TRANSIT STRATEGIES

FIRST AND LAST MILE CONNECTIONS

When it comes to a traveler's experience, "the last mile can be the longest mile." For people who ride transit, their journey rarely starts when they board the bus or ends when they alight. Rather, their trip begins when they ride their bike from home to the train station or walk from the bus stop to the office. The connecting journeys before and after the transit ride can be influential enough to encourage or discourage a person to ride transit again. For this reason, transit agencies and cities across the nation are developing and implementing strategies to improve first and last mile connections to transit services, stops, and stations in order to facilitate a seamless and convenient travel experience and attract more riders.

Because successful fixed-route transit services rely on direct alignments through higher-density corridors, increased route coverage is typically not the most cost-effective solution to increasing ridership. As a result, other first/last mile strategies must be used, and the convenience of a first/last mile trip largely depends on three factors:

- **Distance.** How far must a transit rider travel between transit services and their origin and/or destination?
- **Modal Integration.** How easy (or difficult) is it to pair a transit trip with bicycling, driving, or a ride sharing service? Are there places to park and/or places to be dropped off or picked up at the transit facility? Can cyclists bring bikes on board?
- **Network Quality.** What are the physical conditions of biking and pedestrian infrastructure between the origin/destination and the transit facility?

TYPES OF FIRST/LAST MILE TRIPS AND SERVICES

First mile/last mile connections are made in a number of ways, and these include:

- Walking
- Bicycling
- Private automobile
- Shuttles, both public and private
- Publicly operated FlexBus services
- Private rideshare companies, such as Uber and Lyft
- Car share/private short-term car rental companies, such as Zip Car and Car2Go

Whereas the "middle miles" service is provided by public transit agencies, first mile/last mile connections are provided by different parties in a variety of ways. Traditionally, it had been left to individual riders to get themselves to and from transit stops by either walking, bicycling, driving, or getting dropped off or picked up. Then, beginning in the 1970s, public agencies and employers began providing shuttle connections and Flex/dial-a-ride connections. Employers and other groups began to join together to form Transportation Management Associations (TMAs) to provide these and other transportation services. Most recently, private companies have begun to provide first mile/last mile services. These include bikeshare, short-term car rentals, and private rideshare. Some of these, notably bikesharing programs, receive public subsidies but most of the others are operated on a for-profit basis.

WALKING

As a general rule, the average transit rider is willing to walk a quarter-mile to access fixed-route bus service and up to a half-mile for high capacity services (such as light rail and bus rapid transit) that operate with higher frequencies and

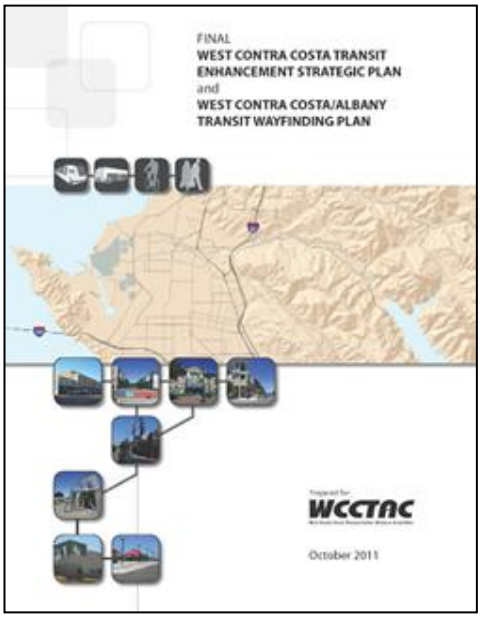
over longer distances. For potential riders who do not live or work within close walking distance to transit services, the prospect of a long walk before or after their transit ride may be enough to deter transit use entirely.

It is neither practical nor cost-effective for transit service to be within walking distance of everyone, especially in lower density areas. However, recognizing that walking is the primary mode for accessing transit, cities and transit agencies have effectively improved accessibility for riders by making improvements to pedestrian infrastructure within the typical walking distances around transit stations. Such improvements include:

- **Connectivity:** Corridors with heavy traffic, highways, and indirect street networks can all be barriers to walking, presenting connectivity challenges. Potential pedestrian access improvements include new pathways and/or pedestrian bridges.
- **Pedestrian Crossings:** Adding new (or redesigning old) pedestrian crossings around transit stops and stations can improve access as well as rider safety and comfort. Many of Nashville's primary transit corridors are the "pikes," which are wide, high-speed roads that carry high volumes of traffic and are difficult for pedestrians to cross. Enhancing crossings is a critical part of making the first/last mile trip both safer and more comfortable.
- **Sidewalk Improvement/Maintenance:** Improving sidewalk infrastructure increases the attractiveness of walking, while allowing the opportunity to design for safety (e.g., traffic buffers), accessibility (e.g., wheelchair ramps), and security (e.g., lighting).
- **Wayfinding:** Wayfinding, including signs pointing to transit services (and pedestrian network maps at transit stations), can improve a person's experience with transit and draw attention to existing transit services. West Contra Costa County, CA recently undertook a *Transit Enhancement and Wayfinding Plan* in which different pedestrian sign types were implemented. These include signs directing pedestrians from commercial districts to transit, from residential/secondary streets to transit, and from transit centers to nearby destinations/transfer opportunities.

PEDESTRIAN ON GALLATIN PIKE (NASHVILLE, TN)

TRANSIT WAYFINDING PLAN (WEST CONTRA COSTA COUNTY, CA)



BICYCLING

Integrating bicycling and public transit involves a number of considerations. First, cyclists are often hesitant to lock up their bikes and leave them for long periods if a transit stop does not have adequate bike parking facilities. Many transit agencies provide secure bicycle parking at stops and stations and allow riders to load bikes onto front-

mounted bicycle racks so that the bike is available for both first- and last-mile connections. Regardless of the approach, successful integration of transit and cycling can be a very cost-effective strategy to help meet first/last mile needs and expand transit ridership. Cyclists are willing to travel longer distances than pedestrians, and bicycle storage requires much less space than personal vehicles. Strategies to improve bike/transit integration and better support first and last mile connections include:

- **Connectivity.** Similar to pedestrian access, bicycle access is also constrained by a lack of street network connectivity. Strategies to improve bicycle connectivity can include various types of infrastructure, ranging from bike sharrows and striped bicycle lanes to separated cycle tracks and bicycle bridges.
- **Wayfinding.** Signs along bike networks that point to transit stops and stations, coupled with bike network maps at transit stations, can improve a rider's experience and help draw attention to existing services.
- **Bike Parking.** Bike parking can include both short and long-term parking facilities. Long-term bike parking is ideal for stops served by commuter-oriented routes. Whether short-term or long-term, bicycle parking should be located so that it is highly visible and, ideally, protected from the elements.
- **Onboard Integration.** While front-loading bike racks on buses are quite common, the process of loading a bike onto a bus can increase dwell time at the stop or station. Despite that, allowing transit riders to bring their bike with them does improve first/last mile connectivity. Another strategy most commonly used on higher-capacity vehicles (such as trains or streetcars) is to allow riders to carry their bike on board. Swift Bus Rapid Transit in Snohomish County, WA, is an example of a bus rapid transit (BRT) service that allows cyclists to bring their bikes on board and mount them on interior bike racks (pictured below).
- **Bikeshare.** Bikeshare continues to grow in the U.S., and transit agencies in many cities have successfully partnered with bike share operators to locate stations around transit centers and high ridership transit stops. Integrating these two modes provides people with the option to use a bicycle for both the first and the last mile connection without having to lock up their own bike or take it on board the bus. In addition, expanding bike share networks to other activity centers (e.g., high-density job and residential areas, tourist attractions) can help to ensure that bike share users have a place to begin and end their first/last mile trip. The larger and more visible the bike sharing network, the less of a perceived burden it is for people to plan their trip and make the bicycle/transit connection. Nashville's B-cycle, pictured below, includes a fleet of 263 bikes and 30 B-stations (and growing). B-cycle has stations that provide connections with transit, including at Riverfront Station and one block from Music City Central.

NASHVILLE B-CYCLE AT RIVERFRONT STATION

BIKES ON BOARD SWIFT BRT (SNOHOMISH COUNTY, WA)

PERSONAL AUTOMOBILES

Especially for longer distance trips, such as by express bus and rail, first mile connections via private automobiles are among the most important. They also provide for longer "first mile" connections that most other options, and thus can greatly expand the effective reach of transit. Most transit users who use private automobiles to access transit park at stations, so providing park-and-ride spaces is critical. Space must also be provided for "kiss and ride," or passenger

drop-off and pick-up, for those who are dropped off at the beginning of the trip and picked up in the reverse. Pick-up and drop-off spaces are also important for people using ride sharing services.

CLARKSVILLE, TN PARK-AND-RIDE LOT

SHUTTLES

Shuttles are a very common way to provide connections between transit stations and locations where volumes are too low for traditional transit service operated with 30- or 40-foot buses, destinations that are dispersed, and/or where the times that people travel are highly concentrated. They are also used as a supplement to the public transit network. Most shuttles are provided by one of four types of organizations: (1) Transportation Management Associations (TMAs), (2) private employers, (3) cities and towns, and (4) public transit systems. Local shuttles typically provide coordinated connections that make timed transfers to higher-capacity transit routes.

- **TMA Shuttles.** As described in more detail in the Transportation Management Association section below, TMAs are non-profit organizations formed to increase access and mobility in specific areas or for specific populations. TMAs frequently provide shuttle services between transit stations and employment centers and other major destinations. For example, in Emeryville, CA in the San Francisco Bay Area's East Bay, the Emeryville TMA's Emery Go-Round provides free shuttle connections between BART and local employers and shopping areas. In suburban Boston, the 128 Business Council operates seven routes that provide connections to MBTA stations and local service to, from, and between worksites along Route 128.
- **Employer Shuttles.** Employer shuttles typically focus on providing connections between transit stations and jobs. In downtown Detroit, Quicken Loans operates 10 shuttle routes that provide connections with public transit and between its downtown locations. In Sandy Springs, GA, office parks provide shuttle service connections to MARTA stations. In Stamford, CT, a large number of suburban employers provide shuttle services to their job sites.
- **Community Shuttles.** Many cities and towns operate community shuttles that are designed to provide connections with the regional public transit services. In the Phoenix area, there are 21 community shuttles that provide connections from neighborhoods to Valley Metro transit service and within the communities. Most of these are branded with unique names like Orbit Mars, BUZZ, GUS, and DASH. In West Hollywood, CityLine shuttles provide free service that connects to approximately 15 LA Metro routes. In Boulder, an initial Hop circulator route has expanded to a seven-route system that now includes Skip, Jump, Bound, and Stampede routes, among others.

Case Study: TMA Shuttle
Route 128 Business Council (Suburban Boston)

In 1985, GTE Laboratories, Polaroid, and The Nelson Companies jointly funded a transportation impact study of the area along the Boston area's Route 128 between Route 2 and Route 20. The study concluded that increased traffic congestion would negatively impact the region if alternative solutions and traffic-reducing measures were not immediately implemented.

Two years later, the 128 Business Council was formed to develop alternative transportation solutions, including sustainable and environmentally-friendly practices that would enhance the vitality and economic attractiveness of the 128 West region. 128 Business Council became the first Transportation Management Association in Massachusetts and is now entering its third decade of service to business, collegiate, and residential community members.

The Route 128 Business Council now operates seven shuttle services—four that provide reverse commute connections from the MBTA's Alewife station at the end of the Red Line, one that provides suburban commute service, and two that provide local circulation.

Case Study: Employer-Provided Shuttle
Perimeter Shuttle (Sandy Springs, GA)

The Perimeter Shuttle provides free service from the Sandy Springs MARTA station—a hub for various local and regional transit services—to a number of businesses located at Glenlake Parkway and Embassy Row, including UPS, Kaiser, and Rubbermaid. Carrying 500 passengers a week, service operates every 30 minutes during the weekday morning and evening rush hours.

The shuttle service began in 2011 as a way for the businesses to replace a MARTA bus route that was eliminated during budget cuts in 2010. When the bus route was eliminated, employees faced a 30- to 40-minute walk along a dangerous, high-speed road from the transit station to the business park.

The Perimeter Shuttle is a partnership between the Perimeter Community Improvement Districts and the area businesses; the partnership contributes $90,000 annually toward shuttle operations. The executive director of the Perimeter Transportation Sustainability Coalition noted, "This effort fills a gap that public transit had to abandon," and is the first time that the business community in Metro Atlanta stepped up to replace something that was previously a public service.

Source: Reporter Newspapers, December 15, 2011

- **Transit Agency Shuttles.** Although less common than TMA, private, and community shuttles, many transit systems also operate local shuttles that provide first mile/last mile connections. In Arlington, VA, the local transit system, ART, operates several shuttles that consist of small loops that connect Metro stations with significant employment, shopping, and residential destinations. For example, ART Route 61 serves two Metro stations via clockwise and counter-clockwise loops that operate during the morning and evening weekday rush hours.

PUBLICLY OPERATED FLEXBUS SERVICES

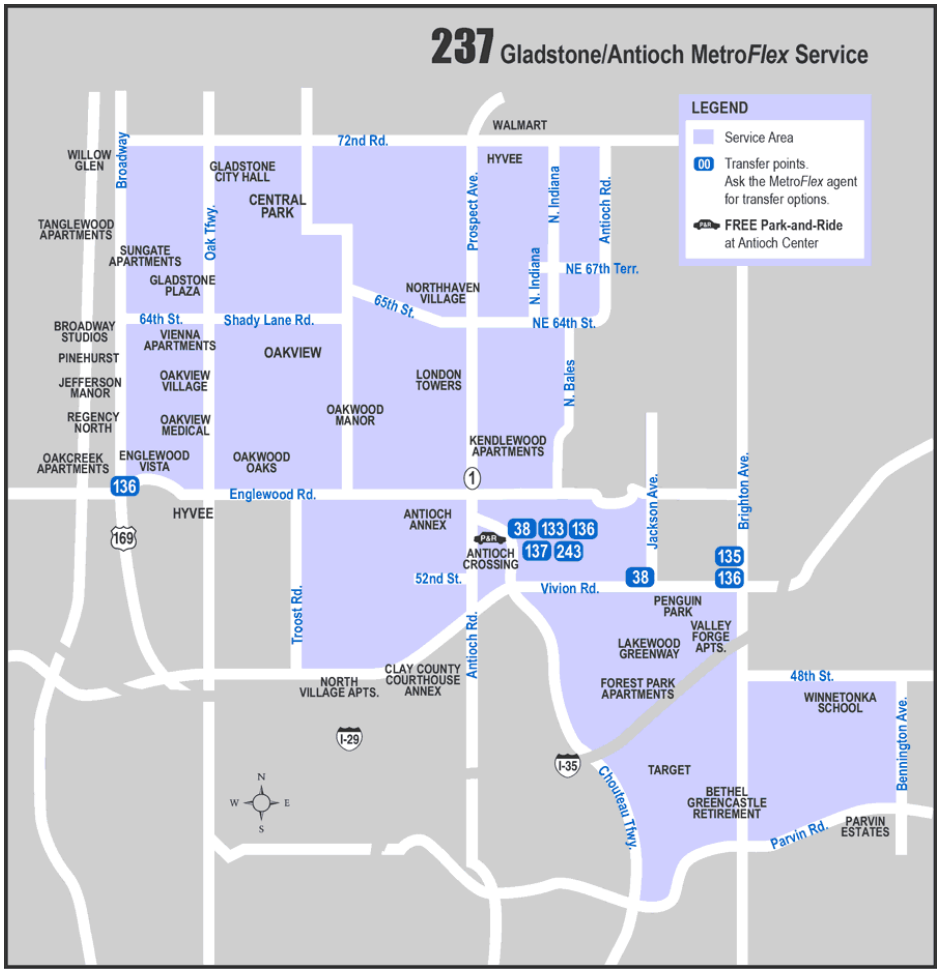
Some transit systems, including Nashville MTA, provide "FlexBus" service that makes first mile/last mile connections to specific areas, or zones (and offers local service within those areas). These services, which are also frequently called Dial-A-Ride, typically operate to and from a transit station or center and provide timed connections with fixed-route transit services.

Most Flex services require passengers traveling to the transit station or transit center to make a reservation in advance, with minimum times varying from two to 24 hours. For trips from the transit station or center, most do not require reservations, and passengers instead board the transit vehicle and tell the driver where they want to go.

Nashville MTA previously offered a service of this type, called BusLink, as a pilot project in the Green Hills, Antioch, and Madison areas. BusLink provided connections between local and express bus services, and required an advance reservation. Of the three pilot locations, Madison was successful and was ultimately turned into a fixed-route circulator. The Green Hills and Antioch services were discontinued.

Other transit systems that provide pre-scheduled FlexBus service include Fort Worth's The T, Providence, RI's RIPTA, and Kansas City's KCATA. The service provided by KCATA is called Metro*Flex,* and it is on-demand bus service that operates like a taxi for the same cost as fixed-route bus service. Buses travel within a six set boundaries instead of along a specific route. In some cases, riders may get door-to-door service, but this is not guaranteed. Metro*Flex* routes service transit centers and some transfer locations. Rides must be scheduled 24 hours in advance.

KCATA METRO*FLEX* ROUTE 237



Most recently, the Central Florida Regional Transportation Authority (Lynx) in Orlando is testing the operation of FlexBus service that, similar to Uber or Lyft, provides for "instant" reservations and web-based fare payment. Compared to prescheduled FlexBus services, the Lynx FlexBus service is expected to:

- **Improve convenience** since it is available on-demand instead of requiring pre-booking.
- **Reduce travel times** through more efficient routing.
- **Reduce dwell times** through the use of web-based fare payment instead of on-vehicle fare payment.

PRIVATE RIDESHARE SERVICES

Private rideshare companies (also called Transportation Network Companies, or TNCs) such as Uber, Lyft, and Sidecar are revolutionizing on-demand transportation. In most respects, these companies provide a form of taxi service that allows customers to book trips almost instantly using smartphones. In terms of providing first mile/last mile service, private rideshare services are often much more widely available than taxis. Moreover, the ability to book via smartphone means that a ride can be summoned easily in areas where traditional taxis cannot be found or require long waits.

Private rideshare companies are becoming increasingly important in the delivery of first mile/last mile services. Their use began informally as transit riders began booking rideshare connections on their own. However, there has been a recent move toward more formalized arrangements between transit agencies and rideshare companies.

Most cooperative arrangements to date have consisted of co-marketing to facilitate the use of private rideshare services as first mile/last mile connections. For example, in the Dallas/Fort Worth area, both Dallas' DART and Fort Worth's The T have included a link to Uber on their mobile fare payment app. Transit riders pay the full Uber fare, but the ability to use the transit mobile ticketing app to also arrange Uber trips facilitates the first mile/last mile connections.

To date, no transit system has used a private rideshare company to provide service in lieu of directly operated services. However, as described in the callout box below, the City of Gainesville, FL is about to start a pilot project with Uber to provide service to seniors. This pilot could become a model for the use of Uber as a more formal extension of public transit. For example, in lieu of local shuttle services or publicly operated FlexBus services, a transit system could instead contract with a private rideshare company to provide those trips at a lower cost. Nashville MTA recently began exploratory talks with Lyft.

DART AND UBER CO-MARKETING

Case Study: Gainesville/Uber Pilot Project
City of Gainesville, FL

While not a first mile/last mile project, a pilot project in Gainesville between the city and Uber to provide transportation for senior citizens could become a model for partnerships between public transit systems and Transportation Network Companies. The project is intended to extend the reach of public transit in lower density areas where traditional fixed-route transit would not be cost effective. According to a June 4, 2015 article in the Gainesville Sun:

"The Gainesville City Commission Thursday decided to move forward with a six-month pilot program that will pair popular ridesharing company Uber with an unlikely customer base: senior citizens. In partnership with both Uber and ElderCare of Alachua County, which runs the Senior Recreation Center in town, the city plans to launch a six-month pilot program that will offer on-demand transportation services for low-income senior citizens.

Uber customers request rides using a mobile app. They can pay with a debit or credit card and are picked up by a driver—who uses his or her own car—and taken to their destination. The pilot program will provide transportation services through Uber for two Gainesville neighborhoods: the 400 Building on Northeast Eighth Avenue and Turkey Creek Forest.

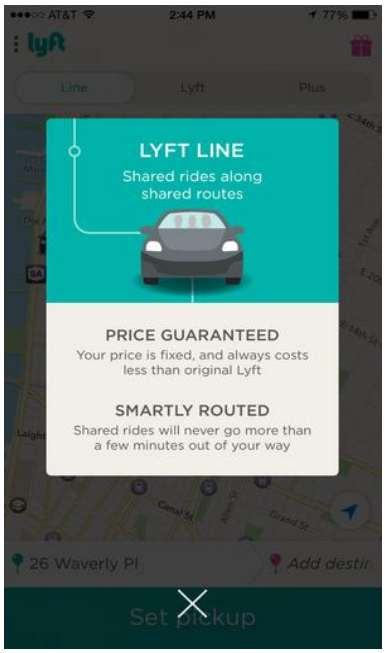
Commissioner Harvey Budd, who has an elderly mother who uses a walker, said he sees a need for this program in the community. "We're all getting older, the Baby Boomers. Ten to 15 years from now, we're going to be so excited that this exists," he said.

Mayor Ed Braddy and City Manager Russ Blackburn met with Uber representatives to discuss the idea for a senior-centric transportation initiative during a recent trip to California for a Gainesville Area Chamber of Commerce marketing visit, according to Thursday's agenda. It appears no other community in the U.S. has established this type of transportation program.

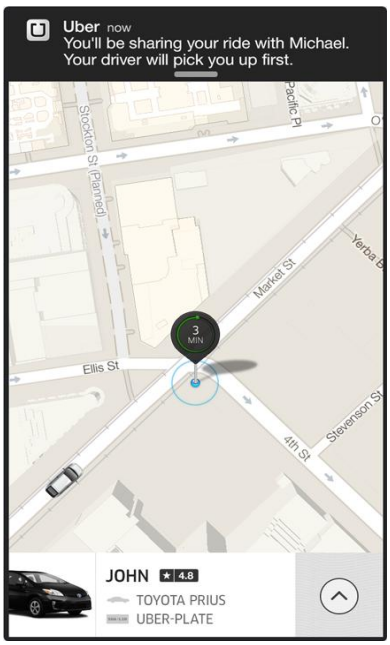
Here's how it will work: ElderCare will set up an account with Uber that will be billed whenever a senior citizen in one of those pilot communities requests a ride to either the senior center or to other select destinations. A copay between $1 and $5 may apply to seniors who use the pilot program, said Anthony Clarizio, ElderCare's executive director. The copay would be lower or nonexistent for some seniors, depending on their income."

A second development is that Uber and Lyft have begun to offer pooled trips. Whereas the original service model was to provide a single ride to a single customer, Uber's UberPool and Lyft's Lyft Line provide pooled trips at a lower cost. Passengers arrange these trips in the same manner as regular trips, but stops may be made to pick up and drop off other passengers along the way.

LYFT LINE



UBERPOOL



Many transit systems now provide services that are similar in many respects to private rideshare services. For example, most transit systems provide paratransit service that attempts to pool riders but often provides a single ride to a single customer. In addition, as described above, many transit systems provide FlexBus service that is similar to private rideshare services but is less convenient because it requires advance reservations. The provision of FlexBus service is often beyond the core competencies of most transit systems and TMAs, and partnerships with private rideshare firms offer the potential to provide better and more first mile/last mile service at lower cost. One possibility for this type of arrangement in Middle Tennessee would be first mile/last mile connections to Nashville MTA and RTA commuter services such as express bus and the Music City Star.

CAR SHARE/CAR RENTAL

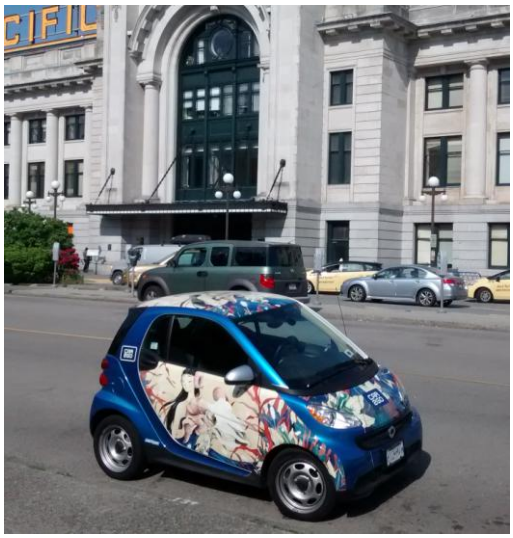
Transit agencies are beginning to partner with car share companies such as ZipCar and Car2Go to improve first mile/last mile connections around transit stations and high-ridership transit stops. These partnerships make cars available at the outer ends of trips where a car is needed or other forms of transportation are not available. Traditional car rentals are also available at many large transit stations.

The different types of available rentals facilitate different types of trips. While ZipCar is priced to encourage longer round-trips (with a one-hour minimum), Car2Go is more oriented toward first- and last-mile trips with per-minute pricing and no round-trip requirements. The integration of transit and car share typically consists of:

- **Station/Stop Integration.** Integration with transit stations or stops typically involves designating "car share only" parking spaces in park-and-ride lots, drop-off areas, or on adjacent streets. Dallas Area Rapid Transit and ZipCar have formed a recent partnership, with designated car share parking at two DART Rail stations.
- **Free-Floating Parking.** Another approach, which requires an agreement with a municipality, is to allow car share companies to purchase "free-floating" permits that allow the cars to be parked in any on-street space. This approach is particularly convenient for making first/last mile connections with transit. The City of Seattle has formed a successful relationship with Car2Go, which buys free-floating permits from the city for each of its 500 cars. Subscribers to the service are able to pick up and drop off a Car2Go from any on-street parking space without having to pay for parking. The program has been so successful (with over 59,000 registered users) that the city recently passed an ordinance allowing for three other companies to enter the market with up to 750 permits each. Similar permit programs exist in many North American cities, including Vancouver (pictured below).

DESIGNATED ZIPCAR PARKING AT DART RAIL STATION (DALLAS, TX)

FREE-FLOATING CAR2GO PARKING NEAR TRANSIT (VANCOUVER, BC)



TRANSPORTATION MANAGEMENT ASSOCIATIONS

Transportation Management Associations (TMAs) are member-controlled organizations that provide transportation services in a particular area, such as a commercial district, mall, medical center, or industrial park. They are often a key element of first mile/last mile services, and generally consist of area businesses and organizations that group together to provide transportation-related services including:

- Shuttles to transit stations and centers
- Discounted transit passes
- Ridesharing programs
- Guaranteed Ride Home programs
- Marketing and promotion of commute alternatives
- Parking management and coordination

Of all of the programs provided by TMAs, perhaps the most important from a transit perspective are first mile/last mile shuttles to work locations that cannot support traditional transit. As one example, RTA could provide service to and from Cool Springs, and a local TMA could provide shuttles between a Cool Springs transit center and local businesses and stores.

Case Study: TMA Shuttles
MASCO Shuttle (Boston)

MASCO, the Medical Academic and Scientific Community Organization, is a non-profit organization dedicated to enhancing Boston's Longwood Medical and Academic area (LMA) for the benefit of those who live, work, study, or receive care in the area.

MASCO has 24 members and associate members that include several of the nation's top medical institutions, one of Boston's most revered museums, Harvard Medical School, Harvard Dental School, Harvard T.H. Chan School of Public Health, the six Colleges of the Fenway, the largest Reform temple in New England, cutting-edge medical research organizations, a distinguished private high school, a major health insurer, and a leading health maintenance organization. MASCO members employ more than 45,200 people and generate an average of 1,100 new jobs and 7,500 job openings each year.

As part of its services, MASCO operates seven shuttle routes that connect the LMA with key locations in Boston, Cambridge, and Brookline, including rapid transit stations. The seven routes serve 12,500 riders per weekday.

IMPLICATIONS FOR MIDDLE TENNESSE

First mile/last mile connections are a particular challenge in Middle Tennessee, largely due to very poor pedestrian connections in many areas and the way the region sprawls. As described above, there are also many different ways to provide, encourage, and enable first and last mile connections, most of which are best suited to specific situations. The implementation of most will also require partnerships:

- **Pedestrian Improvements:** One of the largest barriers to transit service outside of Nashville's urban core is poor pedestrian conditions that force transit passengers to walk along major arterials that lack sidewalks and to cross streets that lack pedestrian signals or crossings. The City of Nashville and other local communities will need to take action to make it easier to walk to and from transit. Nashville's Complete Streets policy sets the framework to improve pedestrian conditions, calling for street designs that accommodate people of all ages and abilities. Pedestrian improvements are needed along many of Nashville MTA's most important routes, especially along corridors that provide the greatest potential for High Capacity Transit (HCT).

- **Bicycling Improvements:** In a similar manner as pedestrian access, the region's communities will need to improve bicycle facilities to make it easier for people to ride bikes to and from transit. Nashville's Complete Streets policy also speaks to the need to improve cycling conditions, and several of Nashville's Complete Streets projects have installed state-of-the-practice facilities. Although complete streets do not always look the same, they include bicycle, pedestrian, vehicle, and transit facilities in a manner than complements the character and setting of the area. Concurrently, Nashville MTA and RTA can improve bicycle facilities at stations and stops and on board transit vehicles, especially as the agencies develop HCT services.
- **Park-and-Ride/Kiss-and-Ride:** Especially in outer areas, park-and-ride and kiss-and-ride will remain among the most important ways to connect with RTA services. At the present time, RTA and Nashville MTA's primary focus is to develop park-and-ride lots at locations where local businesses and other organizations are willing to make parking available to transit riders. This approach reduces costs but also results in many park-and-ride lots in inconvenient locations. To make service more attractive, Nashville MTA and RTA will need to develop more purpose-built park-and-ride lots in more convenient locations.
- **Shuttles:** As service expands, especially outward in the nine counties surrounding Davidson County, it is certain that new shuttle services will be needed to provide connections between Nashville MTA and RTA services and local job sites and other local attractions. These shuttles could be provided by local organizations, TMAs, and/or Nashville MTA and RTA. However, considering the demands on Nashville MTA and RTA to provide more high-quality transit services, the providing shuttle services through private employers and other organizations, such as TMAs, would produce a more robust regional transit system. It would also ensure that shuttle services are tailored to specific local needs.
- **Private Rideshare:** Private rideshare companies and their services, and especially those like UberPool and Lyft Line, provide the potential for transit systems to expand transit services to lower demand areas through partnerships rather than through the provision of direct service. While the development of these types of partnerships is still in its very early stages, they offer the potential to start service more quickly, provide service at lower costs, and better tie expenditures to utilization levels.

Finally, as has been the case throughout much of the rest of the United States, the development of TMAs to address specialized local transportation needs would greatly enhance first mile/last mile connections. As Davidson County and Middle Tennessee have sprawled, more of the region's residents live and work in areas that cannot be cost-effectively be served by traditional fixed-route transit. In these areas, Nashville MTA and RTA will need assistance from private companies and other organizations to provide first and last mile connections.