

Chapter 1

Introduction

Purpose of this Plan

The Transit Development Plan (TDP) for the Chittenden County Transportation Authority provides a program for the expansion and enhancement of public transportation service in Chittenden County. In many ways, it is the foundational planning document for the agency, as it establishes the framework within which all other short term service planning and operations planning occurs. It also acts as the transit component of the Chittenden County Metropolitan Planning Organization's Metropolitan Transportation Plan, the region's long-range transportation planning document.

This TDP is not restricted to the short-term period (five years from the present) as previous transit plans have been, but rather covers at least a 10-year time frame. Projects included here for the long-term future are intended more as guideposts and reference points than detailed plans. The goal is to have a coherent plan with short-term actions that make sense on their own merits, as well as building toward a future enhanced system.

This chapter serves as the introduction to the TDP, including various background materials that offer a context for the chapters that follow. It begins with an overview of the TDP document, followed by a discussion of CCTA's mission and vision of the future. After a listing of the accomplishments since the time of the last comprehensive plan and a brief overview of the history and structure of CCTA, the key partners in the process of creating and implementing the TDP are identified and discussed. The chapter closes with a hierarchy of public transportation services to set a context for the existing and proposed services discussed in later chapters.

Overview of TDP

Following this introductory chapter, Chapter 2 is a review of existing transit services in Chittenden County, including CCTA, SSTA, and other transportation providers. Chapter 3 provides a demographic and economic profile of Chittenden County, with special emphasis on target populations: youth, older adults, low income households, and autoless households. Important destinations, such as senior housing, accessible housing, major employers, social service agencies, and major employers are also discussed. Chapter 4 is a needs assessment, based on findings from Chapter 3 as well as recent surveys and public outreach, and Chapter 5 discusses regional coordination and sustainability. The service and facility recommendations of the TDP are listed in Chapter 6, while Chapter 7 discusses costs, funding and ridership impacts. Chapter 8 offers conclusions and next steps for the Transit Development Plan.

CCTA Mission and Vision of the Future System

The mission statement of CCTA is focused on the immediate purpose and benefits of public transportation service in Chittenden County:

The mission of CCTA is to operate safe, convenient, accessible, innovative and sustainable public transportation services in the Chittenden County region that reduce congestion and pollution, encourage transit oriented development and enhance the quality of life for all.

Part of the purpose of the TDP is to outline a future system that will allow CCTA to achieve its mission to a greater extent than is possible today.

The Strategy Committee of the CCTA Board has developed a vision statement to describe CCTA's future role in the region and its relationship with its member communities:

The Chittenden County Transportation Authority will play a major and important role in northwest Vermont's transportation system and will carry an increasing number of passengers each year. With growing ridership, CCTA will provide the region with economic development, environmental benefits and a cost effective means of transportation. The public transportation options offered by CCTA will serve a wide range of passengers, including those who are transit dependent and those who have other transportation choices. CCTA's services and facilities will use technology in order to be convenient and attractive enough to entice individuals to use their cars less. In order to maximize access to CCTA's public transportation services, communities will focus development along existing transit routes, considering the presence of transit when contemplating future development, and will work to improve the pedestrian environment in all areas served by CCTA buses. By combining efforts with bicycle, pedestrian, carpool, and carshare entities, alternative modes of transportation will rival the primacy of the single occupancy vehicle and will surpass it in terms of affordability.

The following attempts to show what the achievement of this vision would look like from the perspective of a future rider. The entire process of planning and then taking a trip is described, taking full advantage of advances in technology, facilities, service, and the supporting infrastructure.

Planning My Trip

- I need to go from my home in the New North End of Burlington to my job near Champlain Mill in Winooski. Rather than fight with traffic, I decide to use the bus and get some reading done.
- I'll need to take a bus into downtown Burlington and transfer to a bus to Winooski, but I can take the Essex Junction route which will speed up the trip.

- The North Ave route runs every 15 minutes and takes me to the downtown transit center with weather protection, heat, restrooms, and passenger information.

Reaching the Bus Stop

- I don't really need to check the schedule because the route runs quite frequently.
- But I check the bus information system using my smartphone, key in my bus stop number (on the sign at my stop), and the time of the next arrival shows up on my screen. I know the time estimate is accurate, because it is calculated from a global positioning system device on the bus.
- My local bus stop has a shelter with a solar light, and is in a safe and easy-to-reach location, since the City has made it a priority to provide safe access to bus stops.

Boarding the Bus

- The low-floor, low-emissions bus pulls up to the stop within 1 minute of the scheduled arrival.
- I board easily, and the farebox reads the chip in my smartcard; hardly anyone uses cash any more so boarding is quick.
- The bus is clean inside and much quieter than those old buses from years ago.

Transferring at the Transit Center

- After the short trip from my neighborhood, I reach the downtown transit center.
- A display at the transit center shows that the next Essex Junction bus will depart in 9 minutes; time to grab a cup of coffee.
- I don't have to worry about paying on my next bus because I already have my transfer ticket.
- The Essex Junction bus always seems to have green lights (due to transit signal priority), and can bypass congestion at a few of the busiest intersections via a queue jumper lane.



Reaching My Destination

- I leave the Essex Junction bus at Champlain Mill, and can either walk from here to my destination or take a local circulator bus. It is raining today, so I decide to take another bus.
- The circulator is waiting for me, as it is timed to meet the Essex Junction bus.
- I transfer again with no fare, and the smaller, friendly circulator bus takes me to a stop a half-block from my office.

- The sidewalks here are also in very good shape and there are crosswalks at every stop. Even during the winter, the City is committed to keeping sidewalks and bus stops clear and accessible.
- The trip, even with the transfers has been about the same



- as I could have done it driving because of all the traffic congestion, but taking transit allowed me to get my coffee and get some reading done.

Other Features of the Bus System that Make It Work for Me

- Many services run later in the evening than they used to
- All local routes run seven days per week
- Trip planning is a snap with the improved website that tells me which buses to take to get anywhere I need to go.

In order to make this vision a reality, investments must be made on many fronts, both by CCTA and by its municipal partners. Clearly, a significant amount of technology is involved, from planning the trip, to finding out about the expected arrival time, to paying the fare, and finally to having a quick trip because of all of the green lights for the bus. Systems that support these functions include:

- Trip planning software, either residing on CCTA's website or hosted through a private partner such as Google Transit;
- Automatic vehicle location with GPS units on each bus, central data processing of the geospatial data, algorithms to predict arrival times at particular spots, and communications channels to disseminate this information via the Web, mobile data units, and interactive voice recognition;
- Electronic fare collection, with fareboxes that communicate with smartcards;
- Transit signal priority, with transponders on vehicles and receivers built into traffic signals along major corridors so that buses receive extended or advanced green lights to speed them through intersections.

In addition to the technology, CCTA would also need to upgrade service, so that buses run more frequently on trunk and local routes. Peak frequency of buses every 15 minutes on trunk routes,

with 10-minute service on the major corridors such as US 2 and VT 15, and local neighborhood buses timed to meet the trunk routes, would require a major increase in operating funding.

The vision includes a new downtown transit center with enclosed waiting areas and many passenger amenities. CCTA has been working with the City of Burlington for several years to plan for a new facility.

Finally, supportive infrastructure such as sidewalks and crosswalks are necessary to make the transit trip attractive to riders who have other alternatives available. In this vision, the cities of Burlington and South Burlington have invested in improved pedestrian facilities and have also committed to maintaining them in all weather conditions. Other elements of supportive infrastructure include bike lockers, more passenger shelters, more park & ride and intercept lots, showers and locker rooms at major employers, and car-sharing programs that allow more people to forego automobile owners and rely on public transportation.

Such a future system can only be viable if it is planned in concert with future land use decisions that support public transportation. Whether this land use is called “smart growth,” “transit oriented design,” “pedestrian oriented design,” or some other term, it is essential that future development (especially the type that generates demand for public transportation) be focused in a geographical area that is compact and conducive to efficient operations. If public transportation is instead spread too thinly by being asked to serve larger and larger geographic areas infrequently, it will never be able to operate at a level of service that can be attractive to choice riders.

Review of Accomplishments since last SRPTP

Since 2003, CCTA has been working to implement new routes and service expansions recommended in the last SRPTP. The following lists the improvements made since 2003:

- Interregional commuter routes
 - Montpelier
 - Middlebury
 - St. Albans
- Regional commuter route to Milton
- Regional line-haul services
 - Restructuring of service along the Route 2 Corridor between Burlington and Williston (June 2010)
 - 15-minute peak service on the new Williston Road (US 2) route (June 2010)
 - Peak hour service to Williston Village (June 2010)
 - Restructuring of the Essex Junction and Pine Street routes
 - 15-minute peak service on Essex Junction route
 - Late-night service on Friday and Saturday on Essex Junction route
 - Increase in service on Shelburne and Essex Center routes
 - Implementation of the CATMA Park and Ride Shuttle (discontinued June 2009)

- Adjustment of running times through timepoint analysis
- Facilities
 - Upgrade and expansion of CCTA offices and maintenance facility
 - Installation of 23 shelters throughout the system
- Vehicles
 - Replacement of half the bus fleet with ultra-low sulfur, particulate-filter-equipped biodiesel buses
- Programs
 - Unlimited Access program covering Hill institutions and Saint Michael’s College

In response to these improvements, marketing efforts, capital upgrades, and institutional relationships, CCTA has enjoyed annual ridership increases in the range of 5-7% for each year since the last SRPTP.

Table 1 below connects these service and facility improvements to the elements of CCTA’s mission statement (see page 1). Specific definitions of the mission elements are provided below. A similar table is provided in Chapter 6, which demonstrates how the proposed investments in the TDP promote CCTA’s mission.

Definition of Elements

Safety	Security of passengers on-board and waiting for transit vehicles, and offering safe transportation options for travelers (e.g. late night service)
Convenience	Greater flexibility of travel times due to span increases, reduced waiting time due to more frequent service, and reduced travel time due to more direct service, plus greater reliability. Also easier fare payment (UA).
Accessibility	Geographic service expansion to increase access for more people, plus ADA-related improvements in vehicles and shelters (plus surrounding areas). Also widening the audience through UA program.
Innovation	Use of technology and new programs to improve reliability and efficiency and increase ridership.
Sustainability	Projects that promote public transit use among more populations and choice riders and that have a greater impact on the environment.
Congestion/ Pollution Reduction	Projects that are directly targeted at commuters in major congested corridors and that reduce emissions from CCTA vehicles.
Encouraging TOD/POD	Supportive of higher-density development and a lifestyle less dependent on automobile use. Includes capital investments and service increases to a level that makes transit an attractive option.
Enhanced Quality of Life	Various types of improvements which raise transit service to an attractive level, mitigate negative impacts of bus operations, and encourage a sustainable transportation system

Table 1: Comparison of Completed Projects to Mission

Service/Facility	Safety	Convenience	Accessibility	Innovation	Sustainability	Congestion/ Pollution Reduction	Encouraging TOD/POD	Enhanced Quality of Life
Montpelier LINK			*		*	*		*
Middlebury LINK			*		*	*		*
St. Albans LINK			*		*	*		*
Milton Commuter			*		*	*		*
US 2 Restructuring		*	*				*	*
15-min. peak service on US 2		*			*	*	*	*
Peak service to Williston Village		*				*	*	
Essex Junction Restructuring		*					*	
15-min. peak service on Essex Junction		*			*	*	*	*
Essex Junction Late-night weekend service	*	*						
Increase service to Shelburne	*	*					*	*
Increase service on Essex Center route		*					*	*
Pine St. Restructuring		*						
CATMA Shuttle (discontinued in June 2009)					*	*		
Adjustment of running times		*		*				*
CCTA maintenance facility				*				
Install 23 shelters	*	*	*				*	*
Replace 50% of bus fleet	*		*	*	*	*		*
Unlimited Access		*	*	*	*	*		*

Historical Background and Funding

CCTA was established by the Vermont legislature in 1973 as a municipal corporation. The legislature acted to maintain public transportation service previously operated by Burlington Rapid Transit, a private bus company, which had gone out of business. CCTA was given the power to assess fees on its four original member municipalities according to the number of revenue miles operated in each municipality. The members—Burlington, South Burlington, Winooski, and Essex—made up the CCTA Board of Commissioners, each with two representatives. The mileage formula was inadvertently structured in such a way as to discourage new municipalities from joining CCTA. It also discouraged changes in service to the existing route structure.

The mileage formula was finally abandoned in FY2007 after a two-year systematic review and analysis and was replaced by a new means of determining local assessments. This new method allows for greater flexibility in providing service and removes barriers to new members joining. As a result, Williston, Milton, and Hinesburg have since joined CCTA, and the planning staff has been able to implement several service changes to improve operational efficiency and attract new ridership.

The primary sources of capital and operating funding for CCTA are:

- Federal funds (about 30% of total operating funds)
 - Section 5307 Urbanized Area Funding
 - Section 5309 Capital Program
 - Surface Transportation Program Transfers for Capital
 - Surface Transportation Program Transfers for Preventive Maintenance
 - Section 5316 Job Access and Reverse Commute (JARC)
 - Congestion Mitigation and Air Quality (CMAQ) Improvement Program
- State operating and capital assistance (about 17% of total operating funds)
- Farebox and advertising revenue (about 23% of total operating funds)
- Assessments on member communities (about 24% of total operating funds)
- Passes funded by Medicaid (less than 1% of total capital plus operating)
- Employers and institutions enrolled in the Unlimited Access program (included in farebox revenue)
- Purchase of service (regular ongoing routes) by municipalities and private organizations including management of GMTA (about 5% of total operating funds)

Charges for new services or for major service changes are assessed based on 1) the number of driver pay hours required 2) the fully allocated operating costs for the upcoming year and 3) any foregone fares for no- or reduced-fare service. Special one-time or multi-year assessments may also be required for communities seeking new membership or for capital equipment for new routes or new segments. Member communities pay their assessments from local property tax revenues, an overburdened source, thereby limiting CCTA's ability to expand service. See chapter 7 for a full discussion of funding issues.

Each municipality receiving ADA complementary paratransit service through CCTA is assessed according to the percentage of total trips originating from each municipality during the most recently completed prior year of service. Member municipalities are charged 50% the net cost of service, while non-member communities are invoiced 100% of the net cost of service.

Relationship to GMTA

In 2003, Wheels Transportation, a private, non-profit agency that had operated public transportation service in Washington County, went bankrupt, and CCTA was asked by VTrans to restore and manage service. A new non-profit known as the Green Mountain Transit Agency was formed, and it has been operating under the supervision of CCTA since that time. What now makes up GMTA was taken over by CCTA in stages: Capital District in 2003, Mad Bus in 2004, Stowe/Lamoille in 2004, and Franklin/Grand Isle in 2009.

GMTA has its own Board of Directors, but the Executive Director and several senior managers are CCTA employees. All planning work for GMTA is also done by CCTA staff. The shared resources between the two agencies has led to a high degree of coordination of services. The interregional commuter routes operated by CCTA, the LINK Express routes, connect to local services in St. Albans and Montpelier. Coordinated schedules and fare policies have allowed for improved regional accessibility for residents and employees of Washington, Chittenden and Franklin counties.

Due to Act 71 of the 2010 legislative session, as of July 1, 2011, CCTA and GMTA will be merged into one legal entity. From that time, CCTA will operate all services in the GMTA service area, initially doing business as GMTA. Rural public transportation funds that currently flow from VTrans to GMTA will instead flow to CCTA to fund its operations in the rural portion of its service area.

Key Partners

Public Sector

In the process of planning, implementing, and operating public transportation service in Chittenden County, CCTA has many partners. CCTA interacts with governmental bodies on four levels: federal, state, regional, and local. At the federal level, CCTA receives funding from and reports to the Federal Transit Administration (FTA), part of the US Department of Transportation. As a transit operator in a metropolitan area with more than 50,000 people, CCTA is a direct recipient of federal funds for operating and some capital expenses. In return, CCTA must comply with a long list of federal regulations and requirements—on which it is audited every three years—and report monthly and annual data as part of the National Transit Database. FTA provides funding through formula programs, competitive grants, and congressional earmarks. As of this writing, Congress is in the early stages of a new transportation authorization

bill that will set potential funding levels for the next five years. The amount of federal funding available will be a factor in how quickly the TDP can be implemented in the coming years.

The Vermont Agency of Transportation (VTrans) is the designated recipient of FTA funds for the State of Vermont and has responsibility for overseeing the non-urban public transportation program in the state. CCTA has some degree of independence from VTrans in that CCTA is also a direct recipient of FTA funds, but about one third of its federal capital funds and 10% of federal operating funds pass through the state. VTrans also provides state funding to CCTA for capital and operating expenses. These funds also serve as “local match” for the federal funds and make up some 10% of the capital budget and almost 25% of the operating budget. In the past, VTrans had paid for Short Range Transit Plans to be developed for all of the transit providers in the state, following a legislative mandate, but in 2009, VTrans decided to halt the process of producing new short range plans and reallocate the funds to other priorities. This TDP is being conducted by CCTA.

At the regional level, CCTA’s main partners are the Chittenden County Metropolitan Planning Organization (CCMPO) and the Chittenden County Regional Planning Commission (CCRPC). The CCMPO is the federally designated transportation planning organization for the Burlington metropolitan area and is responsible for producing the long range Metropolitan Transportation Plan (MTP) and the short range Transportation Improvement Program (TIP), both of which cover all surface transportation modes. The transit element of the the MTP and the TIP are closely related to this TDP, as the TDP will serve as the source for projects to be fed into the federally-mandated documents produced by the CCMPO. The CCRPC has planning responsibilities beyond transportation, including housing, water, sewer, land use, etc., and the great majority of the regional transportation planning activities occur at the CCMPO and at CCTA. All federal funding for public transportation flows to CCTA as a result of planning and programming completed by the CCMPO.

The service area for CCTA is all of the cities and towns in Chittenden County, but eight of these municipalities are members of the authority and are represented on CCTA’s Board of Commissioners. These member communities are Burlington, South Burlington, Winooski, Essex (including Essex Junction), Shelburne, Milton, Hinesburg, and Williston. Colchester is not a member, but does receive some fixed route service and pays separately for ADA complementary paratransit service for its residents. The local members are assessed fees that together fund about 25% of operations and 10% of capital expenditures, virtually the same level that the state provides. The Board of Commissioners, which includes two representatives from each member town, make CCTA policy and must approve the TDP and all major changes in service. CCTA works closely with city and town officials, planners, and the public in developing future service concepts and establishing supportive infrastructure on the roadway network.

Private Sector

A key private-sector partner for CCTA is the Special Services Transportation Agency (SSTA), a non-profit provider based in Colchester. CCTA contracts with SSTA to provide ADA complementary paratransit trips for those who cannot use fixed route bus service. SSTA also works with a number of human service agencies and Medicaid to provide demand response service in Chittenden County. The human service agencies and the Vermont Agency of Human Services are partners of CCTA in providing transportation for elderly and disabled residents of Chittenden County.

Over the years, CCTA has established relationships with important institutions in the Burlington area such as the University of Vermont, Champlain College, and Fletcher Allen Health Care (through the Campus Area Transportation Management Association, or CATMA), Saint Michael's College, and the New England Culinary Institute. These relationships allow members of these institutions to make better use of CCTA services and help to increase CCTA ridership.

CCTA works closely with Local Motion, Carshare Vermont, and other organizations that promote transportation alternatives. Through CCTA's Smart Business program, it works directly with employers to promote transit use among commuters in the regional core.

The final partner is the population of CCTA riders, including daily users and infrequent users. For some, CCTA is an absolute necessity and for others it is a convenient choice. Service changes and expansions in the TDP are generally geared toward serving as many riders as possible, in as convenient a way as possible, given scarce resources. There are also service improvements proposed for specific populations to meet essential mobility needs.

Hierarchy of Public Transportation Services

Public transportation in its broadest conception includes a wide array of services from a taxi ride or carpool with two passengers, up to a high-volume, high-performance transit such as bus rapid transit or rail that can carry hundreds of passengers in the peak hour.¹ The following list describes the various levels in this array in ascending order and provides some indication of the type of market and the level of demand for which the levels are appropriate. In many cases, a service offered in one level of the array can be seen as building a market for higher level services that follow it.

1. **Volunteer Driver** – Many areas in Vermont, Maine, and other states have established volunteer driver programs, by which individuals use their own cars to transport other people who have requested a ride. Often, these trips are for medical appointments, such as kidney dialysis. Some drivers request reimbursement for mileage at the standard

¹ For the purposes of this discussion, water transportation and intercity modes of travel—such as air, intercity rail, and intercity bus—are not included.

federal rate (currently 50 cents per mile). These trips are usually arranged through a non-profit or government brokerage, and are the most cost-effective means of providing these essential transportation services.

2. **Taxicab** – Available to all at a fee, typically used infrequently for a given trip because of the high cost per mile. CCTA could be involved with taxi transportation as a broker of trips, as has occurred in the past with some rides for people with disabilities. CCTA discontinued the use of taxis for ADA trips when it became more cost effective to have SSTA provide these trips using newly-purchased sedans.
3. **Carpools** – The simplest form of shared-ride transportation. Often occurs within a household or between acquaintances, but can be organized through a ridematching pool or website. Typically includes up to three passengers all headed to a single destination (such as a workplace) from a common area.
4. **Vanpools** – When larger groups of people (up to 15) are headed to a single destination, they can meet up in a neighborhood or at a park-and-ride lot to form a vanpool. Vanpools are currently facilitated by the State of Vermont through the GoVermont program, but CCTA organized these and provided the vans until October 2008. Vanpools are almost exclusively associated with commuting trips.
5. **Demand response service** – Low-volume general purpose transportation is best served by “demand response” service, which, as the name implies, responds to a particular demand for a trip. Virtually all of the current demand response transportation in Chittenden County is oriented toward seniors and people with disabilities, but general public “dial-a-ride” service is available elsewhere in Vermont and in many locations around the country. This type of service is appropriate for lower-density areas where there is not enough passenger demand to warrant a regularly scheduled service. Service can be provided by a non-profit agency using vans or sedans or a taxi company, working through a dispatch/brokerage office that takes in requests for trips from the public and assigns them to particular drivers and vehicles. The drivers could also be volunteers who use their own vehicles (see number 1 above). The broker attempts to use the lowest cost option to meet the need of the rider.
6. **Commuter bus peak only** – The minimal level of bus service that would typically be provided is two trips inbound in the morning and two trips outbound in the afternoon, possibly with a small bus (30 feet or less). Such a route could serve a town center or two and park-and-ride lots along the way. Total ridership would need to number at least 80 daily to make the service viable (roughly 20 passengers per bus trip). With a typical market penetration of about 5%, there would need to be at least 800 commuters who be in the service area of the route (accessible to the origin end and having a destination within walking distance of places served by the route in the urban core).
7. **Commuter bus expanded service** – Additional trips for a commuter service would be warranted to the extent that demand exceeds the market of 800 commuters, or if there is demand in both directions (so that buses would be carrying passengers outbound in the

morning as well as inbound). A third and fourth peak period round-trip would be added first, followed by midday service.

8. **Full day service** – Regular full day service (6:00 a.m. to 7:00 p.m.) on weekdays is warranted when there are enough generators along the route to create demand for non-work trips as well as commuting trips. The minimum level of service would be 30 minutes during the peak periods and 60 minutes in the midday. Total corridor ridership would need to exceed 250 on a weekday to make this service viable.
9. **Extended weekday service** – Extension of service into the evening hours (until 9:00 or 10:00 p.m.) is warranted depending on the type of generators along the route and the level of demand. Daily ridership of at least 400 would be needed to make extended service viable. This would typically be coupled with a higher level of service during the midday period (every 30 minutes instead of every 60).
10. **Saturday service** – If a route serves retail generators or employers that are open on Saturdays, then Saturday service on the route would be justified. Saturday ridership is typically about 50% of weekday ridership, thus a demand of at least 200 passengers would be needed to make the service viable.
11. **Frequent peak service** – Major commuting corridors can support service at a higher level during peak periods. Service every 15 minutes is considered to be the minimum needed to draw people out of cars and onto public transportation. Corridor ridership would exceed 1,000 per weekday for such a route.
12. **Sunday service** – Once Saturday service has been established and is successful, Sunday service can be considered. Sunday ridership is typically half of Saturday ridership, or only about 25% of weekday ridership. Thus, weekday demand of 1,000 would translate into enough Sunday demand to make the service viable.
13. **Upgraded corridor service** – After improvements in peak and midday frequency have been implemented, elements of bus rapid transit can be applied to a corridor. These can include further improvements in frequency (to 10-minute headways), improved passenger facilities (enhanced shelters), technology applications (such as real-time passenger information), and roadway priority treatments such as transit signal priority and queue jump lanes (to allow buses to bypass congestion at intersections). Corridor ridership approaching 2,000 passengers on a weekday would justify these investments.
14. **Bus rapid transit** – A full application of bus rapid transit, including those elements listed above plus branding, articulated vehicles, further upgrades in the service level, some exclusive right of way, and enhanced passenger stations, would be warranted as ridership in a corridor approaches 5,000 passengers on a typical weekday. This could also involve a limited-stop overlay on regular local service to allow passengers a faster trip.
15. **Rail** – Rail transit can take several forms, including commuter rail with traditional locomotive-drawn trains, commuter rail with self-propelled cars (known as diesel multiple units, or DMUs), streetcars or light rail powered by overhead catenary, and heavy rail rapid transit. Each of these forms of rail requires a substantial investment in

right of way, track, facilities and equipment, and they have much higher operating costs than bus transportation. Full day ridership in a corridor needed to justify this investment ranges from 7,000 and higher, depending on the form of rail service. Commuter rail, which is typically operated only during peak periods, is appropriate for corridors with very large worktrip demand and a high degree of road congestion so that the travel time advantage of rail is maximized. It also works best when the worktrip destinations are concentrated at the end of the rail corridor within easy walking distance of the terminal. Peak hour, peak direction trips would need to exceed 1,000 to make the service viable, though even at this level it would not be as cost effective on a per passenger basis as bus transportation. Light rail typically operates more like a bus, with lower speeds and more frequent stops, and is appropriate for a corridor with a high level of demand all day and with multiple generators along the corridor. Most light rail systems in the US have weekday ridership of at least 7,000 passengers, with the exception of some very short trolley and streetcar routes which tend to be oriented toward tourists. Heavy rail rapid transit is only seen in major metropolitan areas, usually operating in a subway or on elevated tracks.

As CCTA's current services are described in chapter 2 and new services recommended in chapter 6, their relationship to this hierarchy will be identified.