable housing near public transportation. Approximately 60 acres of the development are within the City's Transit Village Specific Plan, which was passed in 2007. The plan is approved for up to 1,850 residences, an entertainment complex, conference center, hotel, parks, and 1 million square feet of retail and office space. The City took the project back from the development group in 2009 and is overseeing the project with assistance from their redevelopment agency.

Concept design for El Monte Busway

Metro is in the beginning stages of completing a bus station expansion, which is a crucial part of the Caltrans/Metro Congestion Demand Management (HOV lanes) federal demonstration project. With the conversion of I-10 and I-110 HOV lanes to congested-priced toll lanes, bus service will be expanded thus justifying the need for the station expansion. The footprint of the proposed, much larger redesigned Metro station extends onto Caltrans' park-and-ride property and Metro is required to replace all displaced park-and-ride spaces under the terms of the joint use agreement. Currently, a temporary bus station is being constructed and the existing station then will be demolished and reconstructed. However, two elements that were unresolved as of July 2010 are the relocation of the Metro maintenance and bus yard and the relocation of Caltrans

future parking. Some of the land where existing parking is located can not be eliminated upon development of the site because it was secured with federal funds.

Although all agencies are working together, the transit improvement and the development could likely occur without one another. For instance, the transit expansion improvements are taking place now and do not necessarily require the development to also occur before becoming successful. However, all parties understand the importance and benefit on progressing as a cooperative team. Metro ultimately has two goals for this project: (1) the project must make money, and (2) all involved parties must work together to maximize opportunities.

North Hollywood

Station Name:	North Hollywood
Location:	North Hollywood, CA
Station Type:	Urban Neighborhood with Parking
Year Opened:	2000 (Red) / 2005 (Orange)
Distance from CBD:	12 miles
Parking Spaces:	1,904
Feeder Transit:	13 connecting bus lines
Bike Parking:	30 racks and 36 bike lockers
Employment:	4,600
Population:	11,000

Source: © 2011 Google

The North Hollywood Station is located approximately 12 miles northwest of downtown Los Angeles in North Hollywood. The station serves as the northern terminus of the Red Line subway and the eastern terminus for the Orange Line BRT. Access between the Red and Orange lines is street level and requires crossing Lankershim Boulevard at a pedestrian crossing signal. This crossing is heavily utilized throughout the day. Because North Hollywood station is the end of the line for the Red Line, the more than 1,900 surface parking spaces are heavily utilized. Likewise, numerous bicycle parking options are available and are also highly utilized.

Orange Line BRT Station
Source: (Kittelson & Associates, Inc.)

A majority of the 13 connecting bus routes have drop-off/pick-up areas internal to the park-and-ride lot surrounding the Red Line Station; approximately 20 buses per hour enter the station

during each peak hour, with approximately 10 during midday, and eight in the evening. About half of those are buses from the Orange Line. The station is located in a relatively developed area with a range of uses including single and multi-family residential, retail, restaurants, and several art institutions and theatres.

Pedestrian connection between subway and BRT
Source: (Kittelson & Associates, Inc.)

While the area has been well developed for some time, the construction of the Orange Line has led to resurgence in development and has made the area much more accessible to commuters from the west. Metro currently owns four parcels around the station totaling approximately 15.5 acres. Anticipated joint development at the station is to include "landmark, high-density, creative arts-oriented, town center development" with over 500 residential units, approximately 1.7 millions square feet of retail/commercial space, approximately 1,500 transit parking spaces, bus layover facility, and an underground link between the Red and Orange Lines. In addition to the planned Metro development, a few adjacent residential towers and multi-family units have been constructed recently. Based on the high volume of pedestrians crossing between the Red and Orange Lines, the future underground connection between the two lines will be a safer, more efficient, and weather-free access connection.

Development concept for North Hollywood
Source: (Kittelson & Associates, Inc.)

Metropolitan Atlanta Rapid Transit Authority (MARTA)

Fostering TOD in a Parking-Oriented System

THEME

The bus transit system has also been heavily utilized to provide access to the MARTA rail system, with MARTA bus routes being refocused to serve rail stations as the rail system expanded. However, the provision of park-and-ride lots is now secondary and the current focus on TOD is at the forefront of MARTA station access planning.

MARTA has recently begun to focus on transit-oriented development (TOD) as an integral and important component of its access strategy, and sees TOD as a way to increase the ridership potential at its rail stations. MARTA typically considers TOD as a type of access mode for the MARTA rail system, and the agency has developed a comprehensive set of TOD guidelines as well as a station typology. The intent of the station typology is to adopt policies for parking replacement at existing stations by recognizing that stations serving different types of urban development will, in turn, have varied parking and accessibility needs. Historically, parking has been the primary means of access, particularly at stations that are (or were, until an extension was constructed) the rail lines' termini.

This case study focuses on MARTA's transition to a greater focus on TOD and joint development MARTA has pursued transit-oriented development (TOD) to not only increase its ridership but also to maximize the value of real estate near its rail stations. Such TOD projects also help reduce automobile dependence in the agency's service area.

LESSONS LEARNED

- Developing a station typology can allow agencies to better adapt policies to the needs of individual stations, by allowing evaluation criteria and/or goals to vary by station type. For instance, MARTA varies its parking replacement requirements for TOD by station type.
- Neighborhood shuttle services are often more effective at improving feeder access to transit compared to re-routing longer-distance local bus routes to connect to stations, but are also more expensive.
- It is often difficult in joint-development projects to build an amount of parking that effectively balances preservation of park-and-ride ridership, provision of parking for new development, and the desire to create a walkable urban environment.
- There are often opportunities for TOD, even in systems with a historical emphasis on automobile access.

BACKGROUND

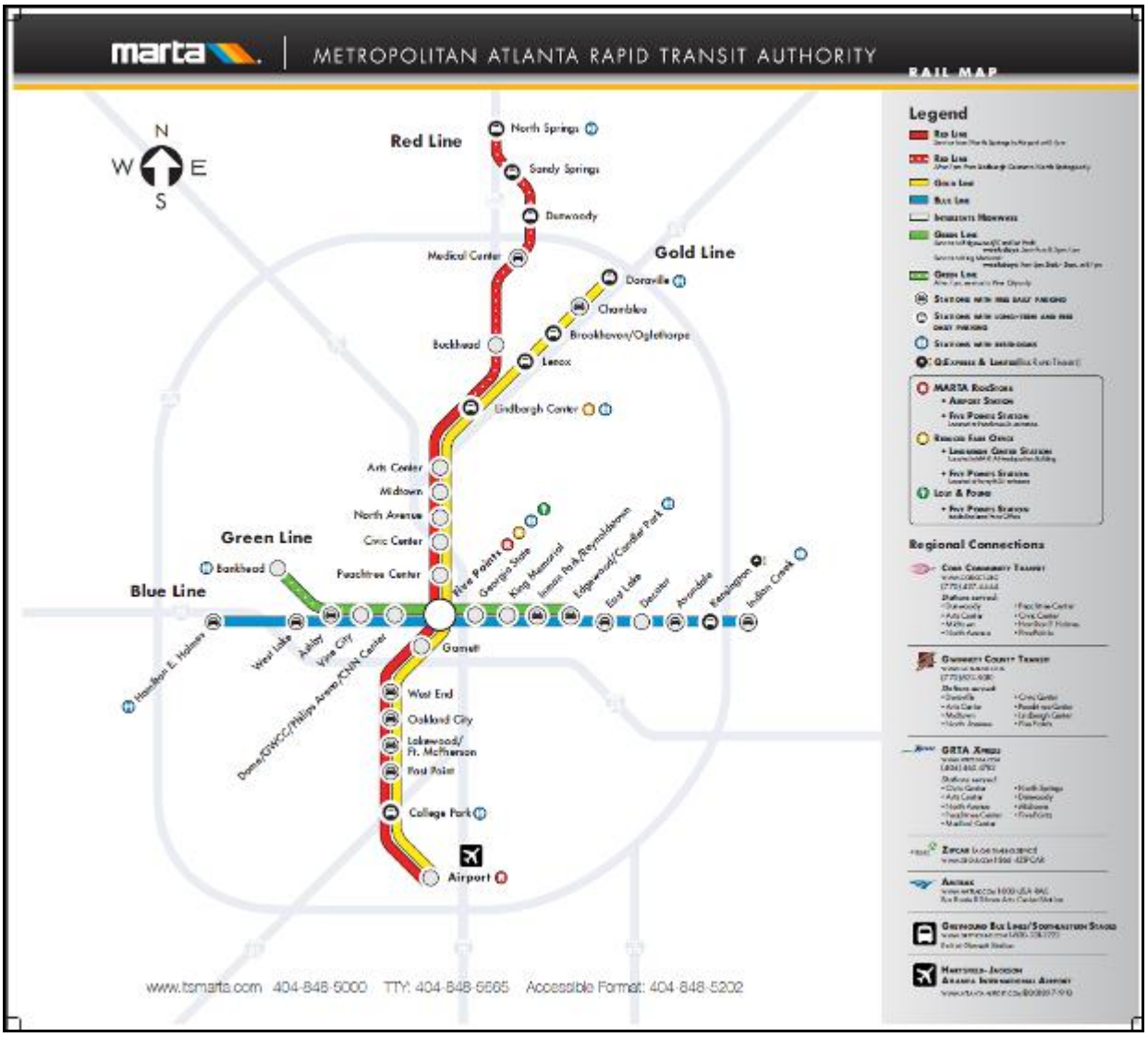
Urban Area:	Atlanta, Georgia
Urban Area Population:	3.5 M
Service Area Population:	1.6M
Year Started:	1979
Total Route Miles:	48
Number of Stations:	38
Park-and-Ride Spaces:	24,000
Daily Ridership:	260,000
Maximum Distance from CBD:	13.3 miles

MARTA operates a heavy rail "regional metro" system, as well as an extensive bus transit network, in the City of Atlanta, Fulton County, and DeKalb County. Rail service was initiated in 1979 and the system currently includes 38 stations. Recently completed extensions include the construction of the North Line in 1996 and the construction of the North Line Extension in 2000. According to the National Transit Database, almost 83 million unlinked trips (i.e., individual boardings) were taken on the MARTA rail system, and another 67.5 million unlinked trips were taken on the bus system, during the 2008 reporting year.

The MARTA rail system underwent a change in its route nomenclature, so that the various lines are now identified by a straightforward color-coding scheme, as opposed to a nomenclature system based on cardinal directions. A map of the current MARTA rail system is presented below.

MARTA faces several funding challenges in the near future as one of the largest transit agencies in the nation to not receive funding support from its state government. In late 2009, the funding situation and the economic climate forced the closure of the Clayton County Transit system (i.e., C-Tran) in Atlanta's southern suburbs. In addition, there are several other transit agencies operating in the Atlanta metropolitan area (e.g., Cobb Community Transit, Gwinnett County Transit), and this leads to a certain level of fragmentation in the planning process for transit infrastructure. However, MARTA and other agencies in the Atlanta area have attempted to coordinate their regional planning efforts via the Atlanta Regional Commission (ARC).

The existence of other transit agencies in the region (in addition to MARTA) impacts station access in that the terminal stations of MARTA's rail lines are designed to accommodate their connecting bus services, as well as to provide large amounts of park-and-ride spaces.



MARTA Rail System Map

PROCESS

Step 3. Develop Objectives and Principles

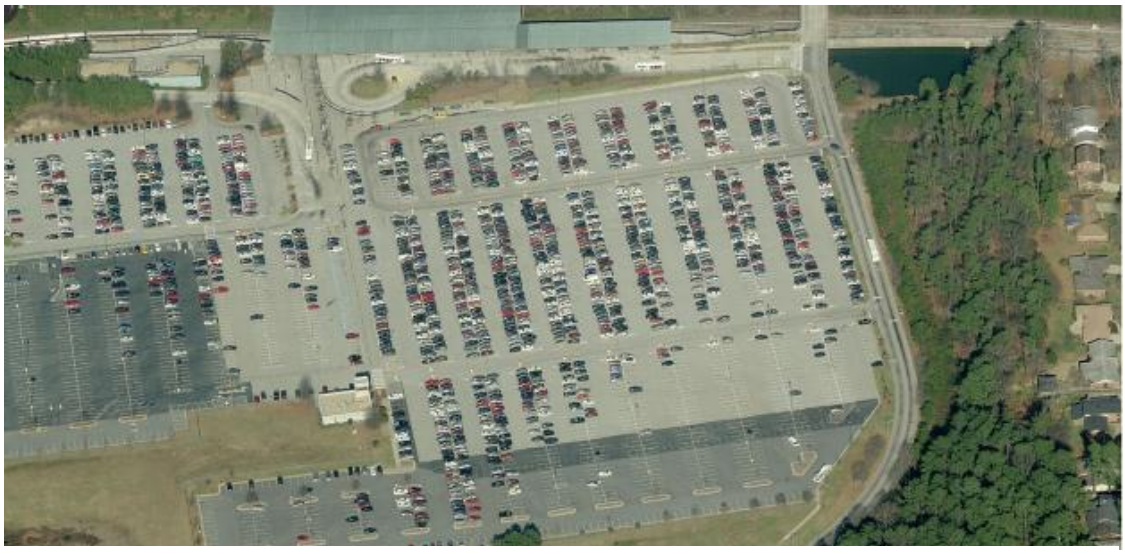
MARTA's primary objective in developing station access guidelines is to recognize that transit-oriented development (TOD) can both increase ridership and improve the value of real estate at and near its rail stations. In addition, TOD can often improve the station area's livability by allowing for more activity to occur without requiring the use of an automobile.

Although MARTA recognizes the importance of increasing the use of other non-auto access modes to its rail stations, there is no formal planning process designed to facilitate this. Rather, the planning process is currently focused on encouraging additional TOD opportunities, especially where surface parking lots may be reconfigured to allow for such opportunities. The

recently developed set of TOD guidelines and station typology scheme help the agency determine the manner in which such development plans may occur. This focus is consistent with both agency and regional goals, as it helps to increase the value of real estate around its train stations, and also reduces regional automobile vehicle miles traveled and thus helps improve air quality.

Historically, MARTA's rail stations were planned with consideration for park-and-ride access, and bus routes were redesigned to feed rail stations, with some rail stations serving as hubs for the bus system. While MARTA initially redesigned its bus network to serve rail stations upon the system's inauguration, planners recently have focused more on individual access issues associated with each station. In 2006, the system introduced its first small vehicle, neighborhood shuttle services. These services are important, as the agency considers shuttle feeder services to rail stations to be preferable to the design of line-haul bus routes primarily around stations. However, given recent funding issues this program has become a low priority in MARTA's budget.

MARTA has also recognized that TOD at its rail stations is most feasible at stations closer to (or adjacent to) central Atlanta than at those stations on the periphery of the service area. At stations located in more peripheral areas, the provision of large park-and-ride lots and connections with feeder bus routes is typically provided.



Typical terminal station with auto and bus connections

Stations that are considered good opportunities for TOD are currently the focus of many of MARTA's planning efforts. Several TOD projects have been conducted, the most notable of which is Lindbergh Center, along with initiatives at the Arts Center, North Avenue, and Lenox stations. Future TOD initiatives MARTA hopes to pursue include development at the Brookhaven/Oglethorpe station, where MARTA owns 15 acres of land, and at the Edgewood/Candler Park station.

One of the best examples of MARTA-initiated TOD is the Lindbergh Center station. This TOD project – which began in 2001 – sits on 47 acres, and contains 4.8 million square feet of office,

hotel, mixed-use residential, retail, and restaurant space. The opportunity to redevelop the Lindbergh Center station area came with the expansion of the station itself with an additional platform at the time of the opening of the Red Line to North Springs. AT&T (formerly Bell South) occupies the office space.

The TOD at Lindbergh Center station includes residential, office, and commuter parking (in the parking structure) as well as on-street neighborhood parking. During the development process, the community mounted legal challenges to MARTA's original parking plans, expressing concern about the traffic impacts. This prompted a reduction in the amount of parking included in the project. MARTA also anticipates that car sharing services such as Zipcar will allow them to further reduce parking requirements at future TOD sites.

MARTA's ability to create more valuable real estate near its rail stations is one of the chief reasons the TOD strategy is pursued. Several MARTA stations were designed with such future development in mind (e.g., knock-out panels, direct access provisions for new buildings, etc.), but the agency has often found it difficult to realize these projects. Some stations in the City of Atlanta have benefitted from Local Community Initiatives or Small/Special Business Initiatives, which are economic incentive programs that benefit areas within one-quarter mile of a transit station. However, given the current development market, even incentives such as these are sometimes not sufficient to create new TOD programs.

Lindbergh Center Station TOD

MARTA recognizes that an important aspect of TOD is the "balance" which must be struck between the parking needs of commuters, residents, employees and other users of the TOD, while at the same time not creating a situation where too much parking is provided. Should too much parking be built, the urbanism of the TOD is made secondary to its function as a park-and-ride lot and the development will be less successful. This includes engaging lending institutions

so that they do not continue to insist on parking minimums that are too high for a successful TOD project.

MARTA also recognizes that a key element in the success of TOD is the "walkability" and pedestrian access to and from the rail station area. One design challenge in particular is the need to better incorporate security concerns earlier in the planning process, so that – for example – pedestrian access isn't hampered by poorly designed fencing around a parking lot. MARTA is trying to work with the municipalities it serves to improve pedestrian and bicycle access to and around its stations, but there have been some difficulties (especially since MARTA does not control property beyond the station's boundaries). For example, MARTA is attempting to improve pedestrian connections at the Buckhead station on the Red Line, with the construction of a new pedestrian bridge at the north side of the station which will allow people to walk between either sides of the Buckhead neighborhood.

Formalization of Principles

MARTA has completed a formal set of extensive "*TOD Guidelines and Staff Procedures"*. As previously mentioned, several TOD projects have been conducted, the most notable of which is Lindbergh Center, along with initiatives at the Arts Center, Lenox, and North Avenue stations.

The MARTA TOD guidelines focus on a hierarchy for station access whereby the pedestrian is viewed as the most important. This will prompt a significant shift away from the focus on parking as the primary means of station access. The agency is also focusing more on the replacement of existing parking capacity with TOD or other development, both in terms of access planning as well as for greater cost effectiveness of the land use. In the future, MARTA hopes to tie its service standards for various modes (i.e., rail, bus, neighborhood circulator) to TOD guidelines.

All MARTA parking is currently free. However, MARTA is considering increasing parking fees to increase revenues, though the agency has not yet performed a detailed analysis or developed a parking pricing policy to establish when and how parking prices should be set.

Step 6. Predict Outcomes and Apply Criteria

The key evaluation criteria considered by MARTA is the agency's ability to leverage transit-oriented development (TOD) to increase the value of real estate in the vicinity of its rail stations. In the aggregate, MARTA's philosophy is that TOD at rail transit stations not only can help increase ridership and reduce automobile dependence, but also increase the tax rate in the vicinity of a rail station. Examples of this focus are provided through the station-specific cases described below.

EXAMPLE STATION

Lindbergh Center Station

Station Name:	Lindbergh Center
Location:	Atlanta, Georgia
Station Type:	Suburban TOD
Year Opened:	1984; rebuilt in 2002
Distance from CBD:	5 miles
Parking Spaces:	2,907 in three garages
Feeder Transit:	5 MARTA local routes and 1 GRTA Xpress route
Bike Parking:	Some racks
Employment:	9,408
Population:	1,700

Source: © 2011 Google

The Lindbergh Center station opened in 1984. The Lindbergh Center station is important as the northernmost transfer location between the Red and Gold Lines on MARTA's rail rapid transit system. In addition, after 7:00 p.m., the Lindbergh Center station serves as the southernmost terminal of the Red Line; all passengers traveling between Red Line stations and any location south of Lindbergh Center must transfer at Lindbergh Center to a Gold Line train.

Development at Lindbergh Center

Issues and Actions

With the construction/extension of the North Line (now called the Red Line), MARTA made a policy decision to leverage the large amount of land it owned at the Lindbergh Center station site so that it could pursue transit-oriented development (TOD) at that location, in addition to significantly expanding the rail station itself.

The impetus for this decision included the fact that MARTA owned a large amount of land at Lindbergh Center (47 acres), and that the Federal Transit Administration (FTA) altered its rules to allow the agency to sell and develop land for TOD. MARTA issued the request for proposals (RFP) to developers, and in 1998 a developer was selected. The office tower housing Bell South (now AT&T) opened in 2001.

The project was primarily developer-driven; MARTA essentially reviewed all plans to ensure that there would not be an adverse impact on transit operations. MARTA was responsible for the cost of its parking structures, roadways and the reconstruction of the station itself. MARTA is able to provide free parking, as 50 percent of MARTA's dedicated tax revenues go to capital construction projects, and therefore there are no parking structure bonds to be paid off through revenue derived from parking fees. Currently, a *Lindbergh Revisioning Study* is underway, which will provide for improved pedestrian access across Piedmont Road.

The aerial view below shows office towers, the bus drop-off area at the rail station, and a portion of a parking structure.

Lindbergh Center Station aerial view

The implementation of the TOD program at Lindbergh Center created some issues of concern for MARTA. During the development process the community mounted legal challenges to MARTA's original parking plans expressing concern about the traffic impacts and the amount of on-street parking that was planned. This prompted a reduction in the amount of parking included in the project.

In addition, MARTA has realized that while developers may be able to tailor their plans to accommodate the amount of parking appropriate for a TOD, the lenders that provide developers with funds to pursue construction still insist on parking minimums that are too high to effectively complete a TOD. Although this lender philosophy is starting to change, it is an obstacle to successfully complete TOD projects.

Massachusetts Bay Transportation Authority (MBTA)

Community Driven Station Access Management

THEME

The majority of the Massachusetts Bay Transportation Authority (MBTA, or locally referred to as "The T") system's fixed guideway elements have been in place since well before the Second World War. MBTA's approach to station access planning is typically on a case-by-case basis, as the opportunities to examine intermodal accessibility to stations and change existing access patterns are limited by the system's age; with older "legacy" systems such as The T, planning for modern state-of-the-art access to transit facilities is more difficult. The age of MBTA infrastructure has also led to a greater emphasis on "State of Good Repair" (SOGR) projects than major system expansion efforts.

MBTA capital expansion projects are first planned by the Massachusetts Department of Transportation (MassDOT), via its Executive Office of Transportation (EOT). The responsibility for planning becomes MBTA's only once the funding is identified and projects are ready to move to capital budgeting.

MBTA has no systemwide standards to help guide its planning process for station accessibility; rather, it approaches each opportunity on a case-by-case basis as they present themselves and allows its Project Development Groups to determine which solutions are most appropriate at each project site.

LESSONS LEARNED

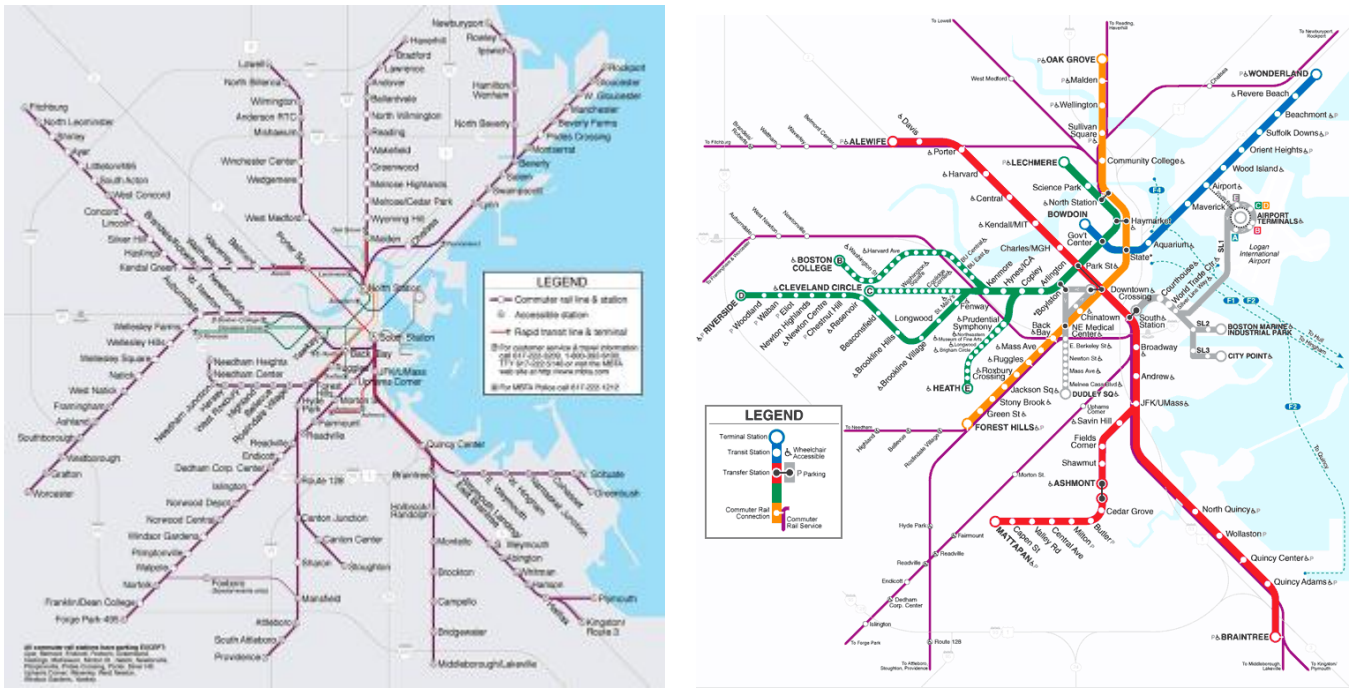
- Even transit agencies with older infrastructure and a commitment to asset management rather than expansion (such as MBTA), can find significant opportunities to improve access to stations. MBTA's recent actions include improved bicycle parking, seeking development opportunities, and improved bus connections.
- Success of many access improvement strategies depends on both transit agency and local jurisdiction commitment. Transit agency resources may be most effective when directed towards communities committed to improving access to transit.
- Data on existing access patterns and access mode shares are important even when an agency has no specific access mode targets (e.g., to inform modeling to predict parking demand at proposed stations).
- Even in cases where parking fee increases result in lower parking demand, actual ridership may remain relatively constant, as many riders will switch to other access modes or find parking elsewhere rather than abandon the line-haul mode. The attractiveness of the line haul mode is especially resilient in metropolitan areas with a

large regional employment core and constrained (i.e., expensive and/or difficult to find) parking availability in the regional core.

BACKGROUND

Urban Area:	Boston, Massachusetts
Urban Area Population:	4.0 M
Service Area Population:	4.5 M
Date started:	Pre-1900
Total Route Miles:	Heavy Rail – 38 Light Rail - 26 Commuter Rail - 368 Bus Rapid Transit - 8 Ferry – 19
Number of Stations:	279
Park-and-Ride Spaces:	65,000
Daily Ridership:	1,260,000 (across all modes including local bus)
Maximum Distance from CBD:	41 miles

MBTA's system consists of several transit modes which all use stations of some type, including commuter rail, heavy rail rapid transit, light rail, bus rapid transit and commuter ferries. Although there are several modes, they function as part of a complete transit system designed to move commuters throughout the region.



MBTA Commuter Rail and Heavy Rail/Light Rail System Maps

The Massachusetts Bay Transportation Authority (MBTA) is the nation's fifth largest public transportation system. It serves a population of 4.7 million (2000 U.S. Census) in 175 cities and towns, within an area of over 3,000 square miles. It operates 183 bus routes of which two are bus rapid transit lines, three rail rapid transit lines, five streetcar routes, four trackless trolley lines, and 12 commuter rail routes. Average weekday ridership on the entire system is approximately 1.1 million passenger trips.

MBTA's T is America's oldest subway (with service initiated in 1897), and its various modes provide transit service throughout the Boston metropolitan area. The heavy rail rapid transit system (i.e., the Red, Blue and Orange Lines) includes 51 stations, the light rail system (i.e., the Green Line and the Mattapan-Ashmont High Speed Line) includes 74 stations, the bus rapid transit service (i.e., the Silver Line) includes 23 stations, and the commuter rail system includes 123 stations on 11 lines. The commuter ferry system serves eight landings.

Recently, most system expansion projects have involved the reactivation of commuter rail service (e.g., the Old Colony Lines), along with the continued modernization and maintenance of the existing system.

Given the recent economic climate, MBTA faces challenges in the future in terms of financing major system expansion efforts. MBTA has selected to prioritize State of Good Repair projects over large system expansions, and the responsibility for the initial stages of system expansion planning now rests with MassDOT.

HISTORICAL DEVELOPMENT OF TRANSIT ACCESS

The Boston region has more than a century of coordinated access to rapid transit stations, and as such provides a useful case study on the historical shifts in transit access provision. This case study gives an historical perspective on how station access has evolved.

Regional Context

The urbanized area population of Boston is currently over 4.5 million, of which about 600,000 live within the 47.2 square-mile city of Boston. Boston's downtown area (known as Boston Proper) is the focal point of the region. There are also major outlying centers, including Cambridge and Salem. Many commercial centers and research parks are located along the circumferential expressways Route 128 and Route 495.

Early Transit Development[i]

Public transportation in Boston began in the 1600s when Boston was a peninsula connected to the mainland by a narrow strip of land. Except for those who could afford horses and wagons, people traveled within the city on foot, and rarely went beyond its borders. In 1630, the Massachusetts Court of Assistants, the Colony's Legislature, sought to improve access to the mainland by offering a charter to anyone who would run a ferry between Boston and

Charlestown. A year later, Thomas Williams began what was probably the first chartered transportation service on the continent: a ferry from Chelsea to Charlestown and on to Boston.

Horse-drawn vehicles and electric streetcar lines emerged during the early years of the 19th century. In the 1880s Tremont Street became so clogged with streetcars that passengers reportedly could walk faster.[ii] This led to establishing a Rapid Transit Commission to investigate needs and recommend actions. On July 2, 1894 the Massachusetts legislature authorized the incorporation of the Boston Elevated Railway Company (BERY) and creation of the Boston Transit Commission. The Boston Elevated Railway Company was delegated the responsibility of building a network of various suburban elevated railway lines. The Transit Commission was a government agency whose main existence would concentrate on the Transit Commission's recommendations for additional subway extensions.

In December 1897, the West End Street Railway Company was leased to the Boston Elevated Railway Company for twenty-four years. This enabled the subway/elevated rapid transit lines to be integrated with surface routes under one coordinated management. The Boston Elevated Railways (BER) established a policy of having streetcars feed rapid transit stations rather than continue to downtown Boston. Accordingly, large multi-storied transfer facilities were built:

- The initial segment of the Forest Hills–Everett elevated opened in 1901 between Sullivan Square (Charlestown) and Dudley Street (Roxbury) where large streetcar transit stations were built at the Dudley Street and Sullivan Square Stations. Elevated trains looped through the terminal's upper level, which was served by two elevated loops for surface cars terminating at the station. Additional platforms for through surface cars were provided at the ground level. These stations permitted convenient transfers, virtually across the platform. They were significant examples of intermodal facilities, and they set a precedent for current access planning and design efforts.
- The Harvard Square Station was initially built to facilitate transfer between the subway trains and surface cars. There are two levels for trains. A third level was initially provided for surface cars along with a short streetcar subway. The terminal design provides convenient transfer between rapid transit and surface transit buses and it eliminated surface traffic congestion.
- The Broadway Station in East Boston had a massive underground transfer facility. Streetcars from various directions used an incline to reach the mezzanine level. This access was removed when the line was extended to the Andrew Station a few years later.

Post War Transit Development (1947–1970)[iii]

The years following World War II brought many changes to the Boston region and its transportation systems. Suburbs grew rapidly, while the city's population declined. Car ownership increased with a corresponding increase in traffic volumes and congestion. Major radial expressways were built to and through the city center. These included the Central Traffic Artery (replaced by a tunnel almost a half century later), the Southeast Expressway, Massachusetts Turnpike (I-90), and finally I-93.

These changes resulted in decreased transit ridership and financial problems for the Boston Elevated Railway (BER). Accordingly, on August 29, 1947, the Metropolitan Transit Authority came into being and absorbed the entire BER system. The MTA was created by the Legislature, after the purchase of all outstanding stock of the Boston Elevated Railway. It was limited to serving the original 14 cities and towns in Metropolitan Boston, including Arlington, Belmont, Boston, Cambridge, Chelsea, Everett, Malden, Medford, Milton, Revere, Somerville, and Watertown.

Concerned urban planners, community leaders, and legislators throughout the surrounding area began to address the growing problems of regional public transportation. This led to a comprehensive plan that expanded the public transport system to the Greater Boston Metropolitan area. In the summer of 1964, the Massachusetts Bay Transportation Authority (MBTA) was established. The MBTA (known as the "T") encompassed 78 cities and towns (as compared with the 14 covered by the MTA). It was one of the first regional transportation planning and operating agencies to be established in the United States. The federally funded mass transportation capital improvements program was also established in 1964.

A major highlight of this UMTA funding came on July 28, 1965 when the MBTA signed a document legally reserving for its present and future needs the entire New Haven Railroad's network of commuter rail lines and rights-of-way within the Authority's 78 communities. At present, Massachusetts Bay Commuter Railroad, under a management contract with the MBTA, provides commuter rail services on 12 routes.

Recent Transit Development (1970–Present)[iv]

The freeway revolt of the later 1960s led public officials in the Boston Region to re-evaluate urban transportation policy. In the early 1970s Governor Francis Sargent cancelled new expressway construction within the Route 128 Belt Expressway. This led to eliminating a section of I-95 and the proposed Inner Loop Expressway. Instead, major public transport improvements, rail transit in particular, were given priority. A ceiling was placed on the downtown Boston parking supply (at about 40,000 spaces). Subsequently, caps were also placed on parking space in South Boston and East Boston. Rapid transit lines were relocated and extended. Commuter rail service was expanded, and the number of park-and-ride spaces was dramatically increased.

The key rapid transit and access improvements include:

- The Red Line was extended to Quincy Center in 1971 and to Braintree in 1975. An 870-space garage with 8 bus bays was built at Quincy Center. The 2,600-space garage at the Quincy-Adams station has direct freeway access with separate bus roadways into the station.
- The Red Line was extended from Harvard Square to Alewife in 1985. A 2,700-space garage was built over the station. Bus bays are provided along the perimeters of the garage.

- The Orange Line was relocated between downtown Boston and Forest Hills in 1987 largely on the right-of-way assembled for I-95. The original Orange Line elevated structures were removed, and a two-level bus terminal is provided at the Forest Hills station.
- "Silver Line" bus rapid transit (BRT) service was initiated over the past decade: (1) along Washington Street between downtown Boston and Dudley Street, and (2) between South Station, South Boston, and Logan International Airport partially in a bus-only subway.
- Commuter rail improvements include restoration of service to the South Shore and expansion of parking at stations. A 2,600-space garage was built at the Route 128 Amtrak-MTA station in the last decade.

A major parking study completed in 1974 analyzed downtown and transit station parking characteristics, and set forth the broad outlines of a park-and-ride strategy for the region.[v] Today the MBTA provides more than 50,000 park-and-ride spaces in 150 facilities, making it the largest parking operator in the Boston region, an increase from fewer than 22,000 spaces in 1972. Its facilities serve 8 million parkers annually.

The impact of the increase in parking is clearly seen in the current mode of access figures. The Central Transportation Planning Staff completed an extensive survey of passenger travel modes to MBTA commuter rail stations in 2009.[vi] More than half of the passengers came as auto drivers and passengers (53 percent), and another 12 percent were dropped off, resulting in a total auto share of 65 percent. Walk access accounted for 28 percent of all riders. Only 5.5 percent came by public transit, primarily other rapid transit modes. The remainder arrived by bicycle and private transportation, such as shuttle vans.

PROCESS

MBTA's approach to station access planning is generally case-by-case; as opportunities arise to examine and improve intermodal accessibility to stations they are pursued, even when feasible solutions are limited by the system's age. The ability to plan for intermodal station access as an element of an entirely new line or alignment is now also somewhat limited by the MBTA's prioritization of State of Good Repair projects.

There are no overall system guidelines or other types of standards regarding station access for the MBTA. As such, the process depends on each case encountered, and station access planning is subject to the unique needs of the station in question.

The only standards that MBTA has are their accessibility design standards, which exceed the requirements of the Americans with Disabilities Act (ADA) and which were developed as part of a consent decree in response to a legal action brought forth by the Boston Center for Independent Living. These standards include systemwide approaches for wayfinding and other items such as minimum elevator sizes and maintenance standards for elevators and escalators.

With MassDOT now leading responsibility regarding system expansion planning efforts, MBTA enters the planning process only after funding has been identified and a project is advanced past the capital budgeting process. For example, MassDOT is the lead agency both in terms of developing the planning process and securing federal "New Starts" funding for the proposed extension of the Green Line past Lechmere. However, MBTA does provide input to MassDOT via an internal review group regarding the feasibility of major system expansion efforts (including the Green Line) for which MassDOT has responsibility.

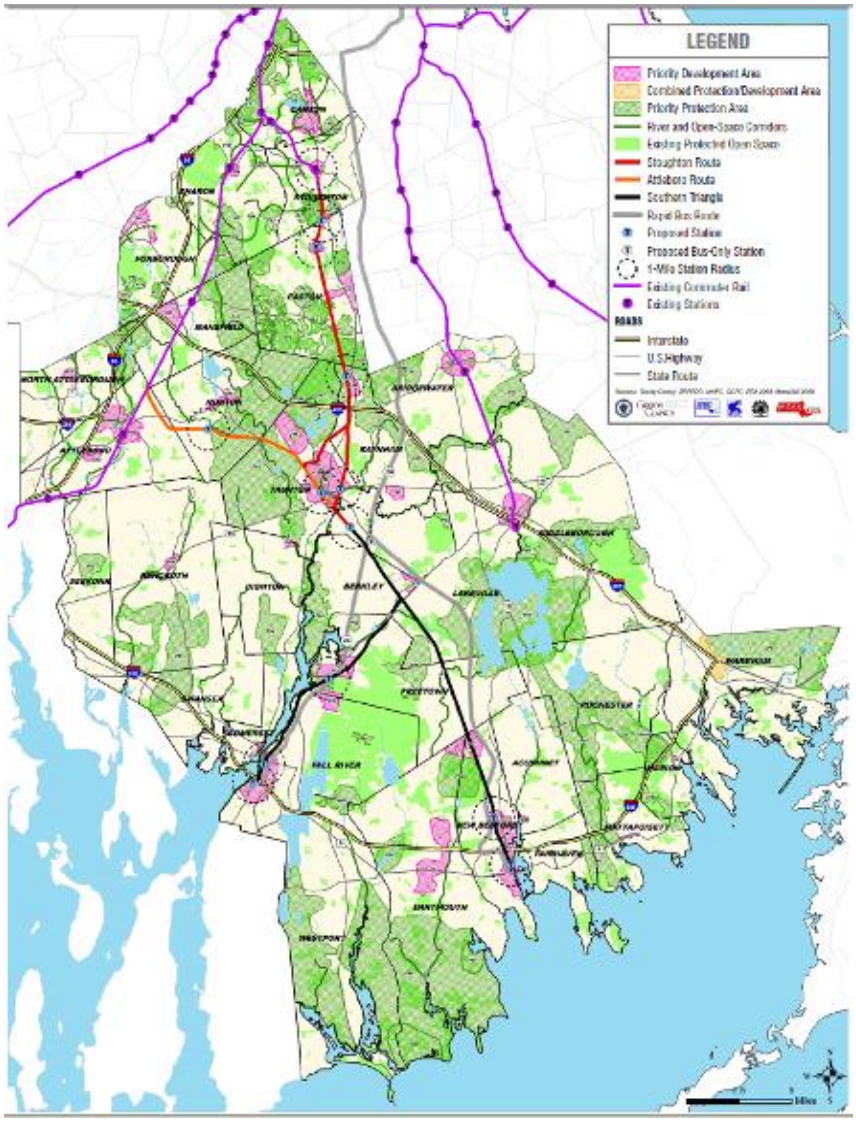
Once MBTA is involved, a "Plan Review Process" is initiated, where MBTA reviews various aspects of the proposed plan via the "Project Development Group". The Project Development Group is formalized and becomes closely involved with a planning effort once the project enters a preliminary design phase. The Project Development Group comprises representatives from different functions within the MBTA, including Bus Operations, Light Rail/Subway Operations, and Planning and Scheduling. It is this Planning and Scheduling function that prepares a bi-annual service plan addressing overall system needs and which includes service to new stations and identifies demand for new bus routes (as well as how existing bus routes may service new system expansion efforts). The Project Development Group also determines when certain State of Good Repair projects can present an opportunity to significantly upgrade intermodal access to specific stations.

The MBTA's role in MassDOT's development of the South Coast Rail Corridor Plan (the extension of commuter rail service to New Bedford and Fall River) will increase with involvement of a Project Development Group once funding for the project is allocated and design and environmental permitting are underway. Presently, MassDOT is involving the community in determining station typologies and rezoning areas near proposed stations for higher densities.

Step 1. Identify the Problem

The MBTA has contended with both the relative popularity of its commuter rail system, and the desire for TOD at many commuter rail stations. The problem the MBTA has attempted to address is the need to balance the desire for sufficient parking to serve commuter rail stations with the concurrent desire to develop TOD projects near some of those stations. MBTA identified this problem by observing that parking capacity at many commuter rail stations (or ferry landings) was saturated, yet there was still a desire on the part of some communities to pursue TOD opportunities.

There are no joint-development or TOD guidelines or standards at MBTA. Rather, the project planning for joint-development or TOD opportunities at MBTA stations occurs on an ad hoc basis. The current economy makes financing difficult for TOD projects. However, in the recent past some TOD projects occurred through purely market-driven channels (i.e., without a formal planning process involving MBTA) near some stations. The Wellington Station Landing development at Wellington Station on the Orange Line is one such example



South Coast Rail Corridor Project

In general, the type of development and station access modes depends on the community for which the development is being proposed. For example, at the South Weymouth Station on the Old Colony Lines, the MBTA is working with the municipality of Southfield on a project where the station, expanded commuter parking, and the proposed retail development are incorporated into a new transit-oriented environment. In addition, at the Hingham Terminal of the commuter ferry, the MBTA is pursuing a mixed-use development project which includes a new 1,600 space parking facility that already opened in 2008.

The level of interaction and coordination with local jurisdictions regarding the transit planning process depends upon the extent to which the local jurisdiction is involved with transit planning in general, but the process is not formalized. For example, communities such as Somerville or Cambridge have Transportation Planning staff, and they may be intimately involved with various aspects of the MBTA capital program (e.g., the extension of the Green Line past

Lechmere), whereas other communities approach land use planning from a more generic real estate development viewpoint.

Wellington Station Landing TOD Project

Step 3. Develop Objectives and Principles

MBTA recently determined that the agency's first priority in terms of capital expenditures should be to maintain the existing transit system (i.e., vehicles, stations, track and roadbed) in a State of Good Repair. Although MBTA recognizes that the expansion of parking capacity is important, and commitments for parking facilities will be completed, whenever possible the first priority will be to maintain the system. Despite this high priority, this objective is not formalized.

Relationship of MBTA Agency and Regional Goals

MBTA's emphasis on State of Good Repair projects dovetails with MassDOT's responsibility as the lead agency in the preliminary phases of system expansion projects. This emphasis on maintaining and improving the existing transit system is also driven by the recent consent decree with the Boston Center for Independent Living. This consent decree has been a great impetus in getting the MBTA to evolve its planning perspective in terms of having its Project Development Groups plan for better accessibility whenever possible.

MBTA coordinates its planning efforts with regional and local goals whenever possible but in terms of planning for station accessibility, this occurs on a case-by-case basis. For example, MBTA coordinates station access projections with the Boston Region Metropolitan Planning

South Weymouth Station TOD Project

Hingham Terminal

Organization so that station access modes can be more accurately measured and predicted. These data are based on a combination of an onboard passenger survey (recently completed and still being processed) and a household survey, which is currently underway. MBTA does not have formal access mode goals, however.

Feeder Bus Access

The Project Development Groups (which include the bus operations function) focus on improving the intermodal transfer experience whenever a State of Good Repair project's magnitude and scope allows them to do so. MBTA attempts to segregate pedestrian paths from bus movements, but ADA issues are typically the most important consideration. Although these planning efforts are on a case-by-case basis, the planned growth for new bus services utilizes model projections for the year 2030 to enhance decision-making. In many cases, available land and community goals dictate feeder bus operations as well. For instance, MBTA would have preferred the recent expansion of the bus stop above the Kenmore Green Line station to include a larger bus facility, but compromised to reach a consensus with other community interests.

Kenmore Station Bus Bays

On the Green Line Extension Project, the MBTA's Project Development Group, working with MassDOT,

used the input solicited from community groups at various charrettes regarding how to integrate bus service at various proposed stations. Although some members of the community would like to replicate the success of the 1980s with the extension of the Red Line to Alewife and the subsequent redevelopment of the Davis Square area, other members of the community fear the possible gentrifying aspects of such a project. Overall, the Davis Square area is viewed as an example of how infrastructure investment can transform a community, and the proposed extension of the Green Line is attempting to replicate its success.

Another example regarding station access needs is the recent use of federal stimulus dollars to construct bicycle storage cages at the Alewife, Forest Hills, and South Stations. Providing any bicycle parking and storage is relatively new for MBTA. Because of the restrictions on carrying bicycles aboard some transit vehicles, parking and storage of bicycles is becoming a larger issue; this is one factor behind the City of Boston's desire to implement a bicycle sharing program at major T stops regardless of transit mode.

Finally, MBTA always attempts to accommodate the needs of other access modes (i.e., kiss-and-ride, taxicabs and private shuttles), but there is no formalized system for doing so.

Step 4. Identify Evaluation Criteria

MBTA's uses a variety of evaluation criteria to support decision-making. For example, when pursuing where to place bicycle cages, the MBTA developed a set of criteria to prioritize stations for the new storage units. The stations were ranked in terms of a score, with the stations attaining the highest score then being those considered to have the highest priority in terms of funding for bicycle cages. The score was developed utilizing a variety of factors, including ridership, supporting bicycle infrastructure, population density near the station, and demographics. The cages will be funded at approximately ten stations, with the number of storage spots at each station dependent on both demand and available space.

The proposed upgrades to the Fairmount Line commuter rail service provide another example of MBTA's use of evaluation criteria. MBTA selected criteria to evaluate and compare various options for access to each station to ensure consideration of the views and input of the surrounding community, ridership potential, and land availability.

Proposed upgrades to Fairmount Line

Step 8. Implementation and Monitoring

MBTA's views towards development surrounding TOD projects have recently changed as a result of data collected on the effects of various parking pricing strategies. In particular, recent increases in parking fees at MBTA commuter rail stations have decreased parking demand but not total boardings. The increased fees resulted in more spaces for mid-day parkers at the station, as many daily commuters either switched access modes (primarily to kiss-and-ride or feeder bus) or finding alternate arrangements at private parking facilities (e.g., churches, shopping centers, etc.) located near the stations. For example, at the Andover Station on the Haverhill Line, the occupancy of the parking lot went from 100 percent to about 50 percent after the parking fee increase; however, the drop in ridership (some of which is due to the economic recession) was not as dramatic.

One impact of this greater understanding of parking demand is that parking expansion is not as high a priority for MBTA capital expenditures, and MBTA is considering more TOD possibilities. Recently, a parking lot at the Woodland station (located on the "D – Riverside" branch of the Green Line) has been built upon with new development. However, in this case the number of parking spots actually increased by 100 as the developer built a new 548 space garage that replaced the original surface parking lot.

Woodland Station TOD project

The result is that the provision of parking at MBTA commuter rail stations has evolved so that the parking improvements now advancing are those being advocated and supported by the local communities. The Project Development Group will establish a working group for an interface with the local community, but MBTA now pursues a vision where the community is encouraged and expected to identify other sources of state funding to encourage buy-in for the project.

EXAMPLE APPLICATIONS

Salem Station – Newbury/Rockport Commuter Rail Line

Station Name:	Salem
Location:	Salem, Massachusetts
Station Type:	Historic Transit Village
Year Opened:	19th Century; rebuilt in 1980s
Distance from CBD:	14 miles
Parking Spaces:	340
Feeder Transit:	5 connecting bus routes
Bike Parking:	5 racks
Employment:	3,585
Population:	7,625

Source: © 2011 Google

The Salem station was originally built by the Boston & Maine Railroad further south along its right-of-way; it was relocated to its present location just north of central Salem by the MBTA in the 1980s. The station has 340 parking spaces, and prior to the recent increase in the MBTA's parking fees the parking lot was essentially full by 7:30 a.m. on a weekday. After the fees were raised, potential passengers can now find an available parking space more easily at the station.

Although the demand for parking at Salem has declined, the total boardings at this station have not declined proportionately (it is the third busiest commuter rail station). The increase in the parking charge had the impact of opening up space for midday parkers at the station, with regular commuters in most cases either switching access modes (e.g., using kiss-and-ride or a feeder bus) or – in most cases, according to anecdotal evidence – finding alternate arrangements at private parking facilities (e.g., churches, shopping centers, etc.) located near the stations.

Salem is now pursuing the development of a new parking garage at the station site, which will accommodate 750 parking spaces and will allow the City of Salem to continue the redevelopment of its downtown area.

World Trade Center Station – Silver Line (Bus Rapid Transit)

Station Name:	World Trade Center
Location:	Boston, Massachusetts
Station Type:	Urban Commercial
Year Opened:	2004
Distance from CBD:	1 mile
Parking Spaces:	None
Feeder Transit:	5 connecting bus routes
Bike Parking:	None
Employment:	15,400
Population:	400

Source: © 2011 Google

World Trade Center Station

The World Trade Center Station, as well as the other Silver Line Waterfront segment stations, was planned to serve a growing area of the South Boston waterfront and increase the of the T system. However, the waterfront area is primarily urban in its character and density. Therefore, the MBTA's station access planning for this service focused on the ability for pedestrians to access the stations. In the case of the World Trade Center station, some accommodation was made for feeder buses to serve the station frontage, but this is accomplished in an on-street fashion and not via large, off-street bus bays.

Proposed Assembly Square Station – Orange Line

Station Name:	Assembly Square
Location:	Somerville, Massachusetts
Year Opened:	N/A
Distance from CBD:	3 miles
Parking Spaces:	N/A
Feeder Transit:	N/A
Bike Parking:	N/A
Employment:	N/A
Population:	N/A

Source: © 2011 Google

The possibility of building this proposed new infill station on the Orange Line (it would be located between the existing Wellington and Sullivan Square stations) was brought to the MBTA by the developer and the community in Somerville, who wish to leverage a new Orange Line station so that new residential and commercial development could take place on the site.

As this project did not originate within the MBTA's capital budgeting process or long-range planning process, the agency's primary concern is making sure that the local community and the developer can identify and secure funding sources that don't impact the MBTA's capital budget.

Conceptual Assembly Square Station design

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Metro-North Railroad

Providing 21st Century Access on a 19th Century System

THEME

As a legacy system in the densely developed New York metropolitan region, Metro-North serves many communities that are effectively built-out and unable, or unwilling, to accommodate expansions in station parking capacity as a response to growing ridership. As demand for commuter rail services has grown substantially in the past decade, the agency has begun to seek creative ways to increase ridership in long-established operating environments.

Moving beyond its historical parking-focused approach to capacity enhancement, Metro-North has successfully mitigated the constraints of its legacy system by forging solutions with partners such as the New York State Department of Transportation and private developers to find new approaches to station capacity. Successful ventures have included off-site park-and-ride lots combined with feeder and shuttle bus services to rail stations, local feeder services in the urban core, and ferry services to bring customers west of the Hudson River in the lower Hudson Valley to the primarily east-of-Hudson rail network.

Metro-North Railroad provides examples of successful planning strategies to increase ridership on its rail systems through targeted access capacity enhancements in environments where space for new automobile parking is unavailable or severely constrained. The agency's focus, traditionally placed squarely on automobile parking expansion, has evolved to recognize and embrace the potential for a variety of access modes, including ferry services, feeder buses, park-and-ride lots, ferry services, and bicycle and pedestrian facilities.

LESSONS LEARNED

- Metro-North is as well-established transit agency with many of its services nearly 150 years old. Yet even here, the agency increasingly sees the need to transition from its traditional focus on automobile access and provide more comprehensive multimodal access options.
- Most transit systems use past experiences to guide station access planning decisions. For example, Metro-North's experiences adjusting operations of the Haverstraw-Ossining Ferry to achieve better results allowed it to implement the Newburgh-Beacon Ferry more effectively. This suggests that agency-wide access guidance to summarize and synthesize past experience would enhance access planning efforts, even at agencies that prize flexibility in planning.
- Enhanced feeder bus service can effectively improve station access and increase ridership at many stations where parking is over-subscribed. Rail transit agencies that do

not directly operate such services can still promote them through effective partnerships with local operators.

- In some cases, such as Metro-North's Hudson Rail Link, targeted improvements to feeder transit service can increase ridership and cover operating expenses as well. Such a result, however, depends on a high-draw urban core (in this case midtown Manhattan), and may not be applicable to many areas.
- Transit agencies where parking facilities are owned by local municipalities will often have few opportunities for parking expansion.

Urban Area:	New York, NY
Urban Area Population:	17.8 million
Service Area Population	6.5 million
Date started:	Pre-1900
Total Route Miles:	275
Number of Stations:	120
Park-and-Ride Spaces	50,000
Daily Ridership	275,000
Maximum Distance from CBD:	76 miles

BACKGROUND

The Metro-North Railroad is an operating group within the New York City region's Metropolitan Transportation Authority (MTA). The MTA operates commuter rail, subway, bus, paratransit, and ferry services within the New York City metropolitan region, including the lower Hudson Valley and Long Island. Metro-North operates the regional commuter railroad system connecting New York City with its northern suburbs.

Ownership of the parking lots serving Metro-North stations varies between Metro-North itself and local municipalities. The operations at some of those stations owned by Metro-North are contracted out to a parking operator. Most stations are served by surface lots, although there are several parking structures located throughout the system.

There are approximately 50,000 parking spaces located at stations throughout the Metro-North system; in addition, there are also approximately 3,000 parking spaces located at various satellite park-and-ride lots which have direct connecting transit service to a Metro-North station (e.g., parking lots at ferry terminals). System-wide, Metro-North parking is nearly 100 percent utilized on any given weekday. The difficulties in finding a free parking space and the general unavailability of parking were the primary impetuses for developing the extensive network of connecting transit services that serve various Metro-North stations. This case study highlights these connecting services and their role in Metro-North station capacity enhancement.

Metro-North System Map

PROCESS

Metro-North does not have formal system guidelines or standards regarding station access; there are no priorities specified for access modes or standards calling for a certain percentage of an access/egress mode split for certain modes at specific stations or station types.

Access planning at Metro-North has typically taken place by examining the needs for each station as they arise, although automobile access to stations has historically been the dominant mode, supplemented by feeder bus and bicycle and pedestrian access. When planning for access to its rail stations, Metro-North examines the existing parking availability and determines whether or not it is sufficient to absorb projected growth in ridership. If expansion of parking facilities appears to be warranted, the primary hurdle often becomes the lack of available land. Expanding parking facilities is not a desirable approach for the established communities that define much of Metro-North's service area, while transit-oriented development (TOD) remains unwelcome for communities when proposals include a reduction in parking.

Increasingly, Metro-North planners ask what alternatives to parking can be implemented to support ridership growth within the constraints of the current service area. Feeder buses are the

most common approach and Metro-North benefits from the robust network of transit providers throughout its service area to link local communities with rail stations.

When the Haverstraw-Ossining Ferry was first developed, Metro-North and its contractor had to make several adjustments (e.g., removing the parking fee at the ferry dock, operating faster ferries which could increase the frequency of service and thus the number of trains being met, etc.) until the service was well-utilized. This experience helped Metro-North and its partners with subsequent implementation of the Newburgh-Beacon Ferry to the north.

With the Hudson Rail Link, Metro-North has been able to improve its service delivery to a niche market (inbound commuter rail ridership from the urban core) with great success, not only in terms of ridership and revenue, but in terms of customer satisfaction as well.

Step 1. Identifying the Problem

Metro-North faced, and continues to face, a challenge shared among many legacy systems in densely developed regions: access capacity constraints. As populations grow and demand for commuter rail services increases, the ability to meet the parking demand of suburban commuters is limited. Metro-North benefits from walk-on ridership and strong bus connections at many stations. Nonetheless, stations outside of the urban core generate demand for automobile parking and the agency is unable to accommodate this demand. Furthermore, local municipalities are not always willing to encourage additional traffic associated with expanded parking facilities.

In overall planning terms, the key stakeholders for Metro-North station access capacity are the municipalities themselves. Local municipalities typically own parking facilities associated with rail stations and set their own fee policies. Furthermore, the decision to expand parking capacity within a given village, town, or city is fundamentally a local one; Metro-North does not pursue parking expansion programs when local governments and communities are opposed. To seek alternatives, such as connecting and feeder bus services or new initiatives such as ferry services, Metro-North works with local municipalities but also reaches out to New York State and, where appropriate, private developers to pursue satellite parking facilities and connections to its rail stations.

Step 2. Establishing a Collaborative Environment

Metro-North engages local and state stakeholders to develop funding and operating partnerships for services to address the need to increase access to parking-constrained rail stations. The New York State Department of Transportation is a key partner in the development of park-and-ride and shuttle bus services and plays an active role in both the planning and funding components.

Metro-North recognizes that partnerships were critical to increasing access to its system from communities not directly served by rail lines. Shuttle and feeder bus services, developed in

conjunction with off-site park-and-ride facilities, provided a cost-effective means to enhance station capacity without adding new parking capacity at the station itself. This capacity increase has been achieved both within close proximity of existing stations as well as through the development of ferry services across the Hudson River, greatly increasing the commuting options of west-of-Hudson commuters as well as mitigating the impact of increased traffic in communities with rail stations.

Metro-North makes a concerted effort to develop and support connecting transit services to its trains, taking into account intermodal opportunities when preparing the designs of any new or rehabilitated stations. Metro-North does not directly operate any of these connecting services to its railroad stations. However, Metro-North then leverages its investment in intermodal accommodations at its stations by becoming partners with a variety of operators in a series of "Partnership Programs" with the New York State and Connecticut Departments of Transportation, as well as local and county governments and transit operators, that allows various operators to operate dedicated feeder service to Metro-North stations.

Examples of partnerships include fare coordination through the UniTicket program, allowing customers to purchase monthly combined rail and feeder service tickets at a discount. The New York State Department of Transportation often contributes substantial funding assistance to construct park-and-ride lots and support local transit systems. Feeder bus services to Metro-North Railroad stations are typically operated by local transit operators (e.g., Dutchess County Loop, Westchester County Bee-Line).

When it began to develop the Hudson Rail Link feeder services in the Bronx, Metro-North assumed that its partner agency within the MTA, New York City Transit, would operate the buses. New York City Transit opted out of the service, citing operational difficulties with steep grades and relatively small neighborhood streets as concerns. This was coupled with the agency's fleet composition, which does not include small transit buses that would be better suited to narrow neighborhood streets. This prompted Metro-North to develop an operating plan with a consultant and ultimately contract the service operations to a private operator.

Step 8. Implementation and Monitoring

Feeder Services have proven highly successful in a variety of Metro-North station communities. As a response to parking constraints in densely-developed, legacy station environments, feeder ferry and bus services have increased access capacities to stations where no additional parking facilities are feasible or desired.

Metro-North undertook extensive data collection and customer survey efforts to gauge the effectiveness of its feeder services over a number of years since their inception. The resulting data have shown that these feeder services, developed through partnerships, have been successful and have contributed to increasing ridership on Metro-North trains.

For instance, average daily ridership on the Haverstraw-Ossining Ferry grew from approximately 140 riders per day to 600 riders per day in the eight years following its inception

in 2000. This has alleviated automobile commuting trips to Tarrytown via the Tappan Zee Bridge and increased usage of Hudson Line trains for west-of-Hudson customers, broadening Metro-North's market reach.

Ridership on the Hudson Rail Link feeder bus services in the Bronx (serving Metro-North's Spuyten Duyvil and Riverdale rail stations) consistently performed better than other Metro-North Stations in the Bronx. Over time, the usage of these feeder services has increased. The initial growth represented a modal shift for many existing MTA-New York City Transit express bus riders, yet the effectiveness of the feeder bus service has contributed to overall growth in annual ridership at the two Bronx stations (46 percent growth from 1990 to 2000), whereas other Bronx stations have experienced a net decline in Metro-North ridership, as shown in Figure 1.

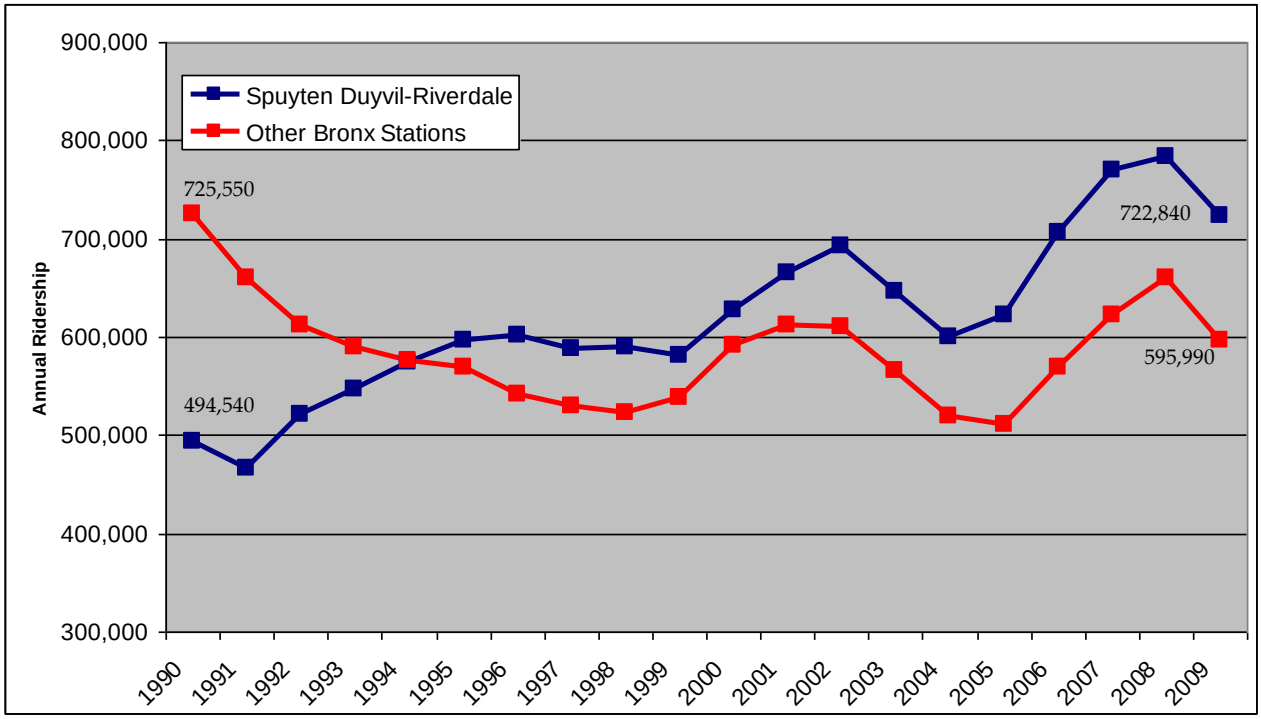


Figure 1 Historical Ridership Growth, 1990 – 2009

Many of Metro-North's feeder services are successful because station parking is typically constrained (less so at the most outlying stations), demand is high, and there is strong NYSDOT support (financial and otherwise) for these services as a collaborative effort between towns/local transit systems and Metro-North. Effective features of Metro-North feeders include new service types that open up entirely new markets. For example, the feeders serving the MNR ferry services allow park & ride access west of the Hudson River to the higher frequency rail services on the east side of the Hudson. In the Bronx, the topography and nature of the Riverdale and Spuyten Duyvil neighborhoods are conducive to a circulator feeder service where traditional New York City fixed route buses have difficulty operating.

EXAMPLE STATIONS

Ossining (Haverstraw-Ossining Ferry)

Station Name:	Ossining
Location:	Ossining, NY
Station Type:	Historic Transit Village
Year Opened:	Pre-1940
Distance from CBD:	30
Parking Spaces:	453 with village permit + 80 privately operated
Feeder Transit:	3 connecting bus routes, ferry service
Bike Parking:	Not available
Employment:	4,610
Population:	11,144

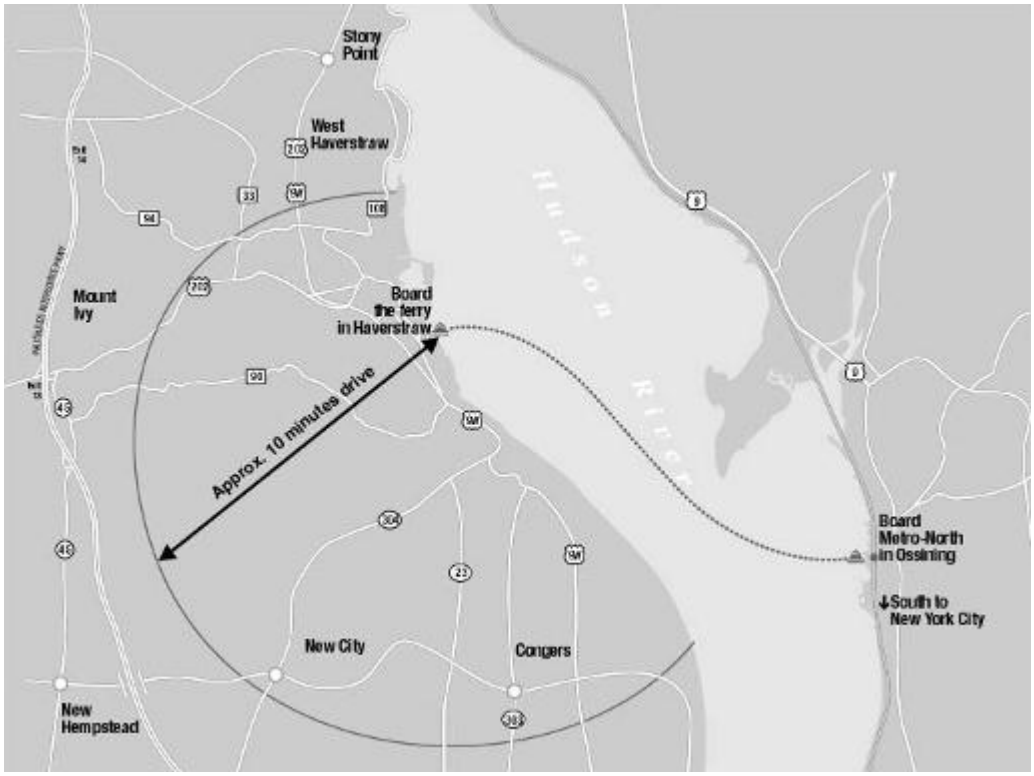
Source: © 2011 Google

The Ossining railroad station on Metro-North's Harlem Line provides an access point for ferry services bringing commuters from communities west of the Hudson River to space-constrained stations to the east, notably Tarrytown. Commuters take advantage of park-and-ride lots and ferry services from Haverstraw and Rockland County to access the higher-volume service on the Metro-North line east of the Hudson River, avoiding longer auto access trips and congestion over the Tappan Zee Bridge to the south.

Metro-North has faced parking capacity constraints at the majority of its stations, including Harlem Line stations such as Tarrytown and Ossining. Access to east-of-Hudson stations has been limited for commuters from Rockland County and points north/west, as park-and-ride options are limited for drivers who cross the Tappan Zee Bridge. To address the east-of-Hudson capacity constraints (in terms of parking as well as commuter bus services crossing the Tappan Zee Bridge to Tarrytown), Metro-North embarked on a new feeder ferry service from Haverstraw to Ossining.

To create the ferry service that would allow park-and-ride access in Haverstraw and connect commuters to the Ossining rail station, Metro-North partnered with a number of key stakeholders, including the Town of Haverstraw, Village of Ossining, Rockland County, New York State Department of Transportation, and private land developers.

The New York State Department of Transportation provided funding for the construction of a park-and-ride lot on a developer's land, while the developer took advantage of state funding to build the ferry terminal in Haverstraw. Metro-North pays a monthly fee to the developer for use of the land (for parking), while ferry operating costs are covered by New York State. A substantial public outreach effort in the local communities helped build support in Haverstraw for the project.



Map of Haverstraw-Ossining Ferry and surrounding area

Free feeder bus service is available to the Haverstraw ferry dock. Shuttles are operated by the Rockland County and the New York State Department of Transportation. Buses make scheduled stops along Route 202, between Mt. Ivy and Route 9W, as well as flag stops at any safe spot along the route. Parking at the dock is free. One-way ferry tickets cost $3.50 ($3.00 for seniors), while various savings options exist for frequent riders. The best deal is a monthly UniTicket, which combines ferry and rail in one ticket, and is available at the discounted monthly rate of only $302 ($36 ferry plus $266 rail).

The project has been deemed a success, as ferry ridership has grown from 140 riders per day to nearly 600. Metro-North customer surveys indicate that riders are extremely satisfied with the service thanks to shorter commuter times, schedule reliability, and new access to the rail system (60 percent of riders are new to Metro-North and formerly car commuters).

Riverdale and Spuyten Duyvil (Hudson Rail Link)

Station Name:	Riverdale*
Location:	New York (Bronx), NY
Station Type:	Suburban Neighborhood
Year Opened:	Pre-1940
Distance from CBD:	13 miles
Parking Spaces:	118
Feeder Transit:	4 connecting bus routes
Bike Parking:	Not available
Employment:	3,520
Population:	7,312

Source: © 2011 Google

* Spuyten Duyvil has similar characteristics as Riverdale

The Riverdale and Spuyten Duyvil rail stations are both situated in the densely-developed urban environment of the Bronx, one of the five boroughs of New York City. Neither station affords substantial amounts of parking given the urban environments and physically constrained sites. Given the limited capacity for parking and inability to expand parking facilities around these stations, Metro-North pursued feeder bus services to enhance the passenger capacity at these stations. Express bus and, to a lesser extent depending on location, subway alternatives are available into the Manhattan CBD; however, travel times are shorter on Metro-North commuter trains combined with the feeder bus service.

The Bronx communities of Riverdale and Spuyten Duyvil feeder services allow the railroad to focus on modes other than the automobile for station and rail service access. Hudson Rail Link service began in October 1991, opening up neighborhood access to rail stations with two peak routes in Riverdale and two peak routes serving the Spuyten Duyvil rail station. One route at each station covered the off-peak periods.

Metro-North considers the Hudson Rail Link to be a success. In the early 1990s, morning peak period rail boardings at Spuyten Duyvil and Riverdale averaged 800 passengers. At present, that number is 1400, with growth attributed primarily to the Hudson Rail Link feeder service.

Rather than focusing purely on farebox recovery for the feeder bus services, the agency considers the feeder bus fare and the rail fare and the costs of both to assess the service relative to the express bus service it replaced for many customers. Even when combined with the rail fare, the feeder bus service provides a favorable cost recovery ratio. Annual operating costs for the feeder bus service are approximately $1.28M. At present, the Hudson Rail Link approaches 100 percent fare box recovery and 95 percent of the rail ridership gains at each station are due to feeder bus usage. Sixty eight percent of the fare revenues come from rail fares, and the remaining from bus fares.

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New Jersey Transit (NJT)

Working with Local Communities to Achieve Statewide Goals

THEME

NJ Transit operates high-capacity transit services throughout New Jersey, with direct rail service to hundreds of municipalities. These communities differ widely in terms of existing land use, land use goals, park-and-ride ownership, and politics, requiring NJ Transit to adopt a flexible approach to transit access. Despite the need for flexibility, NJ Transit and the New Jersey DOT have developed several statewide programs to foster a unified statewide vision for improved transit access and transit friendly communities.

New Jersey is a leader in transit-oriented development (TOD) planning and policy at a statewide level, including the unique Transit Village Initiative program. This initiative provides technical assistance and funding to local jurisdictions to encourage TOD in exchange for adoption of certain policy changes. NJ Transit has also implemented an innovative program to purchase shuttle buses for local municipalities, worked with municipalities to better manage station parking, and developed several guidance documents on developing transit friendly communities.

Note that while NJ Transit operates multiple high capacity transit modes, this case study focuses primarily on their commuter rail lines serving New York City (i.e., all commuter rail lines other than the Atlantic City Line).

LESSONS LEARNED

- Guidelines and guidebooks for improving station access and encouraging transit-friendly development are important. However, for maximum effectiveness such general guidance should be supplemented by direct outreach and assistance to individual communities.
- Timely data on access mode characteristics is critically important for effective service and facility planning. Periodic intercept surveys of access modes and preferences supports trend-tracking and provides objective information for planning and decision making.
- Partnering with an independent organization to evaluate programs (e.g., New Jersey's Transit Village Initiative) provides an objective means to assess program effectiveness and make refinements.
- A comprehensive set of commensurate access improvements should be developed as part of any major improvement or expansion of rapid transit service. This should include identifying locations for parking expansion and

pro-actively working with local communities to prepare for and accommodate increased development pressure in station areas.

- Well-designed statewide programs can be effective at promoting TOD, particularly when they provide direct funding for improvements.
- Transit agencies that serve a large number of jurisdictions should dedicate resources to working directly with individual communities that wish to foster TOD in specific station areas.
- While transit agency and state programs are important, ultimately success in promoting TOD at a given station requires a local jurisdiction that is interested and committed as well.

BACKGROUND

Urban Area:	New York, New York
Urban Area Population:	New York Metropolitan Area - 17.8 M
Service Area Population	6.9 M – New Jersey portion of New York metropolitan area
Date Started:	Pre-1900
Total Route Miles:	536
Number of Stations:	164
Park-and-Ride Spaces:	84,000
Daily Ridership:	280,000
Maximum Distance from CBD:	N/A

NJ Transit operates bus and rail transit service throughout New Jersey, and is the nation's third busiest commuter rail operator. There are approximately 84,000 park-and-ride spaces at NJ Transit facilities, with just over 60,000 of these located at commuter rail stations. In general, NJ Transit owns almost all the parking facilities on its Light Rail lines, but only 50-60% of the parking on its Commuter Rail lines. The remaining spaces are owned privately or by local municipalities. Parking costs at facilities owned by NJ Transit vary by demand, and range from free to $6 per day. Currently, park-and-ride accounts for just over 50% of the ridership at NJ Transit's commuter rail, a percentage that has remained relatively unchanged over the past 30 years.

NJ Transit has pursued increased parking over the past 10 years, and plans to continue to add parking to the system in the future. In particular, planning for new Hudson River rail tunnels through the now cancelled Access to the Region's Core (ARC) project identified increased demand on the rail lines that would have had direct rail service into Manhattan. Parking expansions to complement ARC were thus planned accordingly. In addition to parking expansion, NJ Transit also works closely with local municipalities to increase non-auto access to its stations.

New Jersey Transit Commuter Rail System Map

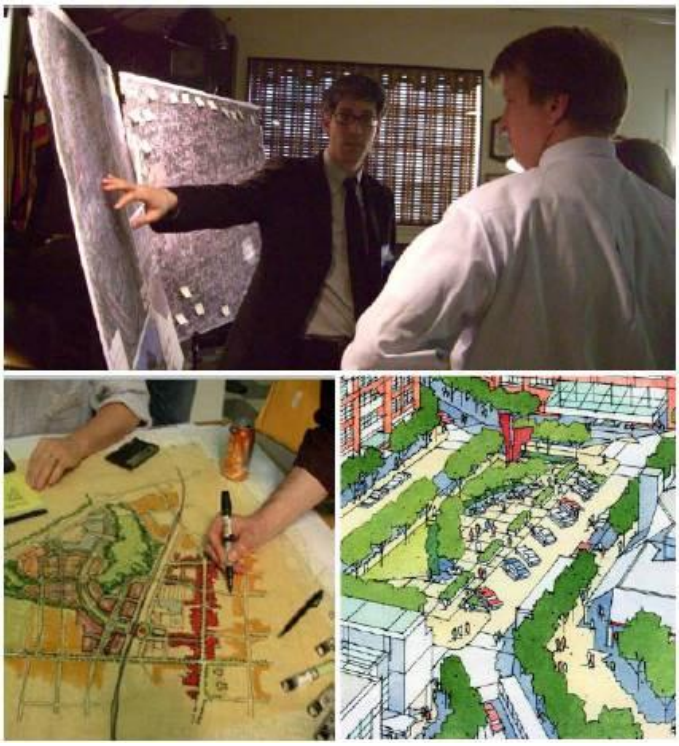
PROCESS

Step 2. Establish a Collaborative Environment

Because of the large number of communities served by NJ Transit rail and the limited number of NJ Transit planning staff, communicating with each local municipality is challenging. However, communication is critical to achieving effective station access improvements. One way in which NJ Transit facilitates communication between itself and local jurisdictions is through its Transit Friendly Land Use (TFLU) program. The TFLU program encourages growth and development where public transportation already exists, with the intent of revitalizing communities and increasing transit ridership.

One way in which the TFLU works with municipalities is through planning assistance for TOD near rail stations. Through NJ Transit staff and on-call consultants, the program provides expertise in transportation planning, urban design, market analysis, economic development, downtown revitalization and community outreach for interested communities. In many cases, communities approach NJ Transit directly asking for assistance; however, TFLU program staff also proactively identify communities for technical assistance based on potential TOD opportunities. To date, over 20 rail stations have received planning assistance through this program.

NJ Transit also provides general outreach and education to constituent communities focused on building statewide consensus for development near transit. The educational modules focus on cases studies that: (1) articulate the value of TOD; (2) provide New Jersey-based examples; and, (3) critically examine negative perceptions of TOD. Recently, workshops have been focused on those rail lines that would have been most likely to be subject to increased development pressure because of ARC (i.e., those lines which will have a one-seat ride to New York Penn Station for the first time).



Example Images from TFLU Planning Projects

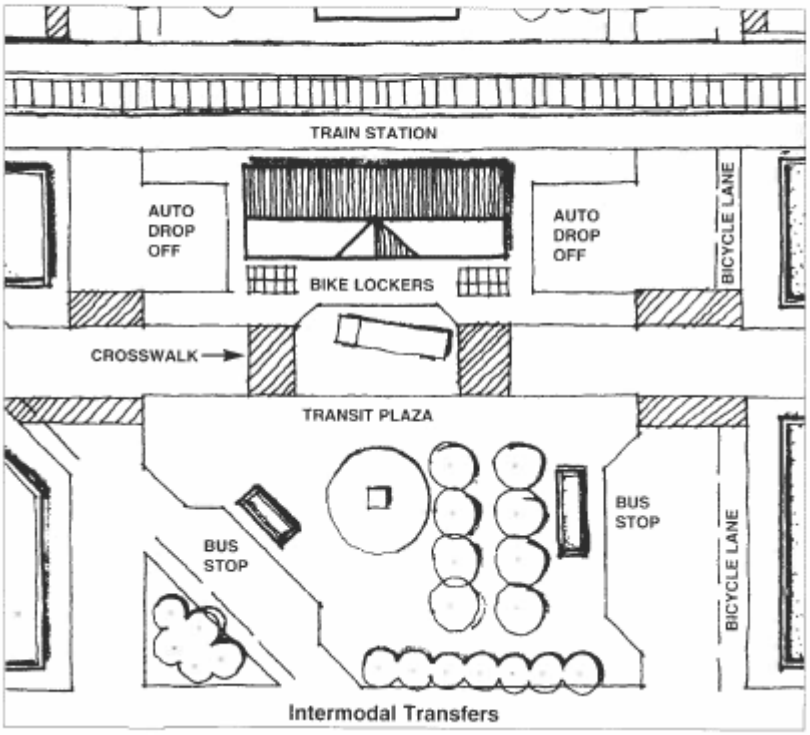
Step 3. Develop Objectives and Principles

Transit Friendly Land Use Guidebooks

While NJ Transit does not have official access guidelines, it has helped develop several guidance documents related to access issues. In particular, the 1994 NJ Transit document *Planning for Transit-Friendly Land-Use*, which serves as a reference guidebook for communities covering a range of topics related to station area development, circulation, and parking. This document is divided into three primary sections:

- *Station development and access principles* – This section of the guidebooks provides a detailed set of objectives and principles related to creating transit-friendly land use. Transit access-related principles include a chapter on pedestrian and bicycle access, and another chapter on automobile and transit vehicle circulation in station areas. The guidebook establishes a typology of six different station types for the purposes of describing appropriate land uses and access principles to fit within local context.

Intermodal transfers can be facilitated in the station area by providing prioritized and adjacent access for connecting buses and bicycles; convenient and secure bicycle storage; and, easily accessible auto drop-off areas.



Example Guidance from Handbook

- *Implementation tools* – detailed descriptions of implementation tools to achieve principles, ranging from developing various types of planning documents to zoning changes to value capture strategies. Each implementation tool includes a description as well as example locations within New Jersey at which it has been applied.

- *Illustrative plan and model ordinance text* – the Handbook concludes with an illustrative Station Area Plan for a fictional New Jersey station, and also provides model code language for jurisdictions related to zoning and site plan approval.

NJ Transit also partnered with the New Jersey Office of Smart Growth and other organizations more recently to publish a document entitled *Building a Transit-Friendly Community*. The document uses the experiences of municipalities in New Jersey and throughout the country to identify twenty-two "lessons learned" related to effective planning and consensus building. While the lessons themselves are not significantly different than the principles in the *Planning for Transit-Friendly Land Use* document, the locations cited within the document provide successful real-world examples.

State Level TOD – Transit Village Initiative

New Jersey is a leader in TOD planning and policy at a statewide level. While there are a number statewide policies related to TOD, the New Jersey Transit Village Initiative is a unique program to designate "transit villages" and promote transit-friendly development in communities with the designation. Currently, over twenty New Jersey communities are designated as transit villages.

The Transit Village Initiative program seeks to revitalize and grow selected communities with transit as an anchor. The Initiative is staffed by NJDOT, and each municipality has a direct contact person at NJDOT.

Obtaining the "Transit Village" designation requires meeting several criteria, including: 1) commit in writing to a growth in housing, jobs, and population; 2) having an adopted land-use strategy for transit-supportive development within walking distance of transit, and 3) the presence of vacant land in the station area. The benefits of being a transit village are an initial $100,000 grant for transportation (initially $250,000 but reduced due to funding), priority for some state grants, and technical assistance. In past years, approximately $1 million in annual funds have been available for distribution to designees (not including the $100,000 grants). Pedestrian and streetscape enhancements are common uses of the grant money. Technical assistance can take many forms depending on community needs. For instance, NJ DOT funds paid a consultant to develop a form-based code for the Town of Dover.

Expansion of the program to more jurisdictions has been hampered by a perception by many locals that the benefits of the program do not outweigh the costs (i.e. re-zoning for higher densities) because there is relatively little dedicated funding available for Transit Villages.

NJ Transit's official role in the Transit Village Initiative is limited; however, NJ Transit staff coordinates closely with NJ DOT staff. In addition, the NJ Transit TFLU program is used to encourage communities to apply for transit village designation and help prepare them for the application.

Step 5: Predict Outcomes and Apply Criteria

Proposed rail extensions for NJ Transit go through a detailed alternatives analysis that includes ridership projections dependent on specific access scenarios (e.g. parking availability, TOD). One notable example of this process is the planning and engineering work over the past several years to prepare for the new Hudson River rail tunnels through the ARC project. By more than doubling the number of peak-hour trains into Manhattan (23 to 48), ARC was anticipated to increase demand on the rail lines that would then have direct service to New York City. While ARC has been cancelled, the planning process still provides valuable insights.

As described above, NJ Transit worked to promote TOD within communities likely to experience increased demand through ARC. However, the agency also recognized the need for significant additional park-and-ride capacity to complement ARC. As part of the Environmental Impact Statement completed for ARC, NJ Transit completed modeling analysis to estimate future parking demand and identify locations where additional parking capacity should be sought (Appendix 3.2 of the Final Environmental Impact Statement).

This document examines existing parking utilization and ridership along NJ Transit line to calculate the parking spaces per rider for each NJ Transit line (values range from 0.17 to 0.76). Line-specific ratios are then applied to future ridership projections to estimate total parking demand and shortfall along each section of rail line. The results showed that ARC would create a deficiency of over 2,500 parking spaces with the largest impacts occurring on the Raritan Valley Line. While the EIS does not specify the stations at which this parking is to be located, NJ Transit pro-actively began work with communities to develop additional parking where needed. For instance, NJ Transit worked the Borough of Somerville to include commuter parking in its station redevelopment plans.

Step 7. Tradeoffs, Negotiation, and Choice

Parking Management

Because of the range of services that it operates and because NJ Transit owns only 50 percent of the park-and-ride spaces at its commuter rail stations, it takes a flexible approach to parking management. In general, NJ Transit attempts to price parking based on demand, and seeks to cover operating costs (at a minimum) through parking fees. Typically, this requires a fee of at least $2 per day.

Parking revenues more than cover operating costs for many facilities, particularly those rail lines with direct service into New York City where demand is highest. Conversely, parking in the southern half of the state is provided for free. NJ Transit has been most successful in the past at increasing parking fees when capital improvements are made, rather than simply based on high demand.

Where parking is not owned by NJ Transit, local municipalities use a variety of methods to manage the park-and-ride facilities that they own. In some cases, parking is restricted to only to residents of the local area, leading to under-utilized facilities. NJ Transit works with local jurisdictions on parking management where possible, but does not have staff sufficient to coordinate with all 130 municipalities served by rail stations. In some cases, NJ Transit will fund parking improvements in return for shifts in parking management. In general, any improvements funded by NJ Transit must be open to the public.

Regardless of parking ownership, NJ Transit's website includes a detailed listing of each park-and-ride lot, and the rules and fees governing its use.

Parking and Joint Development

NJ Transit supports of both joint development and parking expansion. While NJ Transit would prefer for TOD to generate revenue for the agency, past experiences indicate that the cost of structured replacement parking typically offset revenue. For instance, at the Morristown Station, NJ Transit is receiving a parking structure from the developer in exchange for land, but the project is not generating revenue outside of the expected increase in ridership generated by the new development.

Community Shuttle Program

Overall, transfers from other transit services account for only 6% of Commuter Rail access. However, in locations with high parking demand NJ Transit encourages local jurisdictions to provide shuttle services. From 1998-2006, NJ Transit had a program to purchase 20-passenger shuttle service vehicles for local agencies and provide an operating subsidy in return for local agencies providing peak-hour feeder service to rail stations. During the remainder of the day, communities can use the shuttle vehicles for any purpose.

This program purchased a total of 30-50 shuttle vehicles. While the program was discontinued due to lack of funding to purchase new vehicles, it has generally been considered successful. At its peak, approximately 50,000 monthly passengers were served through the program.

Step 8. Implementation and Monitoring

TOD Monitoring and Transit Village Initiative Evaluation

New Jersey DOT partners with the Alan M. Voorhees Transportation Center (VTC) at Rutgers University to monitor TOD activity within New Jersey. VTC staff produces a quarterly TOD newsletter highlighting activity within New Jersey and around the country, and also conduct research and evaluation of TOD within New Jersey. This research includes a 2008 evaluation of development surrounding the Hudson-Bergen Light Rail Line to determine the impacts of the rail line on development activity and real estate values in station areas.

The VTC is also charged with evaluating the effectiveness of the Transit Village Initiative program. The VTC published baseline reports for the first seven transit villages in 2003 and subsequent nine villages in 2005. These reports summarize:

- the socio-economic and transportation aspects of the station areas;
- resident and business surveys to assess community perceptions of smart growth and the impacts of transit village designation; and,

- record building permits activity.

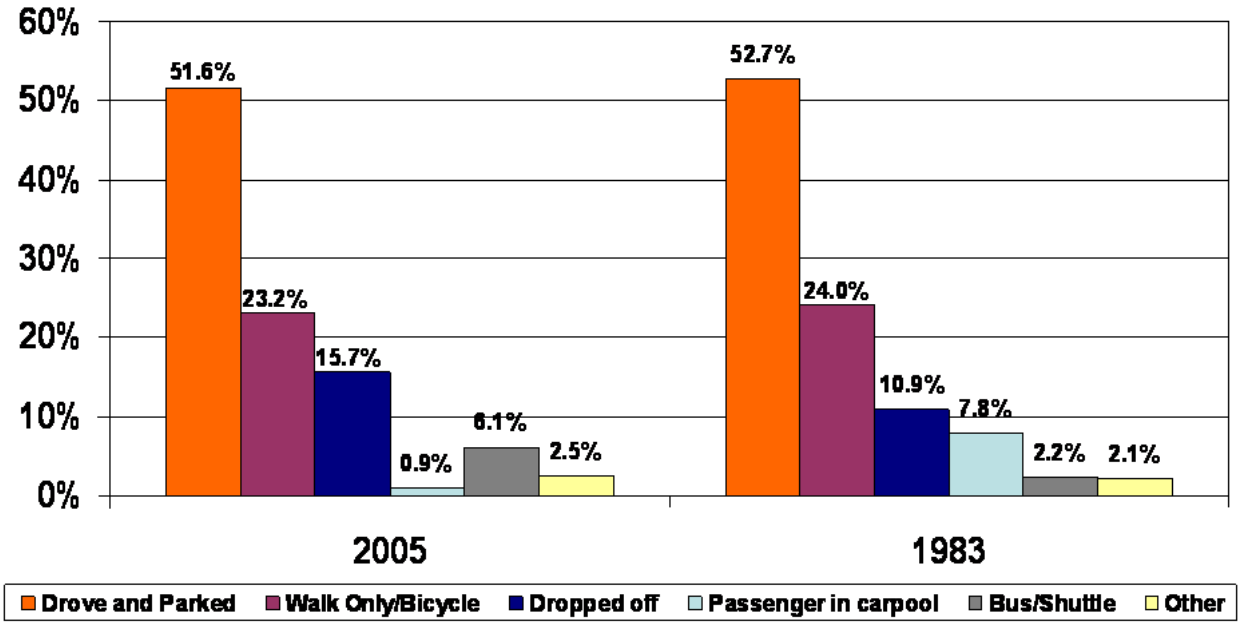
The results of the evaluation, showing significant variation between designated transit villages in all areas of the evaluation (e.g., income, race, support for increased station area development, etc.). However, the evaluation will be most useful to provide baseline information for future longitudinal analysis of demographics, development, and attitudes in the station areas. New Jersey DOT plans to fund additional evaluation studies in the future to document and understand any changes that have occurred in transit villages, subject to availability of funding for the study.

Monitoring Access Choices

NJ Transit has a wide array of access data, both current and historical, on which to base access decisions. The basis of these data are a series of rider surveys conducted in 1983, 1990, 1998, and 2005, which provide detailed information on current ridership and trends. The mode of access data is sufficiently detailed to provide access and egress modes for every commuter rail station in the system. These surveys are used for a variety of planning purposes related to station access.

Overall, the data show that access to patterns to NJ Transit's system overall have remained relatively stable over the past 30 years, with just over 50% of commuter rail passengers accessing the system via park-and-ride (though park-and-ride is down 2.5% in 2005 from 1999), and just under 25% walking. However, the data also show a sharp decline in passengers carpooling to the station, with riders shifting instead to feeder transit and kiss-and-ride.

NJ Transit also uses the mode of access data to monitor ridership per parking space by line. This metric allows NJ Transit to estimate the amount of parking that may be needed as part of extensions or service expansions. Currently, the systemwide average is approximately 0.5 parking spaces per trip.



NJ Transit Commuter Rail Access: 1983 vs. 2005

EXAMPLE APPLICATIONS

Rahway Transit Village

Station Name:	Rahway
Location:	Rahway, New Jersey
Station Type:	Suburban TOD
Year Opened:	Pre-1900
Distance from CBD:	23 miles
Parking Spaces:	640 (owned by Rahway Parking Authority and shared with visitors to downtown Rahway)
Feeder Transit:	1 bus line
Bike Parking:	Bike racks and lockers
Employment:	2,945
Population:	7,760
Daily Boardings:	1,900

Source: © 2011 Google

Rahway was one the original seven transit villages designated under New Jersey's Transit Village Initiative, and has experienced a significant amount of redevelopment in the station area in the past 10 years. Rahway is located on the Northeast Corridor and New Jersey Coast Lines, and is an approximately 40 minute one-seat ride to New York

Penn Station. Parking at the station is limited, however, resulting in relatively low ridership at the station.

Prior to 2000, the downtown area surrounding the station had high retail vacancy rates. According to the City Director of Community Development, the train station at the time was poorly integrated into the community, and contributed to the feeling of neglect in the downtown.

To address this problem and stimulate development in the study area, the City worked with NJ Transit to develop a concept for a new train station. Through cooperation between the City and NJ Transit, the City completed a new downtown master plan calling for higher density development and created a re-development agency, while NJ Transit provided over $13 million in funding for the new station. The station was completed in 1999. In addition, Rahway was selected as one of the original New Jersey transit villages, which has allowed it to receive multiple grants to improve the streetscape and pedestrian environment surrounding the station.

Since that time new development has resulted in over 900 new residential units, a 16-story hotel, and new ground floor retail in Rahway, with additional development planned. The success in Rahway highlights the need for both local and transit agency actions to effectively create TOD opportunities. NJ Transit's investment in a new station and the State's transit village initiative funding (to a lesser extent) created the potential for redevelopment, but the City's actions to re-zone their downtown and actively pursue TOD through a re-development agency allowed it happen.

Rebuilt Rahway Train Station

New development in Rahway near the rail station

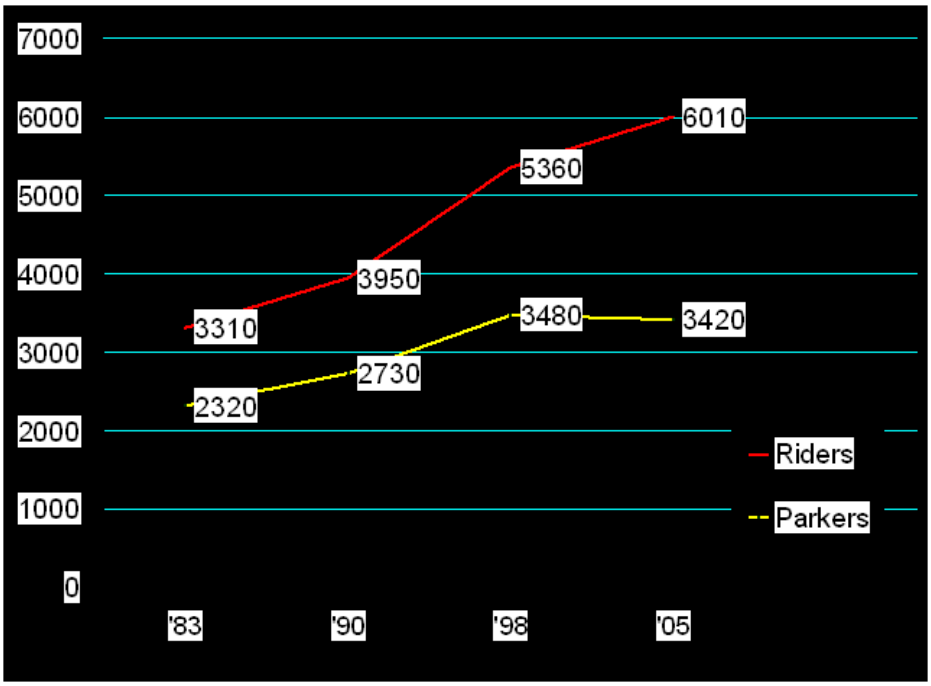
Metropark Transit Hub

Station Name:	Metropark
Location:	Woodbridge, New Jersey
Station Type:	Suburban Employment Center
Date Started:	1972
Distance from CBD:	28 miles
Parking Spaces:	3,600
Feeder Transit:	5 bus lines
Bike Parking:	Bike racks and lockers
Employment:	3,690
Population:	3,800
Daily Boardings:	6,000

Source: © 2011 Google

Metropark opened in the early 1970s as a suburban rail station, with a focus on serving park-and-ride. With over 3,600 parking spaces primarily in structured parking, station

access remains auto-oriented with over 75 percent of users arriving via car (including carpoolers and kiss-and-ride passengers). However, the station is also served by five NJ Transit bus routes and is located adjacent to a large employment center. Approximately 20% of riders access the station via walking or bus, making these modes important considerations as well. As the chart below shows, riders per parking space have steadily increased at Metropark since 1983.



NJ Transit analysis of ridership and parking growth at Metropark

Main Entrance to Metropark Station

Suburban office buildings near station

The majority of the land owned by New Transit at the station is already developed as structured parking. However, NJ Transit is interested in exploring joint development opportunities for the remaining surface lot to increase park-and-ride capacity and encourage TOD. To achieve this goal, NJ Transit worked closely with the Township of

Woodbridge to create a development concept plan for the station area. The concept plan sought to achieve five principles:

- Balance development potential with the need to increase transit ridership
- Build the long term value of the area, not just the parcel
- Organize the development around a great place , and create a gateway to the community
- Design the Place to meet the needs of all the stakeholders
- Activate the site throughout the day and week, not just commuter hours

Through a consultant, several potential development concepts were evaluated in terms of ridership impacts, traffic impacts, property tax revenue, and economic feasibility. Ultimately, the evaluation showed that joint-development offered the most promising mix of outcomes, and the plan recommended a joint development with 500 new park-and-ride spaces and 400,000 square feet of new development.

OC Transpo

Access to North America's Largest BRT System

THEME

OC Transpo operates the largest BRT system in North America, serving approximately 250,000 daily passengers. The system incorporates a wide range of station types, including urban stations surrounded by TOD and suburban park-and-ride stations. For the most part, the access issues faced by OC Transpo on its BRT system are the same as those faced by rail agencies, indicating that rapid transit mode is secondary to local context in determining station access characteristics. One unique aspect of BRT, however, is the flexibility to reduce transfers from feeder to rapid transit service by having local buses enter the BRT alignment (known locally as the Transitway) directly and provide express service into the CBD.

OC Transpo does not have a single set of transit access guidelines. Access planning is done in accordance with several key documents, including:

- City of Ottawa Transportation Master Plan;
- Design Guidelines for Light Rail Stations;
- Ontario Human Rights Code (for accessibility);
- Park-and-Ride Facility Needs Study; and,
- Transit Oriented Development Guidelines.

These documents provide guidance on a number of access-related issues, but do not prescribe a particular modal hierarchy for access to the BRT system. Instead, the agency's guidance documents are used to create station-specific access strategies corresponding to local needs.

LESSONS LEARNED

- For the most part, access issues faced on BRT systems are similar to those faced by rail agencies, indicating that local context is at least as important as rapid transit mode in determining station access characteristics.
- Consolidating adjoining cities into one larger jurisdiction reduces interagency coordination needs, and can result in significant efficiencies in planning and implementing station access improvements.
- OC Transpo's use of extensive public outreach to gauge reactions to potential service restructuring options should the value of public outreach in alternatives evaluation.
- Clearly established design principles, as through OC Transpo's Light Rail Design Guidelines, allow station access planning and design to proceed more efficiently.

- A comprehensive parking facilities needs study should: 1) establish policy regarding locations at which park-and-ride facilities are appropriate; 2) estimate future demand for additional parking; and, 3) identify and screen potential park-and-ride facility locations.

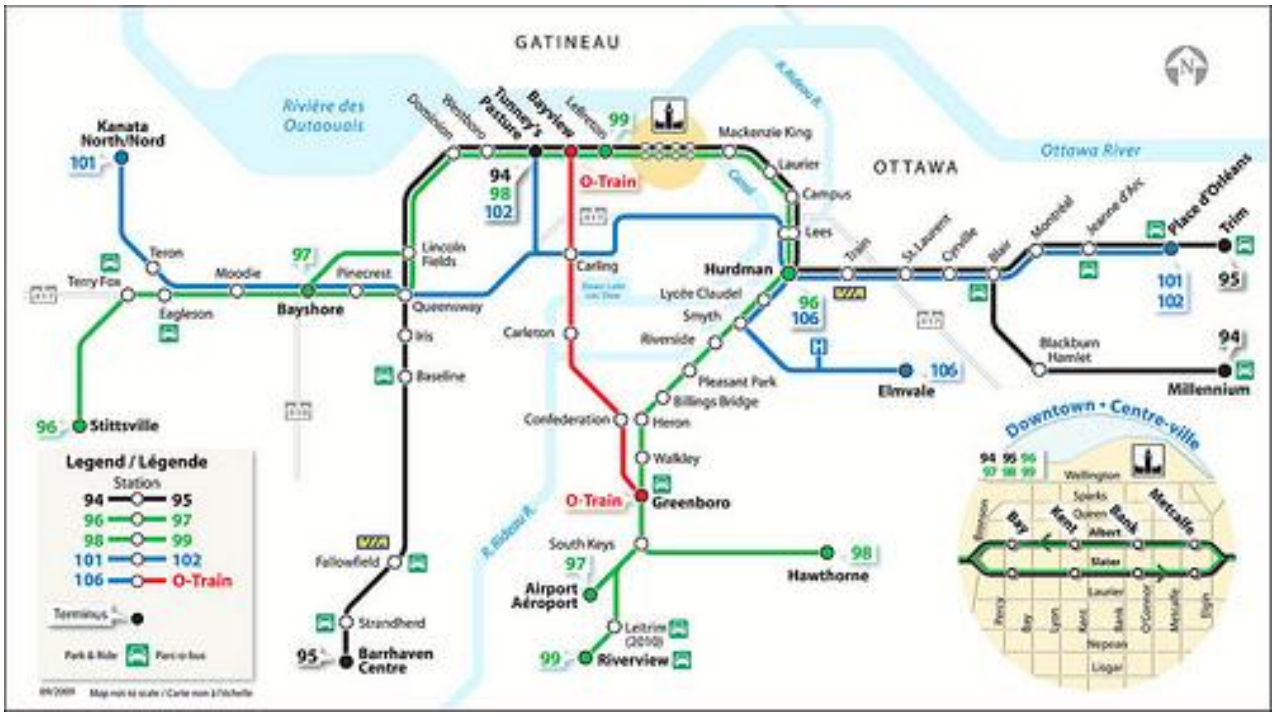
BACKGROUND

Urban Area:	Ottawa – Gatineau, Canada
Urban Area Population:	1.1M
Service Area Population	0.9M
Date started:	1983
Total Route Miles:	19 miles of exclusive bus way
Number of Stations:	43
Park-and-Ride Spaces:	5,100
Daily Ridership:	250,000
Maximum Distance from CBD:	15 miles

OC Transpo is the primary public transit provider for Ottawa, Ontario. Unlike most transit agencies in the United States, the City of Ottawa directly operates OC Transpo. Moreover, the incorporated area of the City of Ottawa covers over 1,000 square miles, and encompasses all of Ottawa's Ontario suburbs as well as some of surrounding rural communities. However, Gatineau, Quebec, which is located directly across the Ottawa River from Ottawa, has its own bus transit system Société de transport de l'Outaouais, which connects with OC Transpo in several locations.

The Ottawa BRT system operates primarily in grade-separated exclusive rights-of-way. However, the downtown portion of the bus way operates in bus lanes on surface streets. To increase capacity through the core, Ottawa plans to replace the central portion of its BRT system with a light rail tunnel, but plans additional expansions of the BRT system in outlying areas. In addition to the Transitway, OC Transpo operates a single five-mile light rail line known as the O Train, which connects to the Transitway at both termini. Overall, the BRT system carries approximately two-thirds of the system's overall ridership.

The City is currently performing preliminary engineering to replace its central BRT line with light rail extending from Tunney's Pasture Station to Blair Station, with a tunnel through the downtown core. The primary reason for the shift is to increase transit capacity through the downtown core, where the current 10,000 peak hour riders per direction are expected to increase by more than 75 percent in the next 20 years. In addition, OC Transpo anticipates operating efficiencies associated with light rail to reduce total operating costs by approximately 10 percent.



OC Transpo System Map

PROCESS

Step 2. Establish a Collaborative Environment

The province of Ontario ordered the unification of the Ottawa-Carleton region in 2001, resulting in a single city government covering the original City of Ottawa as well as its suburbs. Through this unification, the City government also took over operation of OC Transpo, the region's transit system. This unification benefits transit access planning by (i) eliminating the need for coordination between the regional transit agency and multiple local jurisdictions; and (ii) placing control of the entire transportation system within a single agency. As a result, the City directly controls transit planning; transit operations, station land use planning and auto, bicycle, and pedestrian connections to and from all stations.

The City's structure allows for a coordinated approach toward transportation planning and implementation. For instance, the City's 2008 Transportation Master Plan provides a comprehensive assessment of the region's transportation needs across all modes, including a focus on improvements to increase pedestrian, bicycle, and auto access to transit stations.

In addition to eliminating the need for interagency coordination, the City of Ottawa also uses extensive public involvement in its transit planning, including issues surrounding transit access. As part of the 2008 Transportation Master Plan, the City led a year-long comprehensive outreach effort. One of the major questions raised through the process related to the issue of requiring local bus passengers to transfer at transit way stations versus providing "one-seat rides" directly to the CBD. The results of this outreach showed limited reluctance to transfer, and helped to

shape OC Transpo's restructuring of its BRT system to a trunk and feeder system (see case application below for more detail).

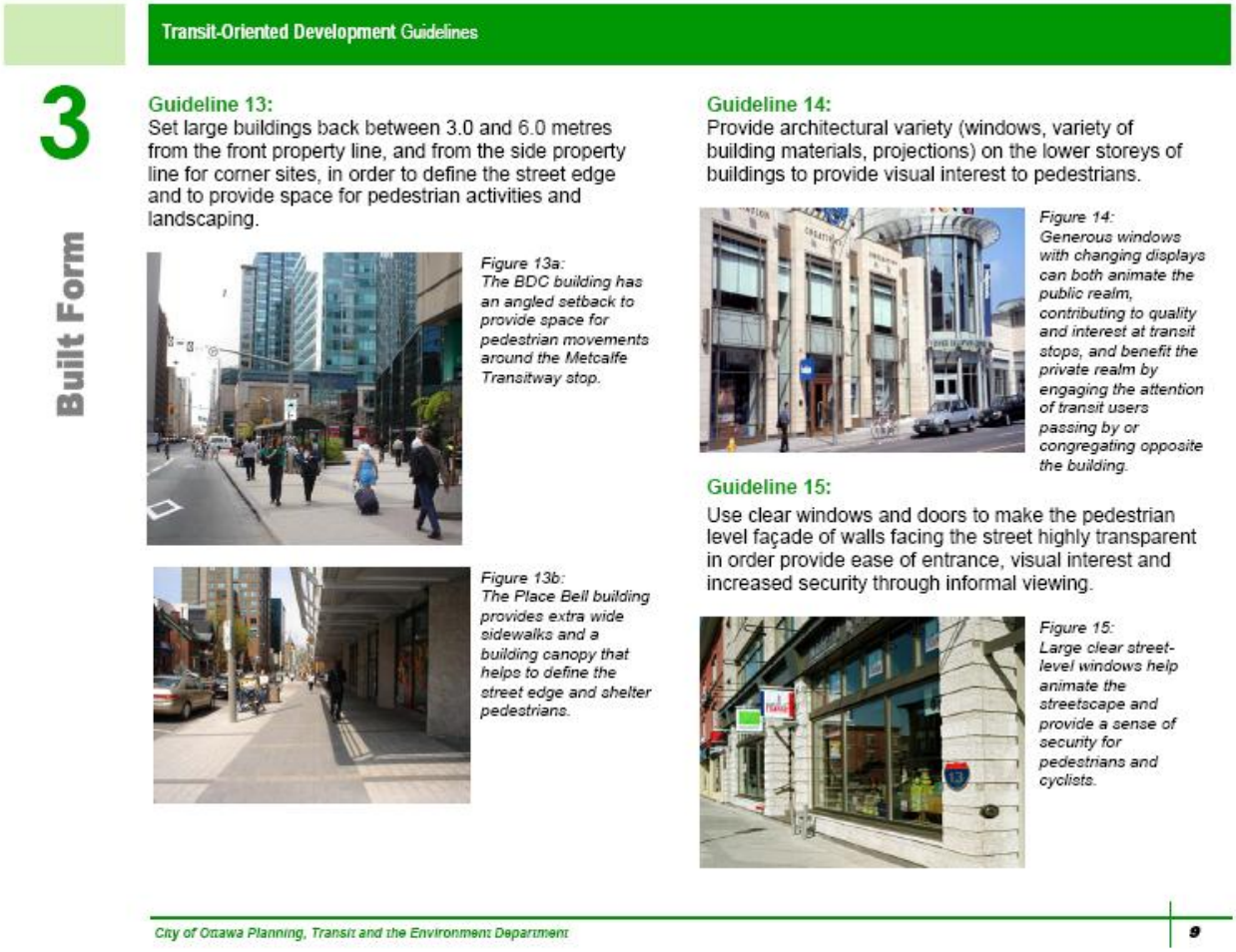
Step 3. Develop Objectives and Principles

Transit-Oriented Development

There are several successful examples of TOD surrounding Ottawa's BRT stations, and the City of Ottawa encourages TOD in rapid transit station areas through a combination of zoning, maximum parking ratios and incentives including reduced development charges. The City adopted TOD Guidelines in 2007, which apply to all new development within a 600 meter walking distance of rapid transit stations (the Guidelines also call for enhancing cycling facilities within 1,500 meters of stations). The Guidelines are not standards, but are used to provide direction in site plan review, community design plans, and other City activities.

Unlike most transit agencies, the City of Ottawa directly controls land use decisions the TOD Guidelines provide more design specifics than are commonly included in U.S. transit agency guidelines. The Guidelines provide 56 specific guidelines for TOD in six subsections relating to:

- *Land use* – establishing the right kinds, combinations, and intensity of land uses to support efficient transit.
- *Layout* – land use patterns and site development to improve connectivity, particularly for non-motorized travelers.
- *Built form* – urban design principles to establish environments that promote community goals.
- *Pedestrians and cyclists* – make the walking and bicycling experience as comfortable as possible.
- *Vehicles and parking* – reduce the total amount of parking needs, and design that which is provided to impact the urban design as little as possible.
- *Streetscape and environment* – ensure high quality design of public spaces.



Transit-Oriented Development Guidelines

3 Built Form

Guideline 13:
Set large buildings back between 3.0 and 6.0 metres from the front property line, and from the side property line for corner sites, in order to define the street edge and to provide space for pedestrian activities and landscaping.

Figure 13a: The BDC building has an angled setback to provide space for pedestrian movements around the Metcalfe Transitway stop.

Figure 13b: The Place Bell building provides extra wide sidewalks and a building canopy that helps to define the street edge and shelter pedestrians.

Guideline 14:
Provide architectural variety (windows, variety of building materials, projections) on the lower storeys of buildings to provide visual interest to pedestrians.

Figure 14: Generous windows with changing displays can both animate the public realm, contributing to quality and interest at transit stops, and benefit the private realm by engaging the attention of transit users passing by or congregating opposite the building.

Guideline 15:
Use clear windows and doors to make the pedestrian level façade of walls facing the street highly transparent in order provide ease of entrance, visual interest and increased security through informal viewing.

Figure 15: Large clear street-level windows help animate the streetscape and provide a sense of security for pedestrians and cyclists.

City of Ottawa Planning, Transit and the Environment Department 9

Example guidance from TOD Guidelines

These guidelines provide detailed descriptions of good practice for transit-oriented design, and are illustrated with numerous figures and local examples. For instance, one guideline in the layout sections calls for street blocks to be no more than 150 meters in length to improve connectivity, while another in the built form section calls for setbacks of 3 – 6 meters for large buildings.

The City has also worked closely with developers in the past to identify station-specific incentives to encourage TOD, such as reducing a developer's parking requirement in exchange for providing better connections to a BRT station (see example application below).

Light Rail Design Guidelines

The first phase of the light rail system will have 13 total stations: four entirely new underground stations in the central core and nine re-constructed stations along the existing BRT Transitway. To ensure that the design of these stations fulfills the City's vision for the light rail system, the City is currently developing Design Guidelines for Light Rail Stations (a draft version of these Guidelines completed in June 2010 was reviewed for this report). The Guidelines contain four basic sections: review of relevant design policies, guidance and required studies; station exterior design guidelines; station interior design guidelines; and station-specific guidance. For the

purposes of planning for access to transit stations, the sections on exterior station design and station-specific guidance are most relevant.

Note that the Guidelines do not discuss park-and-ride facilities, as none are planned at any of the light rail stations due to their relatively close proximity to the central core.

Exterior Station Design Guidelines

The section on exterior design is intended to ensure that stations "form an integral part of the community in which they exist and respond appropriately to the adjacent movement of pedestrians, cyclists, and motor vehicles and land use context". These guidelines establish several general principles related to pedestrian, bicycle, feeder bus, and kiss-and-ride access:

- Pedestrian access and circulation is given the highest priority in station design.
- All at-grade stations will include a minimum of 30 bicycle parking spaces, to be located in covered/weather-protected areas wherever possible.
- All station designs will include a Pedestrian and Cyclist Movement Study to accommodate pedestrians and cyclists traveling to and from stations. The study will consider the potential demand for bike-sharing at each station, and recommend the minimum number of bicycle parking spaces appropriate for each station.
- Stations should include a passenger drop-off (i.e., kiss-and-ride) area wherever possible, but should not conflict with efficient bus circulation through the stations.
- Station designs should accommodate bus to rail transfers as seamlessly as possible.

Station Specific Design Guidelines

In addition to general design principles, the Guidelines also devote a section to a discussion of each of the proposed stations to provide more detail on specific design issues. Each station specific sub-section includes a description of the land use and planning context for the station, urban design opportunities, pedestrian circulation routes and conceptual station design. These descriptions typically include a range of access-related information that will inform the station's ultimate design. For instance, a typical discussion related to Tunney's Pasture Station provides information on future development opportunities and their connections to the station, needed pedestrian access improvements, and the conceptual design of the bus to light rail transfer.

Bicycle Access

OC Transpo encourages cycling, and is in the process of integrating bicycle racks on all of their buses, and currently accommodates them on all articulated buses plus nine other routes. However, bike racks are removed from buses during the winter when usage is low and there may be issues clearing snow drifts. While this is not ideal in the shoulder seasons, when snowy days may alternate with warmer ones, OC Transpo does not anticipate changing this policy.

The website trip planning system includes a bike-rack equipped buses option and OC Transpo has published a "Rack & Roll" map illustrating the transit network including only those routes that accommodate bicycles. Bicycle parking is available at many stations and information about bicycle facilities is available on each station's webpage. Bike lockers were piloted at one BRT station, but were not well-used and were removed. OC Transpo is also very interested in promoting bicycle access to light rail stations through its Design Guidelines for Light Rail Stations (see above).

Step 6. Predict Outcomes and Apply Criteria

Park-and-Ride Facility Needs Study

The City of Ottawa provides about 5,400 parking spaces at 11 park – and - ride lots throughout the City, all in surface lots. Currently, system-wide parking utilization is approximately 90 percent, with most facilities over capacity, and continued increases in parking demand are projected as overall system ridership increases. Parking is free at most stations, with only two stations with no free parking available (Baseline Station - 276 spaces and Jeanne d'Arc Station - 60 spaces).

While the City's Transportation Master Plan identified the need for additional park-and-ride capacity and established the desire to place new facilities outside of the City's greenbelt, this Plan did not provide detailed analysis of potential locations for parking expansion.

To address the parking deficiency and refine the Transportation Master Plan, the City completed a Park-and-Ride Facility Needs Study. The study was completed in 2009, and consists of two primary parts: (1) best practices and policy directions; and (2) identifying and evaluating needs.

Part one of the document provides a general overview of principles for developing park-and-ride facilities based on a thorough literature review and interviews with other transit agencies covering parking pricing, estimating demand, and performance monitoring. Based on this review, Part one:

- Establishes twelve planning principles for developing parking facilities (e.g., construct park-and-ride in locations to maximize trunk transit ridership and promote reverse commuting).
- Provides a five-category classification of park-and-ride facilities based on location, and identifies the primary functions for each type.
- Identifies supporting policies related to park-and-ride location selection, pricing, design, operations, shared parking agreements, and monitoring. For instance, the pricing policy establishes the OC Transpo should only institute parking charges at new facilities.
- Identifies an appropriate demand estimation method to be applied in Part two of the study based on a linear regression model developed in Calgary and adopted for use in Ottawa.

Part two of the study uses the principles, policy, and demand forecasting method established in Part one to estimate the need for new parking facilities, identify appropriate locations for park-and-ride, and create an implementation plan and schedule. Overall, the study projects a demand for over 15,000 total parking spaces through year 2031. Through the forecasting method, this demand was allocated to four regional catchment areas, and existing park-and-ride capacity was compared to demand within each area.

Potential park-and-ride locations were then screened using detailed criteria related to transit service levels, site accessibility, environmental impacts, feasibility, zoning, and cost. This screening resulted in a list of preferred locations for new park-and-ride facilities, with total parking spaces needed for each location. Finally, the study includes an implementation plan detailing the number of new parking stalls required at each location by 2013, 2018, and 2031 to prioritize investments in the parking system.

Step 8. Implementation and Monitoring

OC Transpo collects a detailed data related to transit access to support its planning and decision-making activities. Data collection includes manual parking utilization counts for one week every month at each park-and-ride facility. These data are used for day-to-day monitoring activities, as well as to support larger planning efforts such as the Park-and-Ride Facility Needs Study. In addition, the City collects annual bicycle and pedestrian counts at over 500 locations, including many transit stations that allow it to understand trends in non-motorized station access.

OC Transpo also performed annual surveys of bus bike rack usage from the program's implementation in 2000 through 2007. However, the surveys are no longer done do to high costs and the limited value of the resulting data (i.e., the surveys did not inform any particular decision as the program was considered successful yet no expansion beyond two bikes per bus was feasible).

Currently, OC Transpo has limited knowledge of transfer activity between buses; however, with the implementation of smart-card fare collection in the near future they hope to be able to gain a greater understanding of transfer patterns.

EXAMPLE APPLICATIONS

Structuring Feeder Service for BRT

During peak-periods, OC Transpo's focus has traditionally been on providing passengers using the Transitway system with a "one-seat ride." This means that rather than dropping passengers off at BRT stations, local buses enter the BRT alignment and provide express service into the CBD without requiring a transfer. The potential to eliminate transfers from local bus passengers to rapid transit is one of the primary benefits of BRT compared to rail system.

However, as documented in OC Transpo's Interim Tactical Plan, the agency is currently migrating away from this model toward a trunk and feeder system similar in structure to bus feeder service to a rail network. There are several reasons this change:

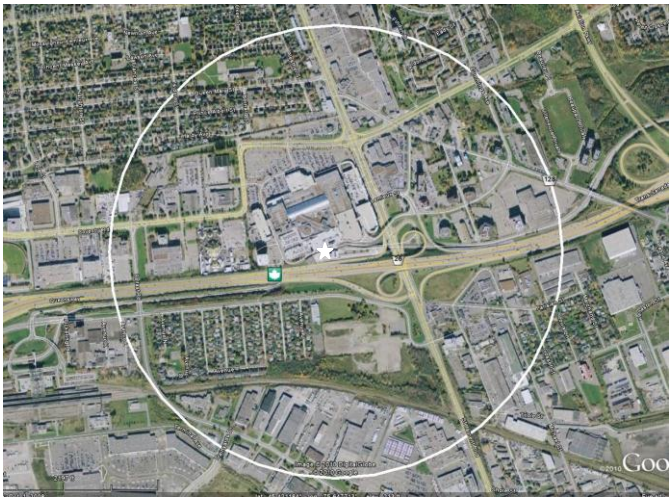
- Increased capacity (the central portion of the Transitway is currently at capacity with over 160 buses per direction per hour during the peak) due to lower variability in passenger loads between vehicles in a feeder and trunk system;
- Reduced operating costs; and,
- The eventual transition to light rail in the core.

While the above reasons make the benefits of traditional feeder service very clear from an operator perspective, the benefits to passengers are less clear. For this reason, the City asked targeted questions about customer transfer preferences compared to other aspects of transit service as part of the City's Transportation Master Plan to gauge potential reactions to shifting the network structure. The feedback indicated that transfers were not perceived negatively by the majority of the public as long as transfer wait times were short. This was especially true when respondents were given the option of trading-off additional transfers with improved reliability.

Given the feedback, OC Transpo is currently moving forward with its restructuring, with a focus on designing transfer points to minimize walking distance and ensuring frequent on-time service to reduce overall wait times.

St. Laurent Centre Bus-Oriented Development

Station Name:	St Laurent
Location:	Ottawa, Ontario
Station Type:	Suburban Retail Center
Year Opened:	1987
Distance from CBD:	4 miles
Parking Spaces:	0
Feeder Transit:	Over 30 bus routes
Bike Parking:	Racks
Employment:	Not available
Population:	Not available
Daily Boardings:	12,500



Source: © 2011 Google

St. Laurent Station is located along the southern edge of the St. Laurent Centre, the largest mall in the Ottawa region. Construction of the station was linked to an expansion of the shopping center, which occurred in 1987. Through this expansion, the developer was allowed to construct less parking than required by code in exchange for providing land for the BRT station and sharing in the costs of constructing the station. The shopping center expansion and station were designed to allow for direct connections between the two on multiple levels. In addition, the transfer center between feeder services and the Transitway occurs immediately adjacent to a main entrance to the mall.

View from transit station to shopping center entrance

The St. Laurent Station serves as excellent example of transit-oriented retail development. While the shopping center provides over 4,500 parking spaces for shoppers, approximately 30 percent of mall patrons arrive via bus. The symbiotic relationship between the shopping center and the Transitway is such that the transit strike of 2008/2009 significantly impacted retail sales there.

Currently, preliminary engineering is beginning to replace the existing BRT station with a light rail station as part of the City's light rail conversion. Through this process, conceptual designs for the station intend to upgrade existing connections between transit and the mall, and develop direct pedestrian connections to a currently under-developed parcel to the south of the station to help spur redevelopment.

Baseline Park-and-Ride Redevelopment

Station Name:	Baseline
Location:	Ottawa, Ontario
Station Type:	Suburban Employment Center
Year Opened:	1983
Distance from CBD:	7 miles
Parking Spaces:	276
Feeder Transit:	Over 20 bus routes
Bike Parking:	Racks
Employment:	Not available
Population:	Not available
Daily Boardings:	11,000

Source: © 2011 Google

Baseline Station is currently the western terminus of the exclusive Transitway, with buses running on surface streets to points located farther from the central core. As a terminus station, Baseline was originally developed with a park-and-ride lot, which is fully utilized. However, an expansion of the southwest Transitway beyond Baseline to Barrhaven Centre is scheduled to open in Spring 2011. This expansion and the City's preference for park-and-ride facilities to be located outside of the greenbelt (Baseline is inside the greenbelt) make the parking expendable.

As a result, the City is working with adjacent Algonquin College on several improvements to better integrate the station with the college. These include constructing a new station west of the current one and building the new Algonquin College Centre for Construction Trades and Building Sciences where the previous station was located, and constructing a pedestrian bridge from the station to the main campus across a busy roadway. As a result of the changes, the new station will include only 100 parking spaces, a reduction of over 175 from what currently exists.

Baseline illustrates Ottawa's commitment to create transit-oriented places in addition to providing park-and-ride facilities. While demand for parking at Baseline is high, the transit agency recognizes that at this particular station regional goals are better served through development even if it reduces the station's parking capacity. At the same time, the reduction at Baseline is being balanced with parking increases at stations outside the greenbelt, supporting the City's commitment to reducing auto travel across the greenbelt.

New Algonquin College building with existing college buildings in background

Conceptual design for future Baseline Station development with underground BRT station

Regional Transit District Denver (RTD)

Integrating Access into a New Light Rail System

THEME

The Denver Regional Transportation District (RTD) operates a relatively new light rail system and an extensive bus network that includes 40 municipalities in six counties and two city/county jurisdictions. The system is still being expanded, and access planning is an active issue at this time. RTD completed its first Transit Access Guidelines in January 2009. The Guidelines were developed to support future TOD and ensure that stations are well-integrated into their surroundings. RTD's Strategic Plan previously provided access guidelines at a high level, but additional detail was required. Today, RTD's access is heavily dependent on park-and-ride, but a shift has been occurring to create light rail stations that are more multi-modal in nature. As documented in the Transit Access Guidelines, the adopted access hierarchy "encourages an optimal balance of modes to get to the transit system" by giving pedestrians the highest priority, and "balancing the modes of access to transit," thereby managing the system and site capacity constraints. Improved access and TOD are also integral parts of FasTracks, the RTD's multi-billion dollar 12-year comprehensive transit plan, which responds to transportation needs (both bus and rail) in the Denver region.

LESSONS LEARNED

- Developing Station Access Guidelines provides value in supporting collaborative planning efforts. At the same time, Guidelines must remain flexible to be successfully applied.
- Parking pricing can be used to achieve many goals in addition to serving as a potential revenue source, including reducing the number of long-term parkers and shifting parking demand to facilities with unused capacity.
- Establishing a permanent Transit Access Committee is a means to ensuring consistent access improvements and joint development projects throughout the system.
- Direct pedestrian access between transit stations and adjacent development is critically important to transit's success, yet some property owners may still resist providing such access.
- Successful joint development programs require flexibility to adjust to unique market conditions and other constraints at individual stations.
- Maintaining an online TOD database, and preparing periodical summary reports, is a valuable method of documenting TOD in the region and making the case for additional TOD.

BACKGROUND

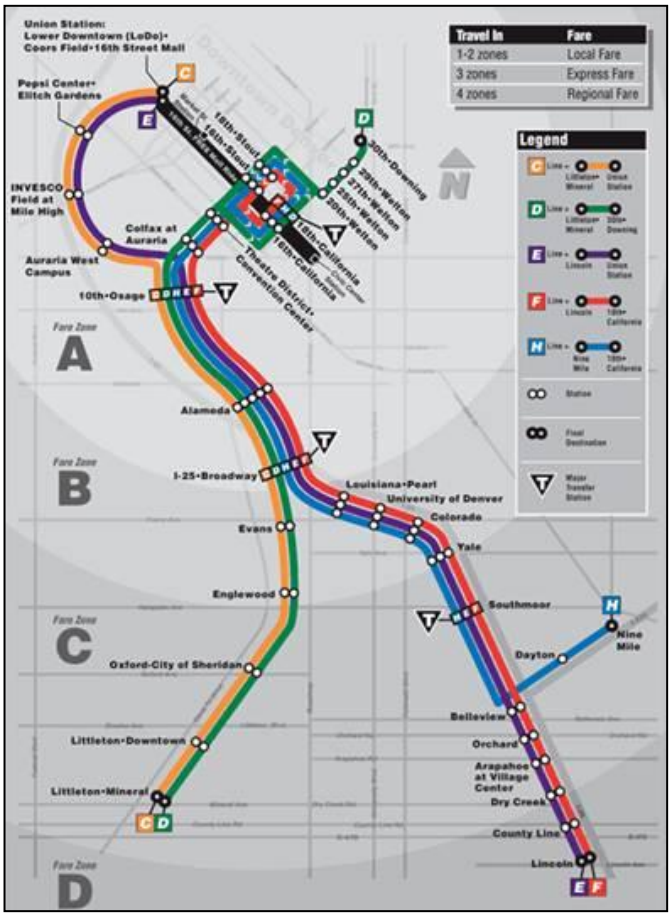
Urban Area:	Denver, Colorado
Urban Area Population:	1.98 M
Service Area Population:	2.6 M
Age of System:	15 years
Total Route Miles:	70
Number of Stations:	37 light rail
Park-and-Ride Spaces:	26,000
Daily Ridership:	66,000
Maximum Distance from CBD:	16 miles

PROCESS

Step 3. Develop Objectives and Principles

Transit Access Guidelines

RTD has a very active access program, including Access Guidelines, a TOD Strategic Plan, and a parking pricing program. The RTD Transit Access Guidelines (January 2009) were developed by RTD's Transit Access Committee and intended to serve as the basis for future access planning. The committee originally began as the TOD Committee, but shifted as the need for more comprehensive access planning was identified. Because the Guidelines are so new, there is little practical experience to date on applying them. However, they are being widely distributed and the intent is that they will be beneficial for joint-development proposals and local jurisdictions, as well as use within the agency.



Denver RTD Light Rail Network

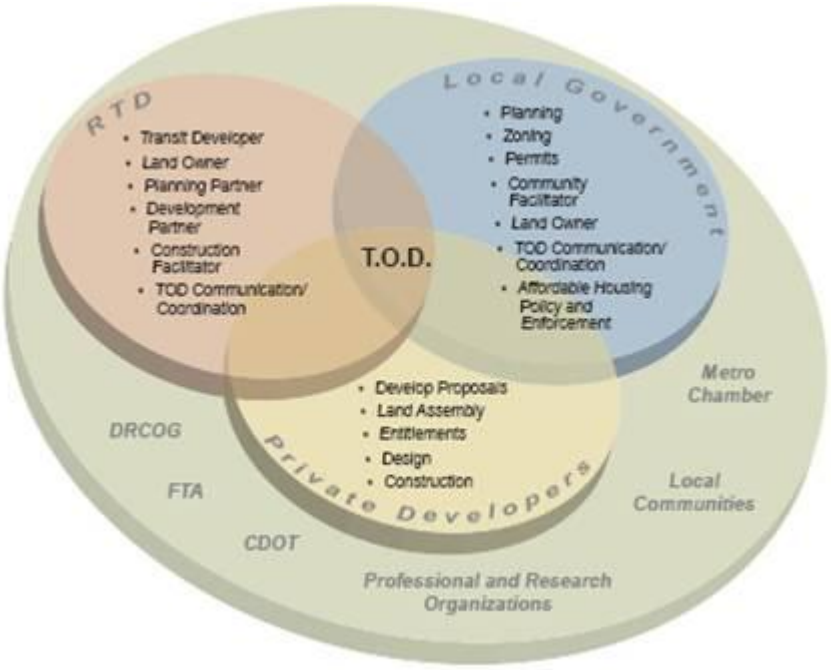
RTD's Access Guidelines provide specific goals and standards for access related to pedestrians, bus transfers, bicycles, kiss-and-ride, and park-and-ride, specifically identifying guidelines and standards that are the responsibility of RTD, the

responsibility of others, and those that are the responsibility of multiple parties including RTD. The Transit Access Guidelines identify that all joint development proposals should "functionally connect to the transit facility, increase transit ridership, enhance the quality of the rider experience, create a sense of place, functionally connect to the adjacent community, respect or advance the vision of the adjacent community, provide the opportunity for improved transit infrastructure for RTD, define a financial framework for any real estate transaction(s) and/or infrastructure improvements, and conform with locally adopted and expressed plans."

In general, RTD access planning is done on a case-by-case basis that attempts to take into account local land use and guidance from the Transit Access Guidelines. Although not all goals are used for the development of each individual station, over time they have all been incorporated in some way, generally as a baseline or starting point that may be modified during planning or negotiations.

Transit Oriented Development (TOD)

Through RTD's FasTracks project, the Strategic Plan for Transit Oriented Development was most recently approved in September 2010 to promote cooperation and communication between stakeholders, provide a flexible approach to TOD, increase ridership and enhanced passenger amenities, support affordable housing development in close proximity to RTD services, capitalize on lessons learned from other TODs, and provide RTD with a range of participation to maximize TOD opportunities.



Collaborative Structure for TOD Planning

One of the document's four key goals for success is to support multimodal access to the transit system by all users. Strategies of this goal include: (1) the creation of an access hierarchy (in order of priority: pedestrians, bus riders, bicyclists, short-term parking and long-term parking); (2) improving access needs away from RTD property such as pedestrian connections within a five to ten minute walk, regional bus transit and bicycle connections, and vehicle access for the station catchment area; (3) strategically managing RTD parking facilities to balance vehicle access, while maximizing ridership at stations and minimizing the need for single-occupancy

vehicle trips; and, (4) optimizing parking at stations by considering proximity to Downtown Denver (less parking closer in), local feeder bus service (less parking with higher levels of service), and pedestrian connectivity (less parking with good pedestrian connections).

RTD recognizes that transit supportive rezoning at individual stations will promote development that occurs in close proximity to transit and incorporates the station into the development. Issues such as urban design, setback minimums, parking maximums, entry frontage, and ground-floor transparency are all important factors for jurisdictions to consider with TOD zoning.

RTD encourages joint-development in its station areas, and has had a number of proposals for joint-development. However, implementation has been limited. In particular, there is opposition and legal challenges to selling land acquired through eminent domain to private developers. As a result, there is currently no clear policy directive on joint-development as RTD attempts to solve associated legal issues.

As an agency dependent on high numbers of commuter parking spaces for ridership, RTD is gradually changing how it views parking. The current Denver Regional Council of Governments (DRCOG) travel demand model projects ridership on future rail lines and "creates a self reinforcing mechanism to replicate existing RTD operational characteristics," as documented in FasTracks TOD Lessons Learned Report (March 2010). At the time of planning and development, FTA's New Start procedures emphasized commuter parking spaces as a key element in determining cost effectiveness. RTD's standard practice of a full 1:1 parking space replacement during joint development/TOD is often viewed by developers as too much of a financial hurdle. With the FTA placing more emphasis on livable communities, RTD is pursuing alternative strategies to auto-based station access. Although RTD seeks full parking replacement through TOD, this is not an official policy and may be adjusted on a case-by-case basis.

DRCOG tracks all new and proposed development projects that occur within a half-mile of existing and proposed Light Rail stations through a database, which is incorporated into a map-based TOD Project Viewer available to the public online. The Project Viewer was developed in partnership with the MPO and provides examples and descriptions of constructed, on-going, and proposed TOD in the region (i.e., address, costs, developer, development type and intensities, year, etc.). The development projects encompass those that occur naturally in the market place, as well as those initiated by RTD. The database allows RTD and other agencies to easily showcase TOD in the region and helps make the case for additional TOD. An annual report is prepared in conjunction and is available online. As of 2009, a summary of completed and under construction projects along RTD's existing rail and planned FasTracks corridors includes more than 16,000 residential units, 4,700 hotel rooms, 5,240,000 square feet of retail space and, 5,100,000 square feet of office space, among others. The Project Viewer is found at http://www.drcog.org/index.cfm?page=TODProjectViewer.

Parking Management Program

RTD operates nearly 12,000 parking spaces at 19 light rail stations and provides an additional 14,000 spaces at park-and-ride facilities connecting to bus service throughout its service area.

RTD has 74 parking facilities throughout the metro area and plans to construct an additional 21,000 spaces along future planned rail extensions. RTD uses 85 percent utilization as a standard for when to begin evaluating opportunities to expand parking. As a relatively new light rail system, RTD's initial focus has been on attracting riders, particularly through the use of commuter parking. The utilization for all 74 facilities is approximately 66 percent.

Historically, RTD has not charged for parking for residents of the RTD service areas. However, RTD began a parking pricing program on February 2, 2009 with three objectives: (1) to introduce demand management at parking lots with usage levels above 90%; (2) to partially offset the costs associated with out-of-District patrons not paying a fair share of costs at the fare box; and (3) to capture relative value of parking for extended periods while traveling. Vehicles using RTD parking facilities with license plates registered within the RTD district boundaries may park up to 24 hours without being charged a fee, while vehicles with license plates registered outside the RTD district will be subject to a fee every 24-hour period. This has been successful in eliminating long-term use parking (often for months at a time) and freeing up spaces for daily commuters. In-district vehicle fees are $1.00 to $2.00 per day after the first 24 hours, while out-of-district vehicle fees are $2.00 to $4.00 for each 24-hour period. The program was implemented along travel sheds, where the largest portion of daily parking occurs, with incentives to relocate from high to low demand facilities that offer similar services. Over 50% of all facilities were not included in the program because of the probability of low yield and the nearly universal availability of capacity at these lower demand facilities. Fees only come into the picture for parking facilities approaching capacity.

For its most heavily used park-and-ride lots, RTD is currently experimenting with a pricing scheme that allows drivers to reserve close-in spaces up until 10:00 a.m. for $37.50 per month. No more than 15 percent of any lot can be reserved. RTD is also testing new technologies to monitor parking activity, including license plate technology, handheld devices, database from the state, and payment information from pay stations. These are all efforts to improve enforcement, which is not that effective, and development of a reliable system for when dynamic pricing is implemented.

Accommodating parking can also be a challenge, as local jurisdictions may prefer structured parking for aesthetic reasons, but may not understand the cost implications of structured parking. Other parking issues include the use of RTD parking facilities by persons making extended out of town trips (approximately 1,500 spaces per week) and non-residents (approximately 1,600 spaces per week). On average, approximately 15 percent of the usage at the 19 "full" facilities is by travelers and non-resident patrons.

Transit Access Committee

RTD's Transit Access Committee provides inter-disciplinary coordination and recommendations for all access related design changes. The committee is intended to be the primary coordination group between external parties (i.e., developers and local jurisdictions) on TOD issues during the joint development review process. Managers at RTD are encouraged to use the committee as a resource for access issues and are required to coordinate at milestones in the approval process

such as alternatives analysis stages, and prior to DEIS completion, preferred alternative selection, completion of FEIS, 65% design, and 90% final design. All joint development proposers are also required to present any access issues to the committee, where a dialogue serves to develop a shared project understanding.

According to RTD FasTracks' TOD Lessons Learned Report (March 2010), the Transit Access Committee needs greater visibility within RTD and needs to meet regularly on TOD related activities. Furthermore, it is RTD's goal that this Committee should become known externally as the guiding operating committee for TOD matters.

Bicycle and Pedestrian Policies

Bike sharing facility at RTD station

RTD currently provides over 300 bike lockers at stations, with approximately 65-75 percent lease rates. Bike lockers were initially provided due to requests from the public and the program has been very successful. However, there are concerns with security related to bike lockers, because some people use them to store items other than bikes. Bike racks are provided at stations wherever space is available. At several stations, racks are full, but there is space to provide additional parking facilities. Bicycles are allowed on-board trains at all times. Denver has also implemented a bike sharing program, Denver B-cycle, and several RTD stations have bike sharing stations available. The Access Guidelines emphasize connections to and from the station, appropriate wayfinding, and bicycle parking. Bicycle standards include the provision of bicycle parking at all stations (e.g., bike racks, lockers, bike station, or a combination), regardless of whether park-n-ride facilities are present.

RTD works with numerous local jurisdictions to improve pedestrian access to stations. One purpose of the Access Guidelines is to provide guidance to local jurisdictions for station area improvements to ensure a consistent approach. While RTD places pedestrian access at the top of its access hierarchy, working to implement pedestrian improvements located outside of RTD property can be a challenge. While local jurisdictions may ask RTD to pay for these improvements, RTD will typically only fund improvements located on its property.

Feeder Service

Approximately 25 percent of RTD's Light Rail ridership transfers from other transit services, making feeder transit a very important means of accessing the rail system. As RTD has expanded the Light Rail system, bus routes changes have accompanied the expansions, with a focus on connecting buses to Light Rail Stations. For instance, the opening of Southeast Corridor rail line

was accompanied by a service plan that detailed how bus routes would change to improve efficiency and increase ridership.

Step 7. Tradeoffs and Negotiations

As a regional transportation agency, RTD must coordinate with municipalities, developers, businesses, and organizations in developing access improvements at stations and park-n-ride facilities. RTD's Access Guidelines document, while descriptive and informative, does provide flexibility to deviate from certain guidelines and standards depending on the situation, developer needs, and/or area characteristics. These different groups generally have varying ideas for success (e.g., a developer may feel more parking is needed, a city may want better pedestrian access, and a bicycle advocacy group may want better multi-use trail connectivity), therefore RTD must work with individuals on a case-by-case basis to reach a balance that works for everyone involved while also achieving its desired goal.

For instance, the success of the Englewood Station involved a determined city with a vision, a developer who was willing to work with that city, and RTD to provide adequate transit service, parking, and funding to tie the project together (see Englewood application).

Similarly, the City of Aurora is currently working with developers and RTD at Nine Mile Station on potential redevelopment adjacent to the light rail station (completed in November 2006). The site has a location ideal for TOD due to its proximity to the light rail station, Parker Road, and I-225. Additionally, RTD maintains 1,225 parking spaces, 16 bicycle racks, 28 bicycle lockers, 11 bus routes, and three seasonal bus routes. The City is currently working with RTD and developers to transform the existing auto-oriented environment into a mixed-use development with possible shared parking with RTD. A key development for the success of this project is a proposed pedestrian bridge over Parker Road which would connect to the light rail station.

Successful collaboration between the rail transit agency, RTD in this case, and other stakeholders, particularly local governments and private land owners and developers, requires an effective negotiator guided by goals and principles, and success stories. Successful implementation generally comes through reasonable compromise so that all parties get something of what they need.

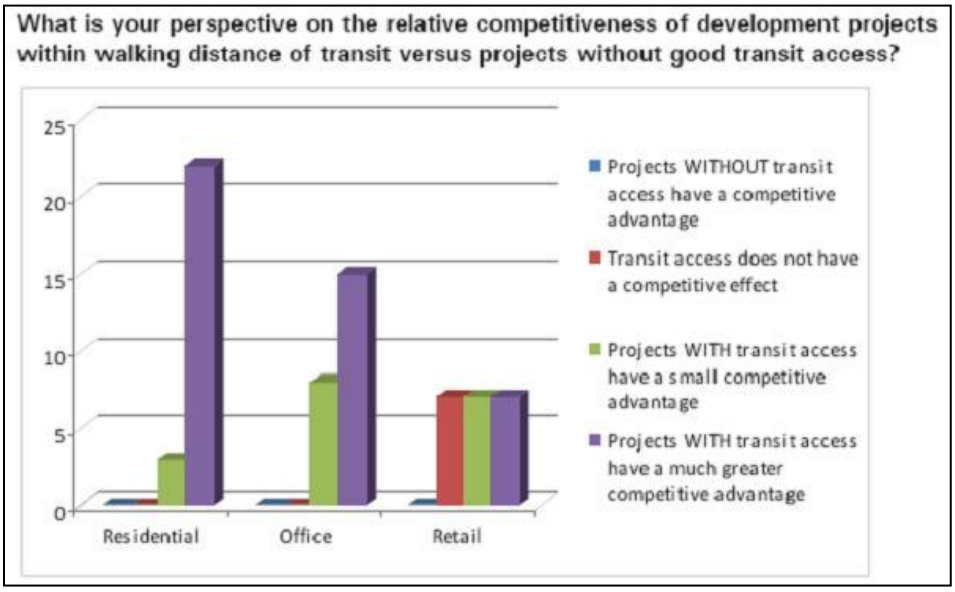
Step 8. Implementation and Monitoring

Transit-Oriented Development

As described earlier, RTD currently tracks all new and proposed developments within a half-mile of its existing and future transit stations, and prepares an annual, regional TOD report that displays spatial trends. As part of the annual report, a local developer TOD survey is also conducted to understand developer perspectives, concerns, how things may be done better, and issues related to the economic downturn. The figure below shows a result of this survey

indicating developer perceptions on the importance of transit proximity to project competitiveness.

Parking



Sample from Annual TOD Report - Developer Survey

RTD maintains relatively detailed parking information at all of its controlled parking facilities, with data collection performed on a weekly basis. Through license plate technology, RTD is able to understand who specifically uses all of their parking facilities. The State Legislature has permitted RTD to use state motor vehicle (DMV) records to understand users within the District, outside the District, and non-area travelers. The detailed system will allow RTD to more effectively transition into dynamic pricing and possible exclusion of non-transit riders when parking demand becomes more of an issue in the future.

Access Data

Although RTD does periodically collect mode of access data at light rail stations, a strong initiative to undertake more frequent data collection and measure performance at stations has not yet occurred. As TOD projects become more prevalent at light rail stations, RTD expects to conduct more extensive mode of access data collection to gain a better understanding of the trade-offs associated with parking, development type, frequency of service, etc.

EXAMPLE APPLICATIONS

County Line

Station Name:	County Line
Location:	Englewood, CO
Station Type:	Suburban Retail Center
Year Opened:	2006
Distance from CBD:	15 miles
Parking Spaces:	388
Feeder Transit:	1 RTD bus route and 2 RTD call-n-Rides
Bike Parking:	8 bike racks and 16 bike lockers
Employment:	10,500
Population:	0

Source: © 2011 Google

The County Line RTD station is located approximately 15 miles south of downtown Denver in the City of Englewood. The station is located on the west side of Interstate 25 and is connected to a 388-space surface parking lot on the east side of I-25 via a 550-foot pedestrian bridge. Access to the station is primarily by automobile, but one RTD bus route (402 Limited) provides access on the west side of the station and two call-n-Ride services (South Inverness and Lone Tree) provide access to the park-and-ride lot on the east side of I-25. According to average daily parking usage data from RTD, ridership is relatively low at this station and only 15 percent of the 388 total spaces are used on a daily basis.

Access to the station is provided by the pedestrian bridge linking the County Line light rail station to the RTD parking lot on the east side of I-25. Passenger drop-off and pick-up are only allowed in the parking lot east of I-25. There is very limited development on the east side of I-25, and pedestrian access to the development is difficult, resulting in private auto as the dominate mode of access to the station.

On the west side of I-25, where the station is located, RTD faced significant accessibility issues because owners of the adjacent shopping mall did not want RTD commuters to use their parking facilities as a park-and-ride lot. After considerable negotiation between mall owners, the adjacent City of Lone Tree, and RTD Board Members, among others, a solution was developed. The pedestrian bridge connecting the light rail station, the adjacent bus stop, and the shopping mall provides access only to persons arriving by light rail, picking up a free bridge ticket, and using that ticket to return to the light rail station. Commuters arriving by bus to use light rail can pick up a free ticket from the bus driver. Travelers who park in the shopping mall lot will not have that free ticket, and thus cannot access light rail.

Ultimately, the mall agreed to provide access to light rail. The group that led the way for this change of events included many transportation officials, predominantly those elected or appointed to their positions, all with the common goal (both highway and transit) of moving commuters to jobs, acting under cooperation to build a strong coalition.

This case illustrates the complexities associated with spill-over parking issues, anticipated or real, and the solutions that may result. The region-wide coalition that helped achieve pedestrian access between the shopping mall and the station illustrates the way tradeoffs have been made between advocates of the regional role of the light rail system and the interests of private land owners.

Walkway Structure for Mall Access

Sign Warning Transit Fare Needed to Re-enter Station

Gate Warning Transit Fare Needed for Entry

Sign to Discourage Park-and-Ride from Mall Parking Lot

Englewood

Station Name:	Englewood
Location:	Englewood, CO
Station Type:	Suburban TOD
Year Opened:	2000
Distance from CBD:	7 miles
Parking Spaces:	910
Feeder Transit:	6 RTD bus routes
Bike Parking:	24 bike racks and 32 bike lockers
Employment:	4,085
Population:	1,500

Source: © 2011 Google

The Englewood RTD station is located approximately seven miles south of downtown Denver in the City of Englewood. The station is located on the east side of South Santa Fe Drive/US 85 and the UP/BNSF freight rail line. The station is located adjacent to a redeveloped shopping center and community space that includes retail, office, residential, park space, and Englewood's City Government Center. The site has gone through several transitions in the past 50 years, serving as a city owned park before 1968, a very large privately owned mall during the 60s and 70s (Cinderella City), a declining retail center facing competition from other malls in the Denver area, and a redeveloped transit oriented development supported by the RTD light rail station. During the redevelopment process, the City went through many proposals and revisions of proposals, transitioning from "big box" retail to a more traditional TOD style development with shared parking. The area does include some "big box" retail including a Wal-Mart and other large establishments.

This is a location where local interested very much wanted light rail access to support economic redevelopment. RTD in return wanted this station to be a park-and-ride location. Concerns of mixed-use parking spaces were less serious here than in the case of the County Line station, perhaps because of strong transit advocacy from the City of Englewood, which saw the economic development potential of RTD access. Shoppers can use light rail to get to retail establishments, and commuters have ample park-and-ride space. Some of the premium parking that serves retail is time-limited to encourage turnover and discourage commuters.

There are approximately 2,500 parking spaces on site, with 910 RTD spaces located in two separate parking lots/garages. The City and RTD developed a transit easement that allowed RTD commuters to use these spaces. According to the City, commuters are currently utilizing over 300 of the spaces allotted. Furthermore, the City has implemented time limitations on most of their

parking spaces, generally between 2 and 4 hour maximums, which generally discourage commuter usage. The City has been having difficulty filling all small scale retail space due to the limited parking available in the area; however, the adjacent Wal-Mart has underutilized parking which is unenforced and often used by commuting students.

Englewood Station

Adjacent Mixed-Use Development

Bicycle Parking

Pedestrian Bridge to Light Rail

Sound Transit

Moving from Station Isolation to Neighborhood Integration

THEME

Small towns in the Puget Sound region which used to be miles from the urbanized area have seen that distance shrink with continued development and suburbanization of the metropolitan area. Prized for their quality of life, these small towns became the bedroom communities for Seattle commuters, increasing congestion on the regional transportation network. In 2000 Sound Transit initiated commuter rail service to Seattle, reopening train service in the historic cores of several of these small towns. This provided high quality transit service to downtown Seattle but created additional local transportation problems, as commuters from outside the local community drive to the station to take advantage of the service. Sound Transit also initiated light rail service from Sea-Tac airport to downtown Seattle in 2009.

During the planning of the Sounder commuter rail line, the philosophy of the agency was to design stations to limit the impact on the surrounding communities. Due to pressure to initiate service under a tight timeline, there was often inadequate time to undergo thorough station area planning, however. As the system has matured, Sound Transit has increasingly recognized the importance of community engagement and station area planning to achieve success, and has shifted their philosophy to "no station is an island". Station access planning now focuses on integrating stations into the neighborhood with a multimodal approach to station access planning.

LESSONS LEARNED

- Each community will have a different set of issues and stakeholders that need to be included in the public process. The City of Seattle's Public Outreach Liaison (POL), where neighborhood leaders are hired as part-time City employees, is one method to address the diversity of needs.
- Transit agencies should not consider stations in isolation from surrounding communities.
- Close coordination is needed to implement new service. Particularly, when the service doesn't depend on park-and-ride.
- Capital improvement programs targeted at increasing access should focus on more than simply increasing parking supply, and address the diverse goals that individual communities have for their station areas.
- Establishing policies to support bicycle access while minimizing the impacts of bicycles brought on-board transit vehicles is important in regions where bicycling is significant and increasing.

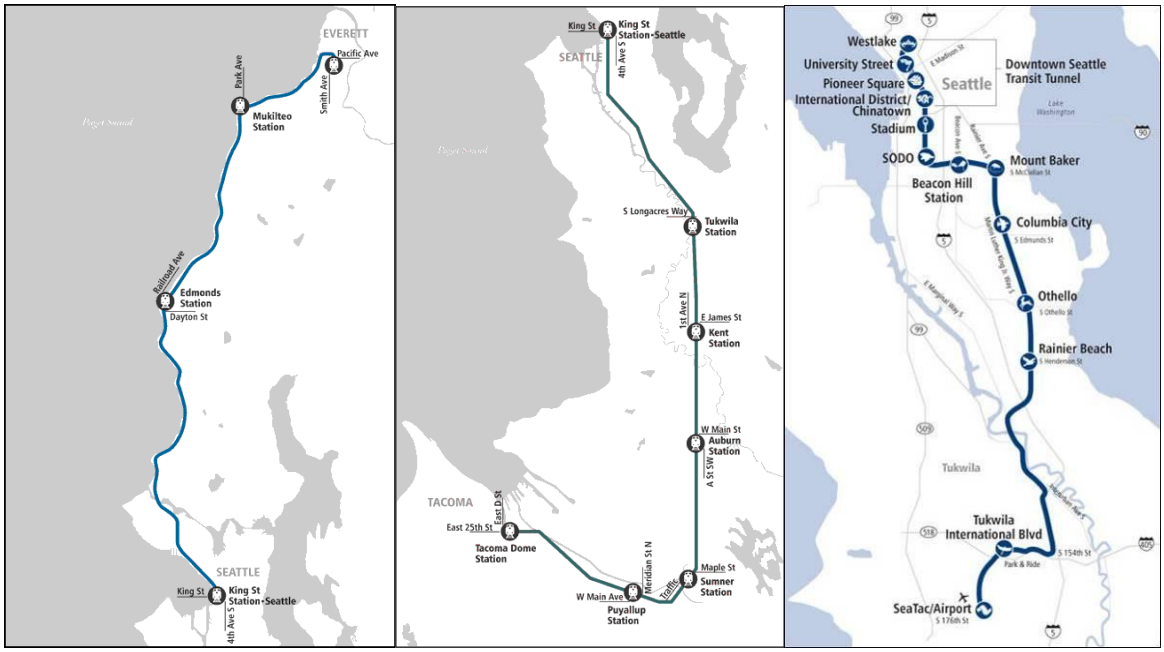
- Transit agencies benefit from having evaluation criteria connected to agency-wide goals to assess potential access improvements.

BACKGROUND

Urban Area (2009):	Seattle, WA
Urban Area Population:	3.3M
Service Area Population	2.7M
Year Started:	2000 - Commuter Rail/2009 - Light Rail
Total Route Miles:	91 miles (Commuter Rail and Light Rail)
Number of Stations:	29
Park-and-Ride Spaces:	5842 – Commuter Rail / 600 – Light Rail
Daily Ridership:	75,000
Maximum Distance from CBD:	32 miles

Sound Transit is the regional transit provider for the Puget Sound (Seattle/Tacoma) area in Washington State, providing regional commuter rail, streetcar, light rail, and express bus service. Sound Transit was formed in recognition of the need for cross jurisdictional transit service in the region. Sound Transit service overlays local bus, streetcar, and ferry service provided by six local jurisdictions and Washington Department of Transportation. The system began service in 2000 with "Sounder" commuter rail service from Tacoma to Seattle with an extension from Seattle to Everett opening in 2003. Sounder service runs from Tacoma north to the southern terminus of the Seattle Transit Tunnel in downtown Seattle where it has easy connections to local bus, light rail service, and Amtrak. The Sounder route continues north from downtown Seattle, terminating in Everett. The Mukilteo station is also close to a ferry terminal connecting to the Woodly Island and Island Transit service.

In addition to commuter rail service, Sound Transit opened Link light rail service in 2009 from Sea-Tac airport to Seattle, with all but two stations located in the City of Seattle. Much of the light-rail line travels through low-income, minority, and/or non-English speaking communities, which required a more tailored approach to outreach to engage the communities during the planning stage. An extension to the University of Washington is under construction with opening scheduled for 2016. Link light rail focuses on pedestrian, bike, and connecting bus service as access modes, with only the Tukwila-Int'l Blvd Station planned for park-and-ride (600 parking spaces). Several stations in the City of Seattle has privately operated surface parking facilities adjacent to stations. Neighborhood residential parking permit programs are in place around many of the stations to reduce the amount of "hide-and-ride".



Sound Transit rail service

PROCESS

Step 1. Identify the Problem

Since the start of commuter rail service between Tacoma and Seattle in 2000 and between Everett and Seattle in 2003, Sound Transit has experienced continued growth in ridership demand. Many Sounder station parking facilities operate at or above capacity, but parking expansion is expensive and local communities are concerned about the potential impacts of increased parking to local streets and downtowns. As a result, Sound Transit responded to the increased demand and community concerns about parking expansion by looking to improve alternative means of access to the regional transit system.

Step 2. Establish a Collaborative Environment

Sound Transit is the regional transportation provider, with services that overlay local transit service and cross both city and transit district boundaries. This requires a high degree of coordination with local jurisdictions, transit agencies, and the public.

Link Light Rail

Link light rail operates predominantly within the City of Seattle. Sound Transit worked closely with the City of Seattle to develop a process that engaged these groups and built consensus around the project. The City worked closely with Sound Transit on planning associated with the project, including taking the lead on station-area planning. This included developing zoning changes and design guidelines to direct new development along the corridor. Many changes to

design were made as a result of the public process. This included implementation of residential parking zones surrounding the stations to prevent "hide-and-ride" parking. Sound Transit paid for the signs required to implement this system. The parking program was difficult to sell to the community, but was adopted through a lengthy process.

The City's station area plans were conducted in 1999 and 2000 as part of a process to develop neighborhood-level plans for all neighborhoods in the City. The plans dealt with both land use and transportation issues associated with the construction of the light rail. The community was heavily involved in these planning efforts resulting in an emphasis on maintaining existing single-family residential neighborhoods in zoning and emphasizing TOD only in existing commercial areas.

The City also used its "Planning Outreach Liaisons" (POL) program to communicate with the community. Through this program, the City hires neighborhood leaders as part-time City employees to lead outreach efforts. This lends credibility to the City's efforts and helps to ensure that the City is aware of key issues within each neighborhood. The POL program is based on the Annie E. Case Foundation's Trusted Advocate Model, with the goals of: inclusivity; economic and social equity; accessibility; and community empowerment. Key criteria for selecting liaisons include: experience and sensitivity when working with diverse communities, bicultural, bilingual (if applicable), familiarity with their respective community, translation experience (if applicable), interpretation experience (if applicable), experience conducting outreach, facilitation experience.

In 2009, POLs held more than 80 workshops in southeast Seattle targeting 13 under-represented communities, as part of three neighborhood plan updates centered on light rail stations. More than 1,600 participants were reached through this process, with many participating in a planning process for the first time. The City acknowledged that the POL model is time-consuming, but has found it to be an extremely valuable method to engage otherwise under-represented communities.

During construction of Link, Sound Transit also implemented an extensive outreach program to notify people of construction impacts. Efforts included specific outreach personnel assigned to individual stations, field offices, and other methods of distributing information to affected neighborhoods.

Step 3. Develop Objectives & Principles

Sound Transit's primary guiding document is its Long Range Plan, which does not explicitly include access considerations. Implicitly, the Plan's recognition of transit stations as "gateways to the region" recognizes the importance of high-quality access and establishes a framework for Sound Transit's efforts to improve access. However, several other Sound Transit policies do, including its Transit Oriented Development (TOD) and Bicycle access policies.

Transit Oriented Development Policy

Sound Transit was an early proponent of TOD, and a TOD program was established in 1997. Its mission is to create transit supportive-development and communities surrounding Sound Transit facilities, stations, and station areas by working with local jurisdictions, property owners and developers. The TOD Program is focused on four main activities: technical assistance, facility enhancement, strategic acquisition, and broker/catalyst/partner. TOD policies were adopted in 1998 and are currently under review with an updated TOD Strategic Plan anticipated to be adopted in 2011. This plan will serve to both provide the Board with guidance on how to approach TOD and guide Sound Transit in discussions with local jurisdictions and developers.

Bicycle Policy

Sound Transit actively supports bicycle access to transit, providing facilities at all light rail and commuter rail facilities. In September 2010, the Board of Directors adopted a bicycle policy that includes these goals:

- Encourage local jurisdictions to promote land development and redevelopment that enhances bicycle access to and from facilities served by Sound Transit, and;
- Partner with interested parties to plan for and fund design, construction and maintenance of bicycle access facilities within a one half-mile radius of facilities served by Sound Transit, within established Sound Transit project scopes of work and budgets.

In addition to designing vehicles and facilities to encourage and accommodate bicyclists, the policy states that "Sound Transit will incorporate non-motorized access assessments during design processes for all stations, park-and-ride lots, transit centers and corridor development plans, including opportunities to incorporate non-motorized facilities, such as bicycle, pedestrian or multi-use trails, within transit rights-of-way where feasible and safe".

Step 4. Identify Evaluation Criteria

The Sound Transit 2 capital improvement program (described in Step 8) provides project evaluation criteria that are being used as the foundation for assessing access planning alternatives. While not all of the evaluation criteria relate directly to access planning, they are well established by the Board of Directors, and provide guidance for the type of decision-making the Board expects. Table 1 provides the Sound Transit Board Project Evaluation Criteria with a discussion of their application to the access planning process.

Table 1 Sound Transit Evaluation Criteria

Evaluation Criteria	Description	Access Planning Application
Ridership	How many riders do the models predict at a given point in the future (e.g., 2030)? Are there other factors to consider that transit ridership models do not address?	Ridership and mode of access are intertwined, with estimated ridership impacting parking and connecting bus service, access quality affecting overall ridership demand in turn.

Evaluation Criteria	Description	Access Planning Application
Capital Costs	How much does it cost to build?	An assessment can be made of the costs of providing the modes of access, including cost of land and parking; bike paths and lockers; sidewalks and pedestrian overpasses to connect stations to neighborhoods; and transit centers. As a maturing agency, Sound Transit is increasingly able to improve the accuracy of cost estimates through use of their own experiences to estimate capital costs.
Operating Costs	How much does the project cost to operate and maintain?	This criterion is directly applicable, based on the facilities planning and estimated on-going operating cost to provide connecting bus service.
Travel Time and Reliability	How long does it take to carry people between the urban centers it connects? Will transit experience congestion in the general traffic right-of-way? Will travel times be reliable?	Access mode is a critical element of the total travel time and reliability. The impact of access options can influence the attractiveness of a particular station and transit overall. Historically this criterion has only been applied to transit in-vehicle time. Improving travel time and reliability of access modes, however, is a key element for improving total transit trip time.
Connectivity and Mobility	How well does the transit system connect urban centers and other key destinations? How effectively does it move people — are they forced to transfer and could the transfer be avoided? Does the system affect the mobility of other kinds of travel?	Increasingly the "last mile"—traveling from the rail station into the neighborhood or business center—has been seen as the missing link in transit service. This connection is a critical piece of the mobility equation, and provides the cornerstone of good station access planning.
System Integration	How well does the transit system integrate with other components of the regional transit system and build on the services started in Sound Move?	This criterion applies directly to the interconnectivity of the commuter rail, light rail, and bus transit networks, which is applicable to station access planning.
Land Use and Development	How does the transit system support local land use or transit oriented development? Does the transit system support local economic development?	The adjacent and nearby land uses are critical components of planning for access to transit stations. In addition to the station area, development along transit corridors serving the stations also strengthens the transit access mode share.
Customer Experience	Is it safe, comfortable, convenient, and easy to use?	The customer experience is directly applicable to mode of access. Providing safe, well-lit sidewalks and bike lanes, and frequent connecting bus service add to the attractiveness of the line haul service.
Risk	What are the risks associated with capital and operating estimates? What are the performance risks associated with each technology or project? Are there policy risks? Is there implementation risk? Are we reliant on the actions of others before we can implement what we want?	A critical partner in the access planning process is the local jurisdiction. The transit agency typically has control over what happens on station property, but the local jurisdiction has control over the connecting sidewalks, bikeways, roads, land use and development, and other elements critical to the success of a transit station. Developing a strong partnership with the local jurisdiction is important to reducing risk
Environmental Benefit	What are the environmental or public health benefits of expanding the transit system (e.g., air quality)?	Transit can benefit the environment through lowered automobile congestion and pollution. However, much of that benefit is lost when the transit trip still includes a "cold start" trip in the morning and evening to travel to and from a park-and-ride lot. Developing an access plan that reduces reliance on individual automobile trips and increases walking, bicycling, and connecting bus service, provides even greater environmental benefit from the high capacity transit network.

Step 5. Identify a Rich Set of Appropriate Options

As described above, Sound Transit desires to simultaneously respond to increased demand on its Sounder service and address community concerns about parking expansion through analysis of alternative means of access to the regional transit system. Sound Transit's on-going Flexible Access Planning Study is developing a set of access planning evaluation tools, and applying those tools at eight high demand Sounder stations. In addition, the study includes a significant outreach component to ensure that the results of the study meet community as well as transit agency objectives.

This study is Sound Transit's first comprehensive examination of feasible methods to improve access to its stations. Initial development of the Sounder system focused on parking, but the agency increasingly realizes that continued expansion of parking to meet is impractical in many cases. Thus, the Flexible Access Planning Study will address demand for parking and recognize that there may be viable and sustainable alternatives to increasing the amount of station parking based on each facility's differing demands and needs for access. The study is expected to be complete in 2011. The result of the study will be a set of prioritized capital projects for implementation through Sound Transit 2 funding (see below).

Step 8. Implementation and Monitoring

In November 2008, Puget Sound voters approved the Sound Transit 2 (ST2) ballot initiative funding a $17.9B capital expansion program for Sound Transit. While the majority of the funding will go toward expanded rail service, the measure is unique in that it also explicitly funds access improvements at existing stations. In particular, the measure targets work at eight Sounder stations for:

- Expanded parking;
- Pedestrian improvements at or near stations;
- Additional bus/transfer facilities for improved feeder service to stations;
- Bicycle access and storage at stations; and,
- New and expanded drop-off areas to encourage ridesharing.

This funding source provides Sound Transit with significantly more capacity for implementing access improvements than most transit agencies. The measure does not include operational funding, however, meaning that Sound Transit could not use ST2 funds for the operation of feeder bus services. One of the first outcomes of ST2 is the Flexible Access Study described above, which Sound Transit is currently performing to identify an appropriate program of access improvements.

EXAMPLE STATIONS

Mukilteo Commuter Rail and Ferry Terminal Connection

Station Name:	Mukilteo
Location:	Mukilteo
Year Opened:	2008
Distance from CBD:	23 miles
Parking Spaces:	68
Feeder Transit:	6 connecting bus lines plus ferry service
Bike Parking:	No lockers
Employment:	500
Population:	800
Typology:	Intermodal Transit Center

Source: © 2011 Google

The Mukilteo Sounder station is located in the City of Mukilteo, about 2000 feet from the ferry terminal and connecting bus service. It is designed to serve riders coming from the Mukilteo-Clinton ferry and the area surrounding Mukilteo. Sounder commuter rail service started at Mukilteo Station in June 2008, operating from a single platform on the north side of the tracks with interim parking and shelters for commuters. A second, future phase of the Sounder station project includes a second platform on the south side of the tracks, auto access improvements, a pedestrian bridge over the tracks connecting the two platforms, permanent passenger shelters and public art.

The photo below (facing north) shows the only access from the community to the waterfront, ferry terminal and Sounder station. The ferry terminal is in the center of the photo, the Sounder station entrance is out of the picture to the east. Cars are typically lined up in two lanes on the bridge, queuing for the ferry.

Ferry terminal access bridge

While there is a sidewalk on the bridge, pedestrians must navigate the around the ferry traffic to access the pathway to the Sounder station. The photo below on the left provides a view of the "pathway" between the ferry terminal and the Sounder station. A survey of Sounder passengers boarding at the Mukilteo station indicated that 24% of those passengers arrived at the station on the ferry. Connecting bus service has a small waiting location at the end of the bridge, where it serves both Sounder and ferry riders.

Pedestrian pathway between ferry and rail **Bus transfer facility**

Sound Transit is working with the Washington State Department of Transportation Ferries Division (WSF) which is studying options to address challenges at the Mukilteo ferry terminal. The Mukilteo/Clinton ferry route is part of State Route (SR) 525, the major transportation corridor connecting Whidbey Island to the Seattle-Everett metropolitan area. It is WSF's second busiest route for vehicle traffic and has the third largest annual ridership. Future usage is expected to increase by 73% by 2030. The Mukilteo terminal has not had significant improvements since the early 1980s and components of the facility are aging. The current terminal layout makes it difficult for passengers to get in and out of the terminal and contributes to traffic congestion, safety concerns and conflicts between vehicle and pedestrian traffic.

Transit connectivity including Sounder commuter rail, and local bus service on the mainland and islands, is a key component of the ferry access planning process. Improvements to the Sounder station are being integrated with the ferry terminal project. WSF is considering a variety of

concepts during the environmental process and all concepts, with the exception of the no-build, include a new multi-bay transit area which would include the Sounder station. Project benefits for the ferry terminal and transit station are to reduce congestion, improve safety, and improve operations and multimodal connections.

Kent Town Center

Station Name:	Kent
Location:	Kent
Year Opened:	2001
Distance from CBD:	16 miles
Parking Spaces:	1,101
Feeder Transit:	17 local bus routes
Bike Parking:	8 racks and 14 lockers
Employment:	4,530
Population:	2,740
Typology:	Suburban TOD/ Village Center

Source: © 2011 Google

The Kent Sounder Station is located in downtown Kent, a city of 114,000 people located approximately halfway between Seattle and Tacoma. Kent Station provides a good example of a station at which both park-and-ride access and TOD successfully co-exist, and one where the local jurisdiction's planning efforts were critical to the success of the station.

The station opened in 2001 when South Sounder service first opened. The station includes a 983-space parking structure to serve park-and-ride commuters, in addition to two small surface lots. The parking is well-used but not saturated, with an average utilization of 86%. Like most Sounder stations, the Kent Station is located in the community's downtown area, reflecting Kent's goal to use the new rail service to catalyze development in its historic, but at the time languishing, downtown.

Planning on the part of Kent to improve access to the rail station and encourage downtown development complemented creation of the station. Most importantly, the City amended its Comprehensive Plan in 2004 to create an environment conducive to development. Key Comprehensive Plan goals and policies related to the Sounder station include:

- Public infrastructure, transportation, and transit service enhancements shall be utilized to focus economic development in the downtown core;
- Encourage residential development in the downtown core; and,

- Additional office and retail development shall be encouraged, particularly in designated centers served by transit.

At approximately the same time, the City purchased an 18-acre abandoned factory site adjacent to the station and solicited proposals for re-development. The result was the 470,000 square foot "Kent Station" retail center. In addition to helping reinvigorate Kent's downtown, the shopping center contributes to Sounder ridership and the attractiveness of the station area.

In 2008, the City completed its Transportation Master Plan, which provides continued support to improved access to Sounder. The Plan identifies and prioritizes specific projects to improve pedestrian, bicycle, and transit corridors and connections that directly serve the Sounder station.

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TriMet

Building Regional Consensus One Community at a Time

THEME

TriMet is the transit provider for the Portland, Oregon metropolitan area, and is widely considered to be a national leader in public outreach for transit planning. In the past 25 years, TriMet has successfully developed a regional rail transit network that has included six separate major expansions of the system with additional expansions in the planning stage. Metro, the region's MPO, is a key partner for TriMet in project planning and manages projects from conception to the start of preliminary engineering, including selection of the locally preferred alternative and completion of the Environmental Impact Statement. TriMet participates in Metro's outreach process to ensure an inclusive and consistent process from project concept through construction and implementation.

TriMet owns 9,600 park-and-ride lot spaces at MAX stations, including five parking garages, four of which are shared use. Unlike many newer transit systems, however, park-and-ride accounts for less than 10 percent of total light rail ridership and the agency actively encourages non-auto access to its stations. Overall, only 55 percent of rail park-and-ride lot spaces are filled on any given weekday. This commitment to non-auto access is backed by regional policy, and implemented through a community-oriented planning process to build support for the regional vision.

This case study considers three primary themes: 1) successful public outreach strategies to build regional support for transit; 2) integration of stations with surrounding neighborhoods; and, 3) the experiences of developing a rail system that focuses on non-auto access.

LESSONS LEARNED

- With a regional commitment to providing non-auto access, especially transit-supportive land use, it is possible to develop a successful regional rail system that relies on park-and-ride access for only a small portion of ridership.
- Effective public outreach on an individual capital project helps to build regional support for subsequent capital projects. According to TriMet's model, effective public outreach should be started early and based on grass-roots outreach. According to one TriMet employee, successful public outreach means that formal public hearings are "non-events" because problems have already been resolved.
- Public outreach may be more effective if conducted by transit system staff. TriMet has its own community affairs staff to ensure that (1) staff truly represent the transit agency to the public and (2) continuity of staff throughout the project.

- Having a strong relationship with local jurisdictions, institutions, and developers is critical to the long term success of station access planning. For example, TriMet's commitment extended to funding a project engineer at the City of Milwaukie to represent the City's interests as part of planning for the Portland-Milwaukie light rail, since the City could not afford this staff itself. This action clearly signaled to the City that addressing its concerns was integral to the success of the project.
- Transit stations and transit activity should directly integrate into communities through station design and site plans. This commitment is seen in the design of many of TriMet's stations.
- Reduction of parking capacity to support TOD may require justification of the reduction to FTA if federal funding was used to construct the parking.

BACKGROUND

Urban Area (2009):	Portland, OR
Urban Area Population:	2.2 million
Service Area Population	1.5 million
Age of System:	1986
Total Route Miles:	67 miles (LRT and Commuter Rail)
Number of Stations:	85 light rail/4 commuter rail
Park-and-Ride Spaces:	11,700
Daily Ridership:	125,000
Maximum Distance from CBD:	16 miles

TriMet has constructed over 50 miles of light rail (known as the MAX) and 85 stations in the last 25 years serving over 100,000 riders per day. The region has a strong land use and planning history, designed to control growth and sprawl, concentrate development within an urban growth boundary, and create great neighborhoods and centers. Transit has long been a significant component of regional planning, with transit links between designated regional centers prioritized.

TriMet's goal is to create communities that make transit a viable option for all trips. TriMet doesn't want to harm what it's trying to preserve by creating auto-dominated station areas that destroy neighborhood character. By providing a vibrant community *at* the station, non-auto access to transit becomes an attractive option.

TriMet light rail system map

PROCESS

This section focuses primarily on TriMet's general public outreach process and regional policy. Other aspects of TriMet's process are covered through the example applications in the following section.

For detailed information on TriMet's experience with Transit Oriented Development, please refer to *TCRP Report 102: Transit Oriented Development in the United States*, Section 4: Case Studies, Chapter 17 – Portland's TODs: Building Community on a Regional Scale, page 355. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_102.pdf

Step 2. Establish a Collaborative Environment

TriMet's public participation process is built around developing a consensus that builds support for the current project and goodwill toward subsequent projects. This process requires a considerable investment on the part of TriMet. However, TriMet's experience is that people know the difference between a meaningful process and window-dressing, and will quickly disengage from the former.

The Regional Transportation Plan sets a framework for rail development in the region which creates an expectation of rail expansion corridors and priorities. TriMet's plans to expand light rail through a north/south alignment were halted in the late 1990s when a funding proposal was defeated at the ballot box. Using a new process model built on consensus and intensive, personal outreach, TriMet constructed and opened the north alignment in 2004. That model has been applied to subsequent projects with great success.

The intensive and on-going community process starts at the inception of the project, and is continued by the same people through construction and project implementation. This personal,

grass-root, neighborhood-based approach connects public agencies with the public and creates a face to the project. Although labor intensive, the benefits of the process are clear-cut as the local and regional jurisdictions develop a strong working relationship and credibility with the people most impacted by the project.

Outreach Strategies

TriMet conceptualizes three different "publics" in their outreach process: adjacent property owners, local leaders, and likely leaders. TriMet proactively finds local, neighborhood leaders at the outset of projects and engages them to understand concerns. This includes speaking to them before public meetings to understand concerns to minimize surprises at public meetings. The leaders are established into an area citizen's advisory committee that represents the residents of that section of the proposed or planned alignment. TriMet often even hires people from neighborhood for outreach tasks, especially as the project moves into construction and implementation.

TriMet typically does not contract public involvement consultants; rather they conduct their outreach in-house with TriMet staff assigned to specific geographic areas of the project. This is seen as important to ensure (1) that staff truly represents the transit agency to the public and (2) continuity of staff throughout the project. Having a dedicated individual whom the community gets to know and who knows their community helps build a relationship between the community and TriMet. That outreach representative meets frequently with the community, and meets them where they are in their businesses and in community centers. This grassroots interaction breaks down the barriers between the "big government" and the individual and building working relationship where both sides can together instead of against each other.

Essential to managing this process, especially over the eight to ten year process of building a light rail line, is a thorough database for each project that includes property owners along the corridor and documents concerns, issues and communications for each. Every interaction is recorded and each receives a response. The database allows TriMet to proactively identify and address problems before they reach a critical level. All comments, testimony, responses and results are posted on the web to ensure transparency in the process. Updates and information are regularly disseminated to the public to keep everyone up-to-date and engaged with the process. Most communication is via email, although U.S. mail is also used for communication with some stakeholders. TriMet is also developing web-based technologies for projects such as Facebook pages.

Building Consensus with Other Public Agencies

Metro, the region's MPO, is a key partner for TriMet in project planning. The Regional Transportation Plan is developed with intensive public outreach and is the base planning document that establishes the region's high capacity transit projects and priorities. In its capacity as MPO, Metro handles projects from conception through the Alternatives Analysis. Once a locally preferred alternative is selected and preliminary engineering begins, the process is turned over to TriMet. TriMet begins their outreach process concurrently with Metro's to ensure an inclusive and consistent process from project concept through construction and implementation.

TriMet project managers are at all meetings to ensure that they understand the concerns of stakeholders and know the conversations, the personalities, and the decisions related to those concerns.

The effort to build a close working extends to local jurisdictions as well. The commitment to these relationships is demonstrated by TriMet's decision to fund a project engineer for the City of Milwaukie to represent the City's interests in planning and engineering for the Portland-Milwaukie light rail. This action provided a clear signal to the City that their concerns were integral to the success of the project. While the position is funded by TriMet, the engineer is housed in City offices and reports only to the City.

Step 3. Objectives and Principles

TriMet's efforts to improve transit access are supported by a comprehensive set of regional plans and policies developed by Metro, the Portland metropolitan area's MPO. In particular, Metro's 2035 RTP includes detailed language supporting improved non-auto access to transit. Specific elements of the RTP include an access mode hierarchy prioritizing (in order) walk, bicycle, transit, kiss-and-ride, and park-and-ride access to transit; neighborhood and site design principles to maximize pedestrian access to transit; and a regional vision for an integrated transportation system that includes multimodal access to the region's rail stations.

The RTP is supported by the Regional Transportation Functional Plan (RTFP), which provides specific directives for local jurisdictions to follow in their respective transportation planning processes. The State of Oregon requires each municipality in the Portland region (and elsewhere in the state) to complete a Transportation System Plan (TSP) to guide transportation investments over a 20-year horizon; the RTFP adds additional requirements with which local jurisdictions within the Portland region must comply. While the requirements are wide-ranging, several relate to access, including requirements that every TSP explicitly assess pedestrian access to transit, bicycle access to transit, and local transit connections to regional transit centers.

In addition to developing policies and regulations, Metro also controls several funding sources that it directs to support its policies. Metro's System Expansion Policy guides prioritization of corridors for expansion of the regional rail system. This policy explicitly provides additional credit to municipalities that proactively work to achieve Metro goals, including zoning for TOD and non-motorized transportation improvements. Because many more communities desire rail service than funding supports, this policy is an effective means of encouraging jurisdictions to comply with Metro's requirements.

Metro also controls funding through the region's Metropolitan Transportation Improvement Program (MTIP), which directs federal transportation funding over a 5-year horizon. The criteria for inclusion on the MTIP explicitly favor infrastructure improvements in designated regional centers (most of which include rail stations), in particular those improvements that will improve opportunities for TOD.

One result of Metro's and TriMet's emphasis on TOD is a conscious lack of investment in park-and-ride facilities throughout TriMet's system. TriMet has reduced parking to accommodate TOD at two stations (see Willow Creek example application below for one example), and is incorporating less parking on the Portland-Milwaukie Light Rail than the estimated demand. In fact, agency staff indicated that TriMet would have even less parking than it currently does if not for the need to add parking to some stations to meet FTA New Starts cost-effectiveness evaluation criteria.

The result is that TriMet's stations are located as close as possible to activity centers enhancing the ability to walk or bike to the station. The Airport station, located adjacent to baggage claim is an early example of this philosophy. A second example, described in detail below, is the Willow Creek/SW 185th Transit Center where a community college and work force center were developed adjacent to the station on what was bus transfer and park-and-ride land. The large parking lot became shared use with the community college.

Another outcome of the emphasis on community building is TriMet's operational strategy to minimize the amount of space dedicated to buses at stations as much as possible. This includes scheduling layovers at sites removed from stations, and having on-street bus stops rather than off-street transit centers wherever possible. The intent is to maximize the space available for TOD. For instance, as part of planning for development at the Gateway Transit Center, TriMet re-routed several bus routes so that they no longer served the station to create more development flexibility.

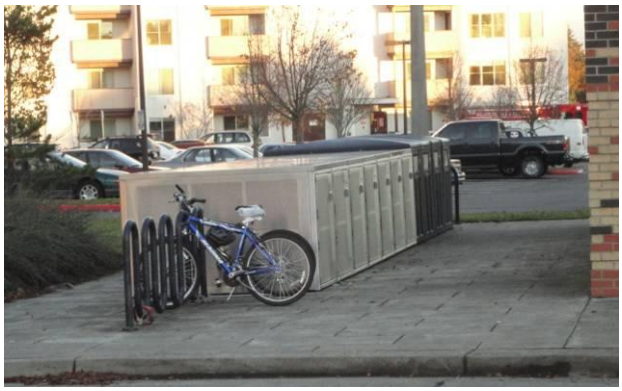
EXAMPLE STATIONS

Willow Creek / SW 185th TC

Station Name:	Willow Creek / SW 185th TC
Location:	Hillsboro, Oregon
Station Type:	Suburban Neighborhood
Year Opened:	1998
Distance from CBD:	11 miles
Parking Spaces:	595
Feeder Transit:	6 connecting bus routes
Bike Parking:	11 lockers for 22 bikes, 1 rack
Employment:	1,345
Population:	3,400

Source: © 2011 Google

Willow Creek/SW 185th Ave. Transit Center station was originally designed as the western terminus of the Blue Line but a subsequent federal grant extended the line further west to the city of Hillsboro. As such, it had a relatively large number of park-and-ride spaces (595) and eight bus bays to support local bus service. Only lightly developed when light rail opened in 1998, the station area has since experienced significant housing developed adjacent to the station and nearby commercial development. Development requirements have resulted in improved pedestrian and bike access, with sidewalks, walkways, and no walls or other barriers between the new housing developments and the station.



Willow Creek Station and surrounding land use

Steps 1 and 2. Identify the Problem and Establish a Collaborative Environment

In 2006, Willow Creek's park-and-ride lot averaged only 35 percent utilization. TriMet staff was aware of the poor utilization of the station area and the agency was open to proposals for redeveloping the park-and-ride into higher use.

The Portland Community College (PCC) Rock Creek campus is located approximately three miles north of the Willow Creek Transit Center, with TriMet bus service connecting the campus to the MAX station. In addition to Rock Creek campus, an extension campus was located in several buildings on a former high-tech campus. PCC approached TriMet for help identifying a transit-served location to replace this space. TriMet identified surplus capacity at the Willow Creek Transit Center as a possible location for PCC.

Step 3. Develop Objectives & Principles

Together, TriMet and PCC proposed placing the building adjacent to the station and bus transfer facility, providing front door access for bus and light rail passengers. This was achieved by reducing number of bus bays and the transit center, and eliminating some parking and quick drop (i.e., kiss-and-ride) facility. Site planning focused on creating a short, direct connection between PCC and the light rail station. In addition, because the park-and-ride lot was underutilized, 150 spaces are allocated for use by PCC students.

Willow Creek Station parking lot

Step 7. Tradeoffs and Negotiation

Another partner in the development was the Federal Transit Administration (FTA). FTA provided capital funding for the original construction of the rail line, including the parking facility, and justification for the project had included ridership projections based in part on the

Original and revised station layouts

number of parking spaces available. Shifting the spaces away from the original use to allow for the PCC development thus required approval from FTA. TriMet was able to demonstrate to FTA the case that having a community college, state employment office, and coffee shop adjacent to the station would provide more ridership than the park-and-ride spaces, designed for commuters.

Step 8. Implementation and Monitoring

The three-story, 100,000 square foot PCC building is certified LEED platinum. In addition to the community college, the building houses a state employment office and work force center, and a deli. As a result, there is now activity at the station from 7:00 a.m. to 10:00 p.m. adding to the overall security of the station area.

PCC Willow Creek has been successful for TriMet and for the college. Enrollment is significantly higher in the new location and ridership is up at the station. Even with students sharing the parking lot, it is still not full, averaging 67 percent capacity after opening of PCC FTA has acknowledged the success of the transition from parking to development and supports targeted redevelopment of stations.

Lake Rd. and Park Ave. Stations (Future)

Station Name:	Lake Rd. (Future)
Location:	Milwaukie, Oregon
Station Type:	Suburban Village Center
Year Opened:	2015
Distance from CBD:	6 miles
Parking Spaces:	None
Feeder Transit:	To Be Determined
Bike Parking:	To Be Determined
Employment:	1,640
Population:	2,790

Source: © 2011 Google

Station Name:	Park Ave. (Future)
Location:	Oak Grove, Oregon
Station Type:	Suburban Neighborhood
Year Opening:	2015
Distance from CBD:	7 miles
Parking Spaces:	600 initial/+400 if needed
Feeder Transit:	To Be Determined
Bike Parking:	To Be Determined
Employment:	600
Population:	4,250

Source: © 2011 Google

Metro and TriMet are currently in design for the region's sixth light rail line, the Portland to Milwaukie line. The initial work for this alignment was completed with the *South/North Corridor Project Draft Environmental Impact Statement* (DEIS) published in February 1998. The project was put on hold, however, when public concerns over the alignment and its impacts on the adjoining neighborhoods resulted in defeat at the ballot box that year. A key component of that defeat was the lack of community support for the project which helped spur the more consensus-based outreach model now used by Metro and TriMet.

The Lake Rd. / SE 21st Ave station is located in the downtown area of the City of Milwaukie. The Park Ave. station is just outside the city limits in unincorporated Clackamas County. The City was heavily involved in the planning of the station.

Step 1. Identify the Problem

The City of Milwaukie is at the southern terminus of the planned Milwaukie Corridor light rail line. As such, there are concerns that commuters looking for parking near the rail station will negatively impacts the livability of the downtown and surrounding neighborhoods. In addition, the City is challenged by natural and man-made barriers, including Kellogg Lake and the Willamette River, the intersection of two regional highways, and freight railroad tracks, which bisect and isolate sections of the city. The light rail alignment and design needed to be done in such a way as to not further divide the city, but also to provide opportunities for new connections.

The City wanted to use the transit investment as a catalyst for revitalization of the downtown core and embraced the opportunity. At the same time, there were issues and concerns with the existing and proposed transit service in the area, including desired relocation of the existing bus transit center; safety and security around the stations; mitigation measures, such as noise and quiet zones; parking and park-and-ride lot location; and the inability of the small city to fund an engineering position to the desired level of involvement in the project partnership.

Portland to Milwaukie line alignment

Step 2. Establish a Collaborative Environment

To address the concerns of the City and ensure a strong partnership throughout the planning, design, construction and implementation of the project, TriMet entered into a Memorandum of Understanding (MOU) with the City recognizing the "exceptional coordination and partnership" needed to build the transit facility of that size. A key component of that agreement was the recognition that, while the city desired to fully participate, it did not have the resources required to dedicate to a project of that magnitude. The MOU states that "The Design and Construction IGA will fund one Milwaukie FTE beginning with FTA approval of Preliminary Engineering to address the staffing needs of the City and any other Project financial obligation to Milwaukie for providing the necessary staff support."

Step 3. Develop Objectives & Principles

Related to station area issues within Milwaukie, TriMet had one clear goal, while the City had three primary goals:

- *TriMet* - Increase ridership through multi-modal access
- *Milwaukie* - Provides economic development benefits to downtown Milwaukie
  - Safe, visible, urban design that enhances the city
  - Integrate transit and stations into the fabric of the city

Step 6. Predict Outcomes and Apply Criteria – Designing for Bike Access

Consistent with the regional access mode hierarchy described above, TriMet supports and encourages bicycle access to its rail services, and allows bicycles on all light rail vehicles. At the same time, the volume of bicycles on-board light rail vehicles is growing, reducing passenger capacity and increasing dwell time. As a result, TriMet is actively engaged in finding methods to encourage cyclists to park their bikes at their origin station. These efforts include an origin/destination survey of cyclists on TriMet to better understand their travel patterns and needs, and recent pilots of on-demand electronic bike lockers at two light rail stations.

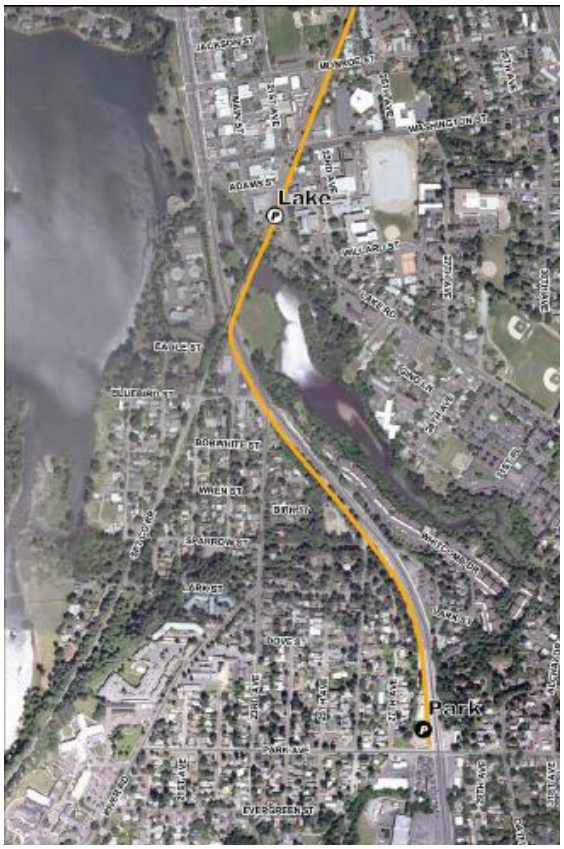
For the Portland-Milwaukie Light Rail, TriMet seeks to proactively incorporate bike access into the design. To ensure that this occurs, TriMet developed a simple spreadsheet tool to assess potential bicycle parking demand at each proposed station. The tool uses the predicted walk access mode share from the regional model (the model does not yet predict bike mode share), the quality of surrounding bicycle facilities, and estimated transit travel time savings compared to cycling to guide the user in selecting an appropriate target for bicycle mode share at each station.

The tool then uses the target mode share and total estimated station boardings to forecast each station's bike parking needs. The results show a wide range in required parking, from fewer than 20 bike parking spaces to over 100 at line's southern terminus. These needs are being incorporated into the project's design.

Step 8. Implementation and Monitoring

As of January 2011, the project was entering final design. The figure on the following page shows the alignment from SE Lake Road to SE Park Avenue. The tracks would cross over SE Lake Road and Kellogg Lake on a new bridge along the east side of the existing freight rail trestle within the railroad right-of-way. The bridge would be constructed to allow the City of Milwaukie to construct a multi-use path beneath the bridge deck that would provide a connection from the area south of Kellogg Lake to the Lake Road Station and downtown Milwaukie in the future. The path would not be constructed as a part of the Portland-Milwaukie Light Rail Project due to lack of funding. The tracks would terminate at a station on the north side of SE Park Avenue, and a 600-space park-and-ride structure would be located south of SE Park Avenue.

TriMet and its partners have also developed a lower cost phasing option for the Locally Preferred Alternative (LPA) to Park Avenue, which would reduce initial capital and operating costs for the LPA to Park Avenue alignment while maintaining a high level of project benefits for light rail service that extends to SE Park Avenue. The LPA Phasing Option reduces costs by deferring some investments and applying lower cost design approaches to several facilities and system features. Access related features of the Phasing Option include a 355-space parking structure at Park Avenue, deferring the full 600-space structure identified in the LPA to Park Avenue, and a pedestrian bridge between the structure and the station would not be constructed.



Park Avenue to Lake Road alignment

Washington Metropolitan Transit Authority (WMATA)

Increasing Access Capacity to Meet Growing Demand

Theme

The access planning goals, design standards, policies and procedures of the Washington Metropolitan Transit Authority (WMATA) have evolved over time to meet ridership growth, changing land use and transportation trends, and expanding local government capacity.

The Washington, D.C. region is connected by over 106 miles of heavy rail, serving 86 stations and transporting an average of 727,684 riders per weekday. With the second-highest ridership volume among commuters in the United States, an average daily rail ridership expected to increase by 40 percent by 2030, and with the proximity of major urban and suburban centers in Maryland and Virginia, WMATA must contend with a variety of transportation issues not found in other communities. WMATA takes a unique approach to coordination within the agency, with other jurisdictions, and local developers by constantly adapting its approach to station access to be both time and place specific and focusing on cost-effective investments in access mode facilities.

LESSONS LEARNED

- Developing Station Access Guidelines provides value in supporting collaborative planning efforts. At the same time, Guidelines must remain flexible to be successfully applied.

- Timely data on access mode characteristics is critically important for effective service and facility planning. Periodic intercept surveys of access modes and preferences supports trend-tracking and provides objective information for planning and decision making.

- Expansion of parking facilities is expensive and requires land that in many cases may not exist. This suggests that transit agencies that expect ridership increases may need to focus on improvements to non-auto access to realize growth.

- Station-specific access studies, funded by either the transit agency or local jurisdictions, are valuable means of identifying and prioritizing access improvement options.

- Transit agencies with significant joint-development opportunities benefit from standardized joint development policies that establish desired outcomes and evaluation criteria for proposed developments.

- Transit agency offices that are involved in access planning should be organized to ensure access planning efforts will be coordinated internally and will provide a more effective process externally. Those involved in access planning at WMATA include planners, real

estate, operations planning, rail and bus operations, plant maintenance, parking management, marketing, and government relations.

- Transit agencies should consider the cost-effectiveness of access modes. WMATA is developing the analytical tools needed to determine the cost effectiveness among access modes in order to set access-mode goals and make investments.

- Transit agencies can proactively set mode-share goals instead of passively calculate mode-share projections. WMATA's access mode-share priorities are related to comparable goals established by member jurisdictions.

BACKGROUND

Urban Area:	Washington, DC
Urban Area Population:	4.2 million
Service Area Population	3.4 million
Date started:	35 years
Total Route Miles:	106
Number of Stations:	86
Park-and-Ride Spaces:	55,000
Daily Ridership:	727,700
Maximum Distance from CBD:	15 miles (Shady Grove station)

WMATA was created by an Interstate Compact in 1967 to plan, develop, build, finance, and operate a regional transportation system in the national capital area. In anticipation of construction, access planning was described in the 1967 *Proposed Regional Rapid Rail Transit Plan and Program* in terms of bus and auto access: "The rail system must be geared to the highway and street network so that people can use their automobiles to drive to and from rapid transit stations. It must also be coordinated with the bus network so that buses will be an important feeder to the rapid transit stations."

WMATA Metrorail

WMATA operates both bus and rail service. Until the 1980s, Metrobus service was the primary public bus service in the region. Beginning in the mid-1980s, local jurisdictions took over local bus routes that fed Metrorail stations with their own bus systems while Metrobus continued to provide longer line-haul service.

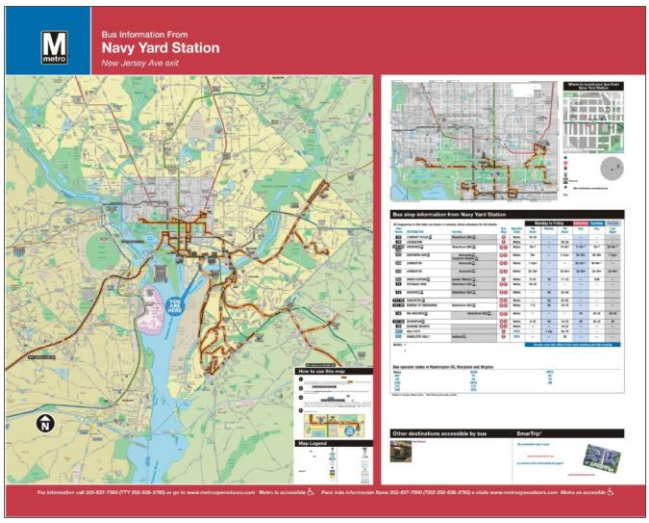
Access needs and planning shifted as the Metrorail system was completed first in the core and then in the suburbs, where land use and travel patterns differ. Initial access planning in the core was limited to needs at the stations, such as pedestrian access on WMATA's property, bus access at rear station entrances, curbside drop-off, and park-and-ride spaces constrained to fit the land available (all surface parking). As Metrorail stations opened outside the core and in more suburban areas, stations were designed to accommodate more buses with on-site bus bays, greater numbers of parking spaces and kiss-and-ride waiting areas, with reduced emphasis on pedestrian access and almost no provisions for bicyclists.

Today, walking, bicycle, bus, and automobile (driving alone, carpooling, and drop off) access all play a major role in access to WMATA's system. Private shuttle buses are also increasing in importance. WMATA recognizes the importance of transit oriented development and joint development projects in improving pedestrian- and bicycle-originated transit trips and enhancing station areas and surrounding developments.

PROCESS

Step 1. Identify the Problem.

Metrorail's expected ridership growth requires increased emphasis on access modes beyond feeder bus and motor vehicle, due to the cost of providing for feeder bus and drive access. Several analyses recommended enhancing bicycle and pedestrian access to stations, which should be aligned with local jurisdictions' pedestrian and bicycle plans. WMATA also recognizes an increasing need for collaboration on TOD within the agency, from local governments and neighborhoods, and developers.



Navy Yard Transit Access Map

In addition WMATA recognizes the need for better coordination between Metrorail and Metrobus services. For example, Metrobus disruption information is not available to Metrorail riders, and connecting bus information is not always available at rail stations. The transit agency is making efforts to "connect the dots." The map below is one example of bus information that is now available at every rail station both inside the station and at some bus bays on the station property. Maps such as the one for the Navy Yard station are also installed on many bus shelters in WMATA's service area, showing bus riders how to get to Metrorail stations by bus.

Step 2: Establish a Collaborative Environment

WMATA includes a wide range of stakeholders in planning, including local governments, state transportation agencies, the MPO, National Park Service, and advocacy groups.

Station access studies are typically performed by WMATA at the request of local jurisdictions. WMATA staff teams (primarily long range planning, parking operation, bus operations) contribute to scope development for access planning projects. Historically, the station access planning group handled the scoping discussions independently. In recent years, however, different departments have worked more collaboratively as a result of new leadership and a re-organization that combined operationally isolated departments.

WMATA uses different mechanisms for engaging stakeholders, depending on the scale of the study. Examples mechanisms include:

- Board-appointed advisory groups such as the Riders' Advisory Council and the Elderly and Disabled Committee
- Standing regional stakeholder working groups primarily comprised of jurisdictional staff, such as the Jurisdictional Coordinating Committee, and the Regional Bus Stop Working Group.
- Standalone one-day workshops, such as the two separate Regional Bicycle and Pedestrian Access to Transit workshops.
- Regional conferences such as the Regional Bus Conference
- Stakeholder steering committees for specific station area planning projects, including jurisdiction staff, developers and community representatives.

WMATA also participates in regional stakeholder groups such as Metropolitan Washington Council of Government's Transportation Planning Board's Bicycle and Pedestrian Subcommittee of the Technical Committee.

These dialogues are formalized through memoranda of understanding, term sheets with developers, Board-adopted policies, and budget adoption establishing operating and capital funding for access programs.

Step 3. Develop Objectives & Principles

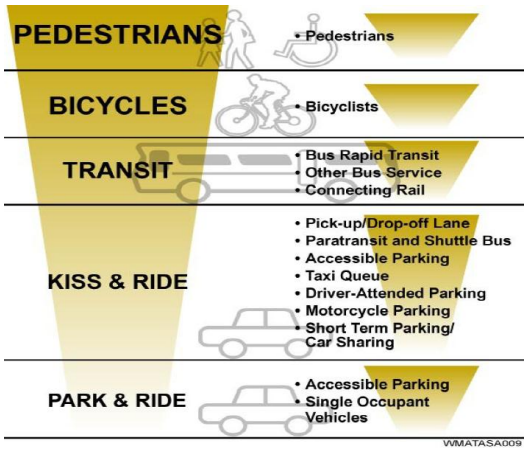
Station access planning is guided by several documents. These documents apply to both access to new stations such as those on the Silver Line to Tysons and Dulles, and for improvements to existing stations. The documents provide a mix of guidance for WMATA staff, public agency partners, and private joint development partners.

- *Metrorail Station Access & Capacity Study (2008)*: This system-wide analysis of future passenger demand and available capacity suggests that, "If the access mode split were to remain constant and the region grows according to MWCOG forecasts, as many as 44,000

new [motor] vehicle parking spaces could be needed by 2030." As the cost of providing this parking would be over $1 billion, a multimodal approach to access will be needed to expand system capacity.

- *Core Capacity Study (2002)*: This study analyzes operating strategies and capital investments required to meet ridership growth on the existing Metro System as well as the impacts of service expansions. It recommends immediate improvements to pedestrian and bicycle access to provide service to more residents of the region.

- *Station Site and Access Planning Manual (2008)*: This manual provides design guidelines for station site and access planning for use by Metro, local jurisdictional planners, government agencies, and Metro joint development partners. It illustrates how station facilities should be planned to optimize access to the station for all modes of arrival, with a focus on physical design and operational issues. The manual establishes a mode of access hierarchy to provide a rationale for station site planning and design, placing top priorities on planning and design for pedestrian, bicyclists, and transit users.



WMATA access mode hierarchy

- *Station-Specific Access Studies (Ongoing)*: Metro conducts station-specific studies on an ongoing basis, as requested and funded by its local jurisdictions, to identify opportunities to improve access to stations by all modes and plan for redevelopment at the station and in the vicinity.

- *Joint Development Policies and Guidelines (2008)*: The guidelines identify the roles and responsibilities for WMATA's Board of Directors, General Manager, local jurisdictions, developers and other community members in the joint development process. Further access mode-related guidelines include the policy for replacing on-site WMATA facilities and how to involve the community in the joint development process.

- *Rail Passenger Survey (2007)*: Metro regularly conducts surveys of existing customers to better plan for their needs.

- *Bicycle Facilities Inventory (2006)*: Metro evaluated the condition and use of bicycle facilities including lockers and racks. Subsequently, it began a program to replace many of the racks that had deteriorated over the years.

WMATA's member jurisdictions also continue to adopt non-motorized transportation plans, which can be used to enhance pedestrian and bicycle transit access. Table 1 shows those member jurisdictions with pedestrian and bicycle plans, maps, and/or Complete Streets policies.

Table 1 Local Plan and Policies Supporting Multi-Modal Transportation

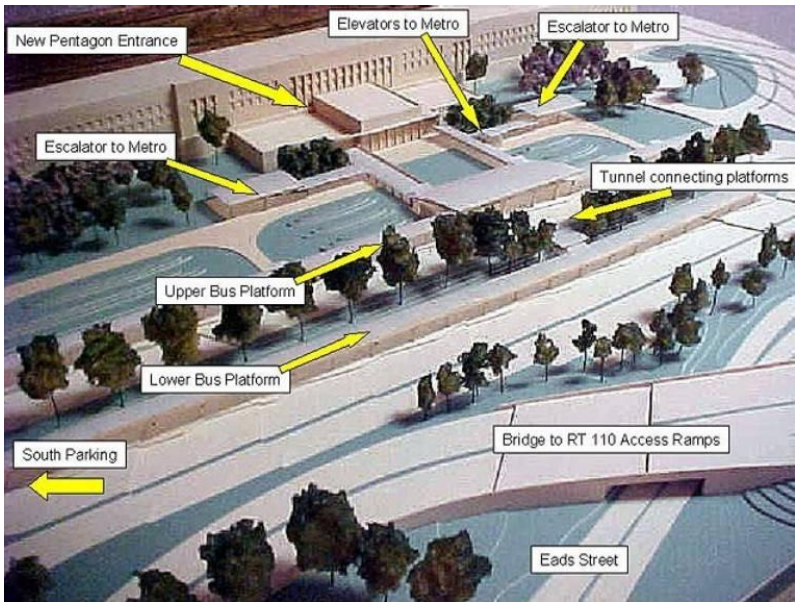
Jurisdiction	Pedestrian Plan	Bicycle Plan	Complete Streets Policy
Washington, DC	Yes	Yes	Yes
Arlington, Virginia	Yes	Yes	Yes
Alexandria, Virginia	Yes	Yes	Yes
Fairfax County, Virginia (Bicycle route map)		Yes	
Fairfax City, Virginia			
Falls Church City, Virginia			
Montgomery County, Maryland	Pedestrian safety program		State
Prince George's County, Maryland	Part of Comprehensive Transportation Plan		State

Step 4. Identify Evaluation Criteria

Evaluation criteria are not explicitly provided in the access planning process. However, data are used to support effective decision-making. WMATA relies on data from three primary sources: the Metropolitan Washington Council of Governments (MWCOG), information from local governments, and internally generated data.

- MWCOG provides travel demand forecasting data, such as mode split and land use projections. Note that MWCOG's model is not refined enough to provide access mode data, however.
- Local governments provide land use and transportation plans, information on development projects and other related information.
- Internally generated data include:
    - Ridership estimates completed for annual budgeting purposes and for longer terms operating and capital planning needs
    - Actual ridership counts
    - Access mode splits from Metrorail and Metrobus ridership surveys completed every two to three years
    - Parking utilization data

Vehicle-pedestrian interfaces at Metrorail stations are designed to reduce or eliminate conflicts in bus bays and parking facilities. The Pentagon, Van Dorn Street and Morgan Boulevard Metrorail stations are examples of how this access planning standard is applied. The graphic here shows the Pentagon Station design, which serves 30,000 daily bus trips through upper and lower bus bay platforms, and stairs, elevators and escalators to move passengers between the two.



Pentagon Station design

Step 5. Build a Set of Appropriate Options

Until recently, alternatives analysis was limited to balancing parking demand with feeder bus service. However, further parking expansion is limited by available land, construction costs, and the roadway network capacity surrounding a station. The demand for parking, especially at terminal stations and suburban stations remains high. To better manage parking, WMATA instituted a reserved parking system in the early 2000s. Today, 34 stations offer reserved parking, where customers purchase permits to park in reserved spaces.

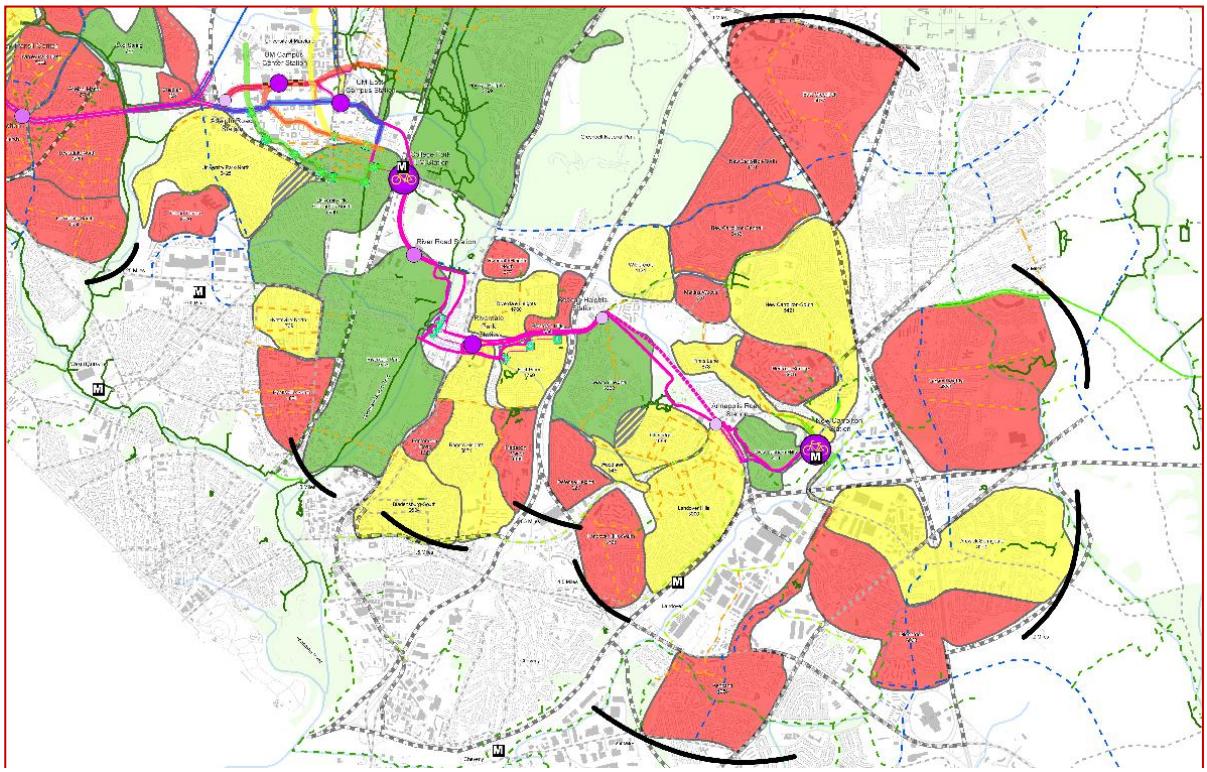
As with all transit agencies, the impacts of access policies set by WMATA's board of directors are revealed in the analysis of access options. Access modes with a higher demand (and accompanying capital and operating subsidy) are balanced with those with a lower demand and cost. For example, the recent Bicycle and Pedestrians Facilities Plan may result in the Board adopting bicycle access mode share goals that would reallocate agency resources. This would be consistent with the 2002 and 2008 core capacity studies and station access mode hierarchy.

Step 6. Predict Outcomes and Apply Criteria

Pedestrian and Bicycle Access Shed Analysis

WMATA is beginning to apply the catchment shed analysis traditionally used for feeder bus and park-and-ride access modes to pedestrian and bicycle access modes. The analysis requires moving from a station site design focus to a station catchment area focus. Called "access sheds", the analysis identifies existing and potential routes for walking and bicycling to a Metrorail station. The 4-step methodology leads to a projection of riders accessing by bicycle or on foot, with further leads to an estimate of needed bikeway and pedestrian network improvements leading to the rail station, and to bike facilities and services at or adjacent to the rails station.

This methodology will allow rail transit system planners to more accurately understand the potential for generating bicycle access trips to rail transit stations. It can be used during the planning process for a series of stations along a proposed new rail line, such as the Silver Line to Tysons Corner in Virginia, or it can be used to determine the potential for increasing bicycle access trips to existing rail stations, such as the Huntington Station on the Yellow Line in southeastern Fairfax County, Virginia. Planning outcomes may include a prioritized list of access improvements that have the greatest yield in terms of increased numbers of bicycle and pedestrian access trips to a single station or a set of stations; the appropriate amount of "floor" space to allocate for bicycle parking equipment in the station design process (including potential demand for bicycle parking).



Bicycle Shed map of sheds for New Carrolton and College Park Stations

Step 7. Tradeoffs, Negotiation and Choice

The recent Bicycle and Pedestrian Facilities Plan acknowledges trade-offs and balancing between modes. For example, the Plan's six goals include the desire to achieve the following outcomes:

- *Facilitate Transit Oriented Development* - Metro will have greater opportunities to capitalize on the value of its existing surface parking lots through its Joint Development program if more current drivers decide to switch to walking and bicycling and larger percentages of future riders choose not to drive.

- *Provide Transportation Options* - Not all of Metro's customers want to or are able to drive. Making it possible to walk and bike safely to and from stations will enable these customers to continue to rely on Metrorail as a primary means of transportation.

WMATA's Office of Long Range Planning is developing a formalized system for evaluating the cost-effectiveness of improvements to different access modes. Currently, tradeoffs and negotiations occur during the budget formulation process based upon historical information and working knowledge of different access modes. The agency compares upfront capital costs with on-going maintenance required (costs and workload), as well as the east of implementation and operation.

WMATA increasingly acknowledges that customers not only want bicycle parking at Metrorail stations, but they want that parking with a greater ease of use and security than traditional bike racks. Car sharing is another key access enhancement that WMATA has accommodated by re-allocating Park-and-ride and Kiss and Ride spaces for shared cars.

WMATA participates in a regional process to improve bicycle and pedestrian facilities through the MWCOG's Transportation Planning Board. Through this organization, WMATA negotiates for federal funding of transportation projects. Most recently, WMATA has collaborated with grant applications from partner organizations to fund a regional bike sharing application with TIGER II funds. The FTA also administers Transportation Enhancement funding specifically for transit agencies that can be used for access needs such as:

- Bus shelters;
- Pedestrian access and walkways;
- Bicycle access, including bicycle storage facilities and installing equipment for transporting bicycles on mass transportation vehicles;
- Transit connections to parks within the recipient's transit service area;
- Signage; and
- Enhanced access for persons with disabilities to mass transportation.[1]

[1] See: http://www.fhwa.dot.gov/environment/te/te_provision.htm

EXAMPLE STATIONS

Silver Spring Metrorail Station

Station Name:	Silver Spring Metro
Location:	Silver Spring, MD
Station Type:	Suburban TOD
Year Opened:	1978
Distance from CBD:	6.6 miles
Parking Spaces:	44 metered spaces/ 716 at nearby garage
Feeder Transit:	50 connecting bus routes
Bike Parking:	26 bike racks and 30 lockers
Employment:	20,300
Population:	11,300

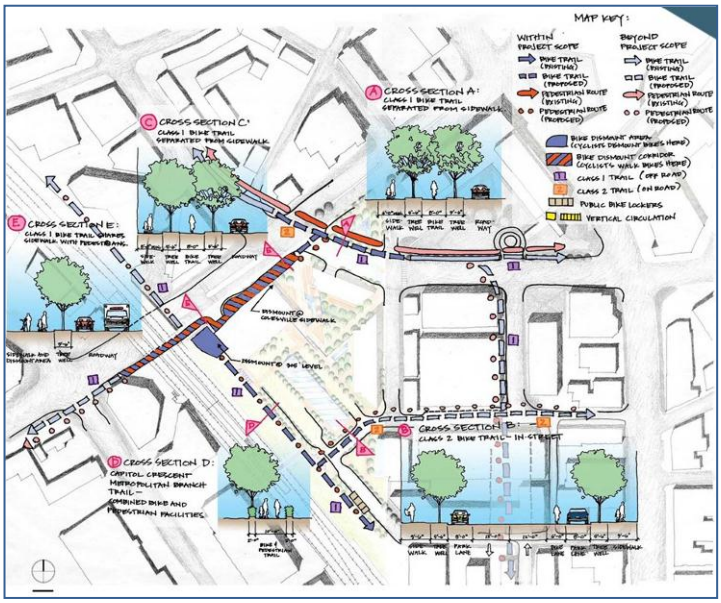
Source: © 2011 Google

The Silver Spring Metrorail station was a terminus until 1990. In addition to providing Metrorail service, it is served by the MARC Camden commuter rail line, 50 WMATA and Montgomery County RideON bus routes, and commuter bus service. Furthermore, Silver Spring and the area around the station have experienced significant residential and commercial development in close proximity to the station, creating more demand for safe and adequate pedestrian access facilities. According to a 2009 WMATA mode of access survey, approximately 42 percent of the passengers boarding in the morning arrived at the station as pedestrians and 1 percent arrived by bicycle. This pedestrian mode share is amongst the highest in the system outside of downtown Washington, D.C.

To address the continued growth in demand from all access modes, WMATA developed a new station design to accommodate demand from all modes, coordinate movements and enhance safety for people accessing the station. The new transit center, scheduled to open in summer of 2011, will be three levels and is designed to improve safety and comfort for all modes. The ground level will provide 34 bus bays for WMATA, RideON, University of Maryland, commuter buses and private shuttles. The top level will provide 54 short term Kiss & Ride parking spaces. In addition to the Transit Center, a private development is planned that will have 200,000 square feet of office space, a 150-room hotel, 176 apartment units, and approximately 10,000 square feet of ground level retail.

The Silver Spring Transit Center is collaboration between Montgomery County, the Maryland Transit Administration (MTA) and WMATA. Officials representing the three entities collaborated on the planning and design of the project. The Transit Center is being built by Montgomery County with $90 million in funding from the County, the State of Maryland and the

Federal government. Upon completion, WMATA will operate the Transit Center. The Center is eventually anticipated to experience up to 100,000 users per day.



Proposed Bike Circulation Near the Transit Center

Constructing the project while operating the current Silver Spring station presents challenges as well. Since such a high percentage of passengers arrive as pedestrians, safe and comfortable access points must be maintained. To facilitate access during construction, Montgomery County has set up a project website with extensive information about temporary bus stop locations and walking routes (including accessible routes) on the station property and to the station from the surrounding area. The County has also developed brochures in English and Spanish that are available at the station and online, and a project hotline with English and Spanish versions to inform passengers about navigating the station area during construction.

Eisenhower Avenue Metrorail Station

Station Name:	Eisenhower Avenue
Location:	Alexandria, VA
Station Type:	Suburban Retail Center
Year Opened:	1987
Distance from CBD:	6.8 miles
Parking Spaces:	12 Kiss and Ride spaces
Feeder Transit:	4 connecting bus routes
Bike Parking:	10 bike racks and 6 lockers
Employment:	5,720
Population:	3,350

Source: © 2011 Google

The Eisenhower Avenue Metrorail Station was built in 1983, and is the second to last station on Metrorail's Yellow Line in Alexandria, Virginia. In addition to providing Metrorail service, it is served by Alexandria's DASH bus service and the Richmond Highway Express commuter bus. The station abuts the Washington Beltway (I-495) and is accessed from Eisenhower Avenue which is a four lane arterial roadway. The Metrorail platforms are elevated at this station, and the bus bays and pedestrian access are at ground level.

The area around Eisenhower Avenue Metrorail Station is in transition. Historically, the area was primarily industrial uses. Currently, the station is immediately bounded to the east and west by large surface parking lots, and there are several lower density office and commercial uses in the vicinity. However, the area is planned to be redeveloped with high density mixed residential, office and commercial land uses. The City of Alexandria's Eisenhower East Small Area Plan will guide the redevelopment of this 230- acre area. This station currently has amongst the lowest ridership in the region, with only 2,000 boardings per day, but projections estimate that boardings will increase to over 10,000 riders per day after redevelopment.

WMATA worked with the City of Alexandria, the Virginia Department of Transportation and 14 major property owners in the area to develop a plan for accommodating the increased ridership, especially related to bicycle and pedestrian access. The Eisenhower East Small Area Plan provides guiding principles that emphasize transit and pedestrian circulation. These are reflected in the resulting land use pattern and urban design guidelines. An overarching goal is to concentrate density near the Metrorail Station, while providing attractive and comfortable pedestrian and bicycle connections to the station.

Rendering from Eisenhower East Small Area Plan