

# CORRIDOR SYSTEM PLAN



**ITS** CORRIDOR SYSTEM

# **CORRIDOR SYSTEM PLAN**

## **Staff Recommendations**

Charlotte Area Transit System

600 East Fourth Street

Charlotte, NC 28202

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# 1.0 SYSTEM PLAN RECOMMENDATION

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The Charlotte Area Transit System (CATS) and the Charlotte-Mecklenburg Planning Commission staff are recommending this transit System Plan in order to implement an integrated land use and transit strategy that supports the continuation and enhancement of Charlotte-Mecklenburg's quality of life and adopted vision for future development. The Charlotte-Mecklenburg region is thriving, with people and jobs coming to the area in record numbers. In order to accommodate that growth in a way that will enhance rather than detract from the region's economy and appeal, land use decisions and transportation improvements must be carefully evaluated and jointly planned.

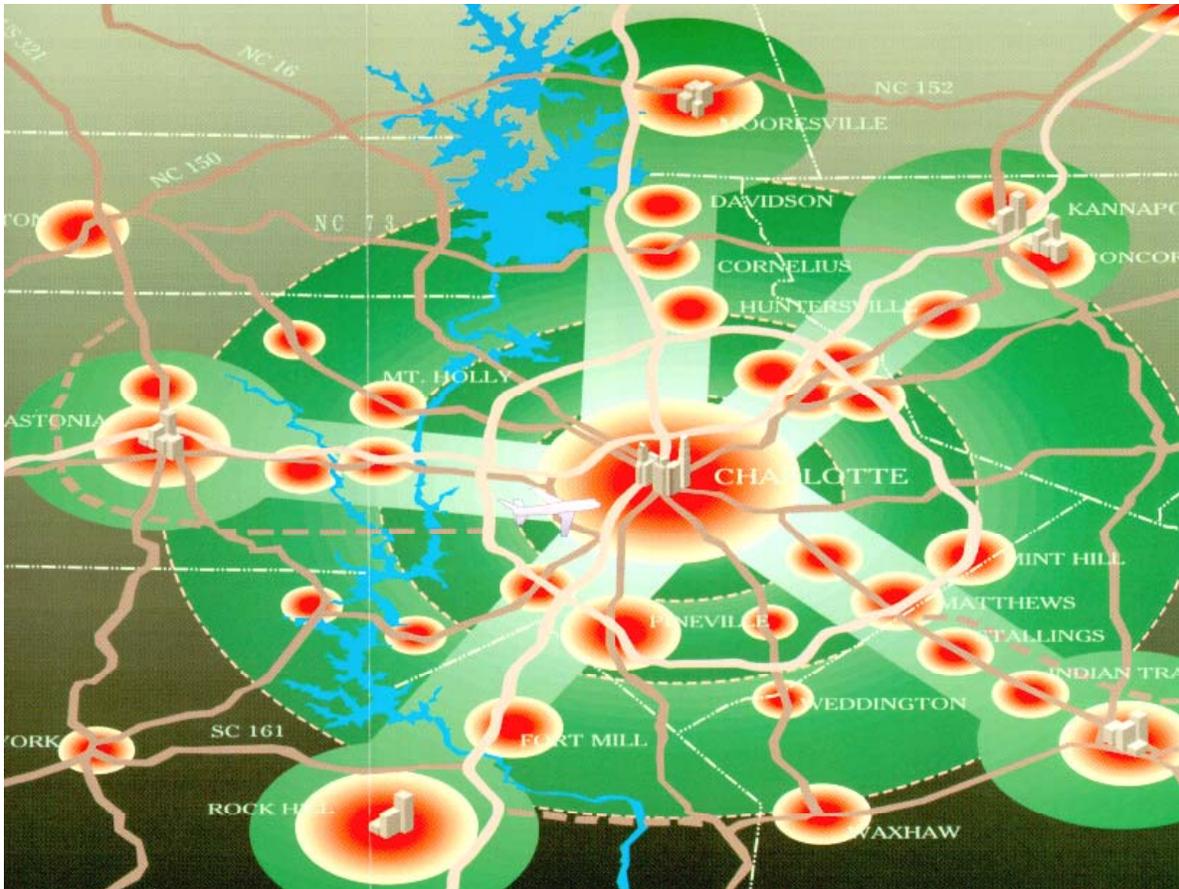
Local officials and citizens have been working together to develop and define those plans for several years. In 1994, the City of Charlotte and Mecklenburg County approved the *Centers and Corridors* vision, a comprehensive guide for future land use and development in the region. The plan established that future development and redevelopment in the region would be focused along five major transportation corridors, shown in **Figure 1-1**. These corridors were identified as strong candidates for transit service and transit-oriented development:

- North Corridor
- Northeast (University Corridor)
- South Corridor
- Southeast (Independence Corridor)
- West (Airport Corridor)

In support of the *Centers and Corridors* vision, the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg* was completed in 1998. A key element of this plan was the development of a regional rapid transit system that would improve mobility, encourage more compact development, and support the proposed land use initiatives in each of the above growth corridors. Building on the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg*, four corridor Major Investment Studies (MIS) were conducted by the Charlotte CATS and the Charlotte-Mecklenburg Planning Commission for the North, Northeast, Southeast and West corridors. The purpose of the Major Investment Studies was to analyze alternative transit improvements in each corridor and use the information to recommend an overall System Plan that includes an alignment and technology recommendation (Locally Preferred Alternative – LPA) for each corridor. The transit improvements recommended in each corridor are to support land use objectives for the corridors.

**This System Plan ties together recommended improvements in the five transit corridors and Center City Charlotte as an integrated system to support the land use objectives and address mobility needs within available financial resources.**

In addition to the recommended transit System Plan for 2025, an implementation plan is presented that identifies the phasing of when specific components of the Plan should be in place. More importantly, a Financial Plan is also presented to demonstrate how the cost of the System Plan – both to build the capital projects and to operate and maintain the services and facilities – could be financed through a combination of operating revenues, local sales tax revenue, Federal Transit Administration (FTA) and North Carolina Department of Transportation (NCDOT) grants, and other local, state, federal and private sources.



**Figure 1-1: Map of Centers and Corridors Concept for Charlotte-Mecklenburg Region**

## 1.1 System Plan Principles

In October 2001, a set of principles was adopted by the Metropolitan Transit Commission (MTC) to assist in evaluating the overall transit System Plan, including the specific components in each of the corridors. These principles are derived from those that underlie the *Centers and Corridors* vision, the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg*, the *Center City 2010 Vision Plan*, and the needs of a System Plan for the Charlotte-Mecklenburg region. The principles on which this plan is based can be summarized as follows:

### *Land Use*

The primary purpose of the public transit system is to support the region's land use vision. Making Charlotte-Mecklenburg's future transit system successful will require developing land uses in a manner that enables decisions that encourage residents to use transit as an alternative for their daily and occasional travel. Transit Oriented Development (TOD) around transit stations will help sustain economic growth and vitality within close proximity to the stations while contributing to the enrichment of the Center City and key activity centers.

### *Mobility*

Mobility has several components. One is ridership, both in terms of how many people will ride new services and how many new transit trips are attracted away from autos. Reducing auto use lowers congestion, air pollution and energy consumption. Mobility also includes serving a

variety of travel markets, such as work trips or off-peak travel or people who are dependent on public transit. Mobility involves improving access to selected areas, providing savings in travel times, and improving service reliability.

### ***Environment***

One of the elements of this principle is to promote Charlotte-Mecklenburg’s air quality goals and minimize disruptions to communities, natural areas and cultural resources. This principle also involves not creating undue adverse effects on communities or neighborhoods.

### ***Finance***

The level of investment in terms of capital costs to build the improvements and the ongoing operating and maintenance expenses should be balanced by the capacity of operating and local sales tax revenues and federal, state, private, and other potential revenue sources. Because many of the federal and state revenue sources are grants and appropriations could be limited, the ability of certain improvements to attract federal and state grants and opportunities to leverage CATS investment with other projects is an important consideration.

### ***System Development***

Each corridor is part of a larger system, as are CATS bus services. The alignment and transit technology solution for a given corridor should be balanced against its ability to operate as part of an overall system, including considerations of passenger distribution within Center City Charlotte, provision of through-service between corridors of the region, and balanced use of system capacity.

## **1.2 Recommended Transit Technologies**

A variety of types of transit are recommended for the System Plan and corridor-specific improvements, as no single transit mode or technology can serve all the particular land use and mobility needs and opportunities of the region.

- **Light Rail Transit (LRT)**. Powered by an overhead electric line, LRT typically operates in exclusive rights-of-way serving stations that can be spaced as close as a mile apart. LRT also can operate in mixed traffic on tracks embedded in the street.



*Light Rail Transit*



*Bus Rapid Transit*

- **Bus Rapid Transit (BRT)**. BRT is similar to LRT in that it can employ exclusive “busways” with on-line stations and off-vehicle ticketing for fast, convenient service. Because buses can operate outside the busway, they are able to travel through neighborhoods picking up passengers at local stops and then enter the busway to take advantage of its higher speed and reliability.

- Enhanced Bus. Enhanced Bus refers to buses operating with several of the features of BRT including enhanced bus stops, off-vehicle ticketing, and more frequent service. The use of bus guideways could be limited to locations of severe highway congestion or where a lack of available streets necessitates guideway construction.

- Commuter Rail. Typically this mode serves longer distance trips and stations spaced two to five miles apart. It consists of locomotives pulling or pushing two or more commuter cars. Diesel Multiple Units (DMU) is a form of commuter rail technology that employs self-propelled passenger cars that can operate singly or as trains of several cars. DMU technology is used when there are shorter distances between stations and where there are no potential conflicts with freight trains.<sup>1</sup>



*Commuter Rail*



*Streetcar*

- Streetcar. This is the 21<sup>st</sup> century's version of the early 20<sup>th</sup> century streetcar. Innovations in vehicle design and in-street construction techniques have shown that this mode can be a viable option for corridors that have high bus patronage. Modern streetcars are smaller and lighter than LRT vehicles and operate similar to a bus with passengers getting on and off at frequent stops along the street rather than at stations, but hold a greater number of passengers than bus.

- Buses. Local bus service that operates along local streets with curbside bus stops and express bus service that operates from suburban park-and-ride lots to Center City will continue to be the mainstay of the CATS transit system. CATS will be expanding these services throughout the region to meet the travel needs of the growing population and employment. As rapid transit services are instituted in the corridors, the bus service will be adjusted to connect at the rapid transit stations and reduce redundant services.



*CATS Bus*

- Paratransit and Other Services. While the above services will accommodate the vast majority of riders, CATS will also expand its other important services, such as neighborhood shuttles, employment center shuttles, Special Transportation Services, vanpool and carpooling services.

### 1.3 Recommended System Plan

The recommended transit System Plan consists of multiple rapid transit improvements in five corridors, a series of improvements in Center City Charlotte, and bus service and facility improvements throughout the rest of the region. Rapid transit guideway services will extend from Charlotte's Center City to I-485 in order to intercept persons traveling into Mecklenburg

<sup>1</sup> The Federal Railroad Administration has not as of yet approved any DMU for mixed operation with freight trains in the U.S.

County and to improve regional connectivity. Two transit guideways are proposed to extend beyond Charlotte-Mecklenburg – to Iredell County in the North Corridor and Cabarrus County in the Northeast Corridor. All recommendations are designed to leverage transportation investments already completed or underway in the corridors.

The Center City improvements are designed not only to serve travel within the central business district but also to provide and enhance transit connectivity between the corridors. These improvements will benefit the entire region by enabling the individual corridors and local services to function as an integrated system.

The recommended rapid transit improvements in the corridors are based on the alternatives developed and evaluated in the recently completed Major Investment Studies for the four corridors. However, the rapid transit alternatives analyzed in the Major Investment Studies have been modified in developing the System Plan for reasons of operational and service integration (i.e., the corridor components should work as part of a system) and financial resources constraints. In describing the specific components of the recommended System Plan, elements that are modifications of the alternatives considered in a corridor MIS are noted.

### ***Plan Summary***

The System Plan (**Figure 1-2**) is expected to serve 205,000 - 215,000 daily transit riders in 2025, compared to 50,000 today. It would have 28 miles of BRT, 21 miles of LRT, 11 miles of streetcar and 29 miles of commuter rail. This is in addition to an extensive network of bus and other types of transit services throughout the region. The cost of building, equipping, operating and maintaining the recommended rapid transit system and the entire CATS system is discussed in Section 5.0.

The components of the recommended System Plan are described below:

#### ***South Corridor – LRT to I-485***

LRT was selected as the Locally Preferred Alternative for the South Corridor in 2000. LRT will be implemented from Seventh Street in Center City along the former freight right-of-way, sharing the tracks with the vintage trolley operations. From Tyvola Road south to I-485, the LRT line will parallel the Norfolk Southern right-of-way.

#### ***North Corridor – Commuter Rail to Mooresville & Enhanced Bus Service on I-77 HOV Lanes***

The North Corridor extends from Mooresville in Iredell County to Center City Charlotte. The corridor will employ two rapid transit components: Commuter Rail serving the eastern portion of the corridor; and Enhanced Bus serving the western portion.

Commuter Rail service will run on the Norfolk Southern “O” line from a station north of downtown Mooresville to the West Trade Multi-Modal Station in Center City Charlotte, where passengers will be able to use either high frequency bus services, a streetcar operating along Trade Street, or the proposed Center City Loop Streetcar for access and distribution in Center City and connections to other corridors. This recommended line that includes 11 stations is a modified version of the Commuter Rail and DMU alternatives considered in the North Corridor MIS. The recommendation in the System Plan has a lower capital cost and focuses service during peak periods with limited off-peak service, more typical of commuter rail service. The line will be designed to enable other stations considered in the MIS to be added at a later time. The service will be provided by either bi-level commuter rail coaches hauled by locomotives or, if available for use on rail freight lines, DMU vehicles. A decision on which vehicle technology to use will be made during Preliminary Engineering (PE) for this corridor.

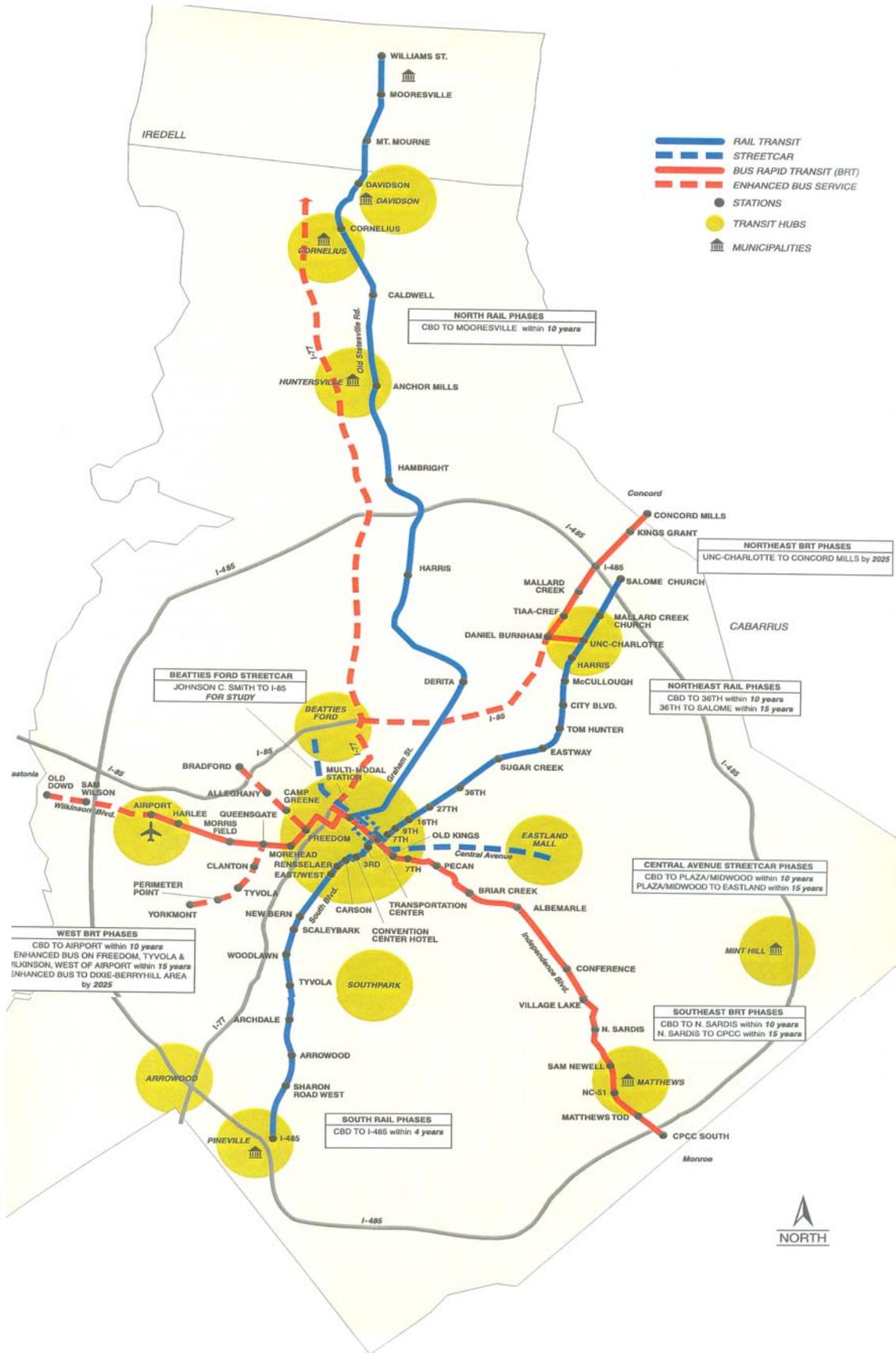


Figure 1-2: System Map

Enhanced Bus service will operate from southern Iredell County, as well as from several places in northern Mecklenburg County to Center City Charlotte using Trade Street to access both the Multi-Modal Station and the Charlotte Transportation Center. The North Corridor Enhanced Bus will operate from various park-and-ride lots and use the median HOV lanes on I-77, which are being constructed by NCDOT as part of the I-77 widening project. Use of these lanes, complemented by additional park and ride lots, eliminates the need to build separate bus guideways that were examined in the North Corridor MIS.

The extension of rapid transit services into Mooresville and Iredell County depends upon these jurisdictions financing not only the local share of required capital improvements within their area, but also the appropriate share of ongoing operating expenses.

### ***Northeast Corridor – LRT to I-485 & BRT in Kings Grant/University Research Park***

The Northeast Corridor extends from Concord Mills in Cabarrus County through the UNC-Charlotte/University Research Park area to Center City Charlotte. Both LRT and BRT services are recommended to serve the many mobility needs of the corridor.

The Northeast Corridor LRT would be an extension of the South Corridor LRT from its currently planned terminus at Seventh Street in Center City Charlotte to a terminal station at I-485. The LRT will use the existing North Carolina Rail Road (NCRR) right-of-way from Center City Charlotte to 36<sup>th</sup> Street, transition over to a US-29 alignment around Sugar Creek Road and stay in US-29 through the University City area past UNC-Charlotte to I-485. The Northeast LRT line also will serve intra-corridor trips as well as trips made by persons living in the South Corridor (and other corridors) traveling to reach jobs and activities out in the Northeast Corridor, particularly in the UNC-Charlotte and University Research Park area.

The BRT component of the Northeast Corridor recommendation would consist of guideways focused on the portion of the corridor beyond Harris Boulevard, the King's Grant/Concord Mills area in Cabarrus County as well as the dispersed destinations of the University Research Park. The BRT bus improvements would consist of BRT stations and guideways where needed to bypass congested roadways or to provide dedicated access to certain areas. Otherwise the buses will use the available roadway system. This is a reduced version of the BRT alternatives considered in the Northeast Corridor MIS, which lowers the capital construction costs. If needed to maintain high-quality service and operational reliability, additional guideways could be built later. Bus services will operate in the outer portions of the corridor and provide connections to the LRT at UNC-Charlotte, while selected bus routes will continue along I-85 into Center City Charlotte and operate along Trade Street to access the two transportation centers.

The extension of rapid transit services into Cabarrus County depends upon the jurisdiction financing not only the local share of required capital improvements within its area, but also the appropriate share of ongoing operating expenses.

### ***Southeast Corridor – BRT to I-485 and Streetcar Service to Eastland Mall area***

The Southeast Corridor extends approximately 13 miles from the Mecklenburg County's border with Union County into Center City Charlotte. The first ten miles are in the City of Charlotte while a portion of the remaining three miles is in Matthews. Both BRT and streetcar services are recommended to serve this corridor.

BRT would operate along Trade Street in Center City to Elizabeth Avenue to Independence Boulevard. At Krefeld Drive in the Crown Point area, the alignment would shift over to the "Midline" alignment along the future Independence Point Parkway to Matthews and would end at

I-485, providing 13 stations. The project includes special ramps and overpasses to enable buses and passengers from surrounding communities to access the BRT guideway and stations as well as enabling stations to be located close to major attractions. The BRT guideway provides high-speed rapid transit via the Independence Boulevard portion of the corridor for commuter trips destined to Center City Charlotte and connections to other corridors along Trade Street. The BRT line also serves intra-corridor trips to the many attractions and institutions along Independence Boulevard.

To complement the BRT line, the Trade Street Streetcar recommended in the Center City Plan would be extended along Hawthorne Lane and Central Avenue, the region's busiest bus corridor, to Eastland Mall. During the Southeast MIS, LRT service along Central Avenue was considered because of high transit usage along this corridor. Although LRT service with stations along Central Avenue was eliminated because of the street's narrow right-of-way and minimal building setbacks, the introduction of lower-cost, less intrusive streetcar service is appropriate because of high bus ridership. The extension of streetcar services to Plaza-Midwood and Elizabeth also would connect these neighborhoods to Center City Charlotte. **Figure 1-3** illustrates potential streetcar service along Central Avenue near The Plaza.



**Figure 1-3. Central Avenue Streetcar Concept**

***West Corridor – BRT to Airport on Wilkinson Boulevard, Enhanced Bus on Freedom Drive, along Clanton Road, West Boulevard and Tyvola Road to the Coliseum area, and on Wilkinson Boulevard west of the Airport***

The West Corridor extends approximately 12 miles from the Catawba River, the boundary between Mecklenburg and Gaston counties to Center City in Mecklenburg County. From a travel and development standpoint, the corridor has three “sub-corridors” defined by Freedom Drive, Wilkinson Boulevard, and Tyvola Road.

The recommendation for the West Corridor is for a BRT along Wilkinson Boulevard to connect with the future inter-modal center at the Charlotte-Douglas International Airport. The recommendation also includes Enhanced Bus service along Freedom Drive, Tyvola Road, and Wilkinson Boulevard west of the Airport. Enhanced Bus services would use the BRT guideway implemented along Wilkinson Boulevard in order to reach Center City Charlotte. The West Corridor’s bus lines would connect with other transit services in the Center City along Trade Street at the two transportation centers.

***Center City***

The recommended concept for the Center City, shown in **Figure 1-4**, includes:

- Two major facilities, the Charlotte Transportation Center and the West Trade Multi-Modal Station, designed to complement each other.
- Two spines, a north-south LRT spine along the trolley/railroad corridor and an east-west spine with a transit and pedestrian-oriented emphasis along Trade Street between Johnson C. Smith University with Presbyterian Hospital.
- New circulation services connecting Center City districts not only with each other but also with areas just outside of I-277, including streetcars along Trade Street extending east to Presbyterian Hospital and west to Johnson C. Smith University and the Center City Streetcar Loop.

The proposed elements of the Center City Plan<sup>2</sup> include:

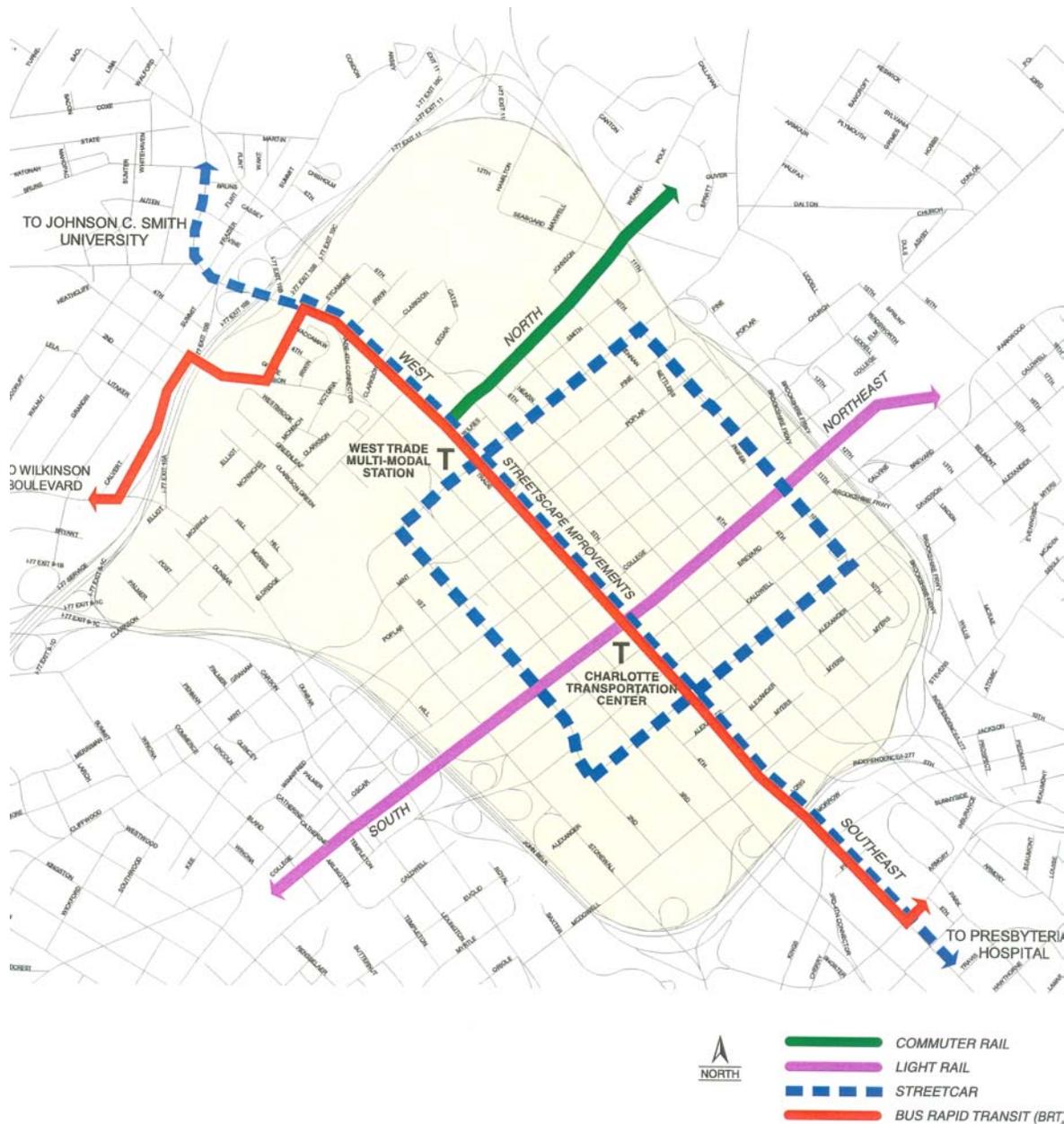
- Charlotte Transportation Center (CTC). The passenger platforms for the South Corridor’s proposed Center City LRT station will span Trade Street and extend parallel to the Transportation Center’s Transit Pavilion for approximately half of the block between Trade and Fourth streets. The LRT station’s current concept provides for passengers who wish to transfer between rail and bus modes to do so along Trade Street, just north of the Transportation Center.

In addition to the new Trade Street pedestrian connection, the LRT/CTC interface will be enhanced by:

- Creating a second level to the Transit Pavilion that will open to the northbound LRT passenger platform. Vertical circulation to the Transportation Center’s ground level will be inside the Transit Pavilion. This option offers a way to expand the customer service functions currently located in the ground floor of the Center’s Transit Pavilion to the same elevation as LRT operations.

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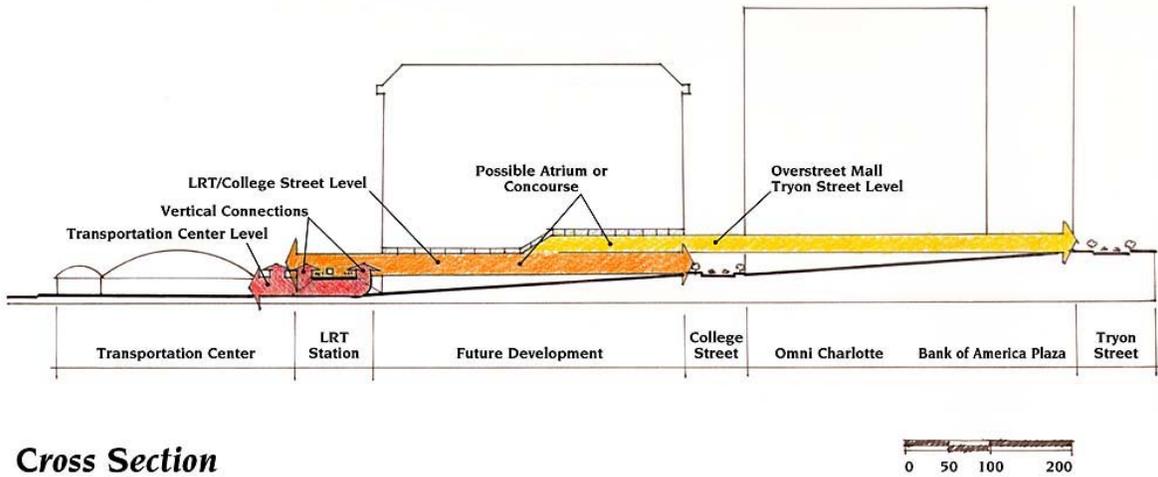
<sup>2</sup> Further information on the development and specifics of the recommendations for Center City can be found in the Center City Plan Report (September 2002).



**Figure 1-4. Center City Transportation Plan**

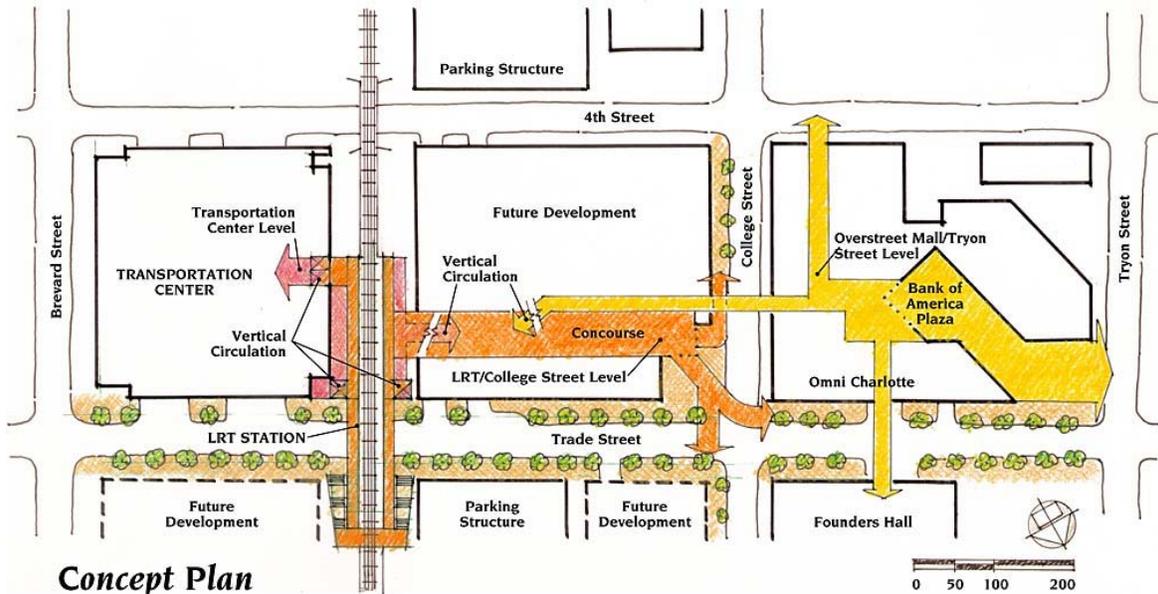
- Providing vertical circulation (elevators, escalators, etc.) at the southern end of the LRT passenger platforms to the ground level of the Center’s Transit Pavilion. The Transportation Center was designed to connect from the Pavilion’s passenger waiting area to the area below the LRT platforms. **Figure 1-5** provides a cross-section of this connection and also shows how the Transportation Center could be connected to future re-development of the old Convention Center, enhancing pedestrian access to College Street. The Transportation Center could be connected to the Overstreet Mall walkway at College Street, creating the perception of a “front door” to the Transportation Center from Tryon Street. **Figure 1-6** illustrates this pedestrian connection from a concept plan view.

- Potentially modifying the layout and operations of the Transportation Center to accommodate the increased number of buses and passengers that will be using the facility in the future.



**Cross Section**

**Figure 1-5. Potential Pedestrian and Transit Links (Tryon/College to CTC)**



**Concept Plan**

**Figure 1-6. Connection of Transportation Center to LRT and Tryon Street**

West Trade Multi-Modal Station. While NCDOT is leading the planning and design effort for the Multi-Modal Station on West Trade Street, the Center City component of the recommended System Plan envisions that the facility will be designed to facilitate intra-regional and inter-regional travel by CATS passengers with both intercity rail and bus services. Trade Street will be improved to a high-quality, pedestrian-friendly environment similar to the urban design treatment already implemented along Tryon Street. The street will accommodate a combination

of pedestrians and transit services. The Multi-Modal Station will allow commuter rail passengers to walk above Trade Street to access the platforms located on the north side of Trade Street. There also will be excellent vertical circulation from the commuter rail level to passenger platforms on the south side of Trade Street.

In addition to the aforementioned passenger platforms located along both sides of Trade Street, CATS would utilize 16 to 20 bus bays, located inside the station within the block between Trade and Fourth streets. As part of the creation of a second transportation hub in the CBD, express transit services serving east and south Charlotte would originate and terminate at this location on West Trade Street.

North – South LRT Spine. Under the recommended System Plan, the North-South LRT spine will directly link the South and Northeast Corridors. Implementation of Northeast LRT service will be accomplished incrementally by extending the South Corridor LRT line along the NCR. The Northeast Corridor LRT line would include a new station at Ninth Street, just beyond the last station on the South Corridor LRT line. LRT trains will be through-routed between the South and Northeast Corridors, providing direct LRT connections between opposite ends of Mecklenburg County. The interconnection of the Northeast and South Corridors also permits LRT vehicles operating along the Northeast line to be maintained at the new LRT maintenance center near South Boulevard and Clanton Road. This facility has been designed with additional capacity for LRT service expansion. Pedestrian, bicycle, and urban design elements included in the design of the South Corridor would be extended into the Northeast Corridor.

East – West Streetscape/Transitway along Trade Street. Under the recommended System Plan, Trade Street would receive streetscape improvements similar to Tryon Street. This includes shaded/protected passenger waiting areas, comprehensive transit way finding information and more street furniture and landscaping.

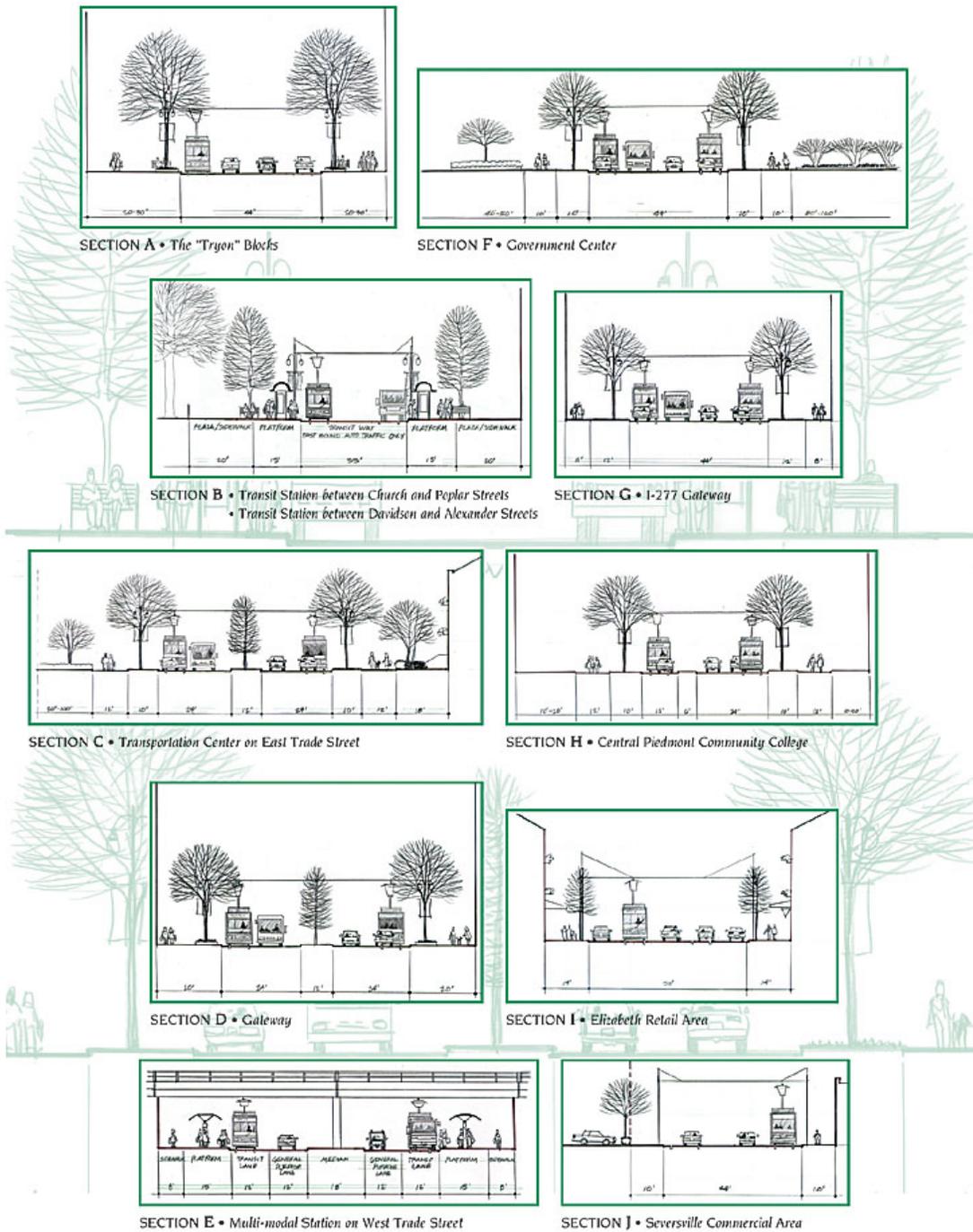
**Figure 1-7** illustrates a possible design concept for Trade Street from Johnson C. Smith University to Presbyterian Hospital. **Figure 1-8** illustrates possible cross-sections along Trade Street based on adjacent land uses. This preliminary design concept eliminates non-transit vehicles from selected blocks along Trade Street in order that transit passengers using buses and streetcars can be well served. **Figures 1-9** and **1-10** are sketches indicating how Trade Street could be transformed to create a memorable transit and pedestrian experience within the Center City.

The recommended System Plan includes use of the Trade Street transitway by BRT services from the Southeast and West Corridors. The through routing of BRT buses between these two corridors also provides frequent connections to the Charlotte Transportation Center and the West Trade Multi-Modal Station. CATS' local bus routes also will operate along Trade Street, maximizing use of the street's amenities for local and corridor riders.

Circulation within Center City Charlotte. Several types of transit technology will provide circulation within the Center City.

The System Plan includes streetcar operations along Trade Street. The recommended streetcar services are similar to the system implemented during 2001 in Portland. Operation of the streetcar along Trade Street would further enhance this street as a pedestrian/transit way. Passenger waiting areas will be designed not only for BRT/local bus services but also for streetcar operations.





## Cross Section Variations

# Streetscape Considerations for Trade Street

CHARLOTTE, NORTH CAROLINA

Parsons, Brinckerhoff, Quade & Douglas, Inc.  
LDR International, an HNTB Company

Figure 1-8. Trade Street Cross Sections



**Figure 1-9. Conceptual Rendering of Trade Street Between Church and Poplar Streets**



**Figure 1-10. Conceptual Rendering of Trade Street Between Davidson and Alexander Streets**

An extension of the streetcar service on Trade Street is recommended beyond the Center City along Elizabeth Avenue to Presbyterian Hospital and along Hawthorne Lane and Central Avenue to Eastland Mall. Route 9 Central Avenue is the most heavily used local bus route in the CATS system. The larger capacity of the streetcar will reduce the number of buses needed to meet travel demand in the Central Avenue corridor.

The expansion of streetcar operations further west along Trade Street and Beatties Ford Road also should be studied for future implementation. The North Corridor MIS considered operation of rapid transit services in the Beatties Ford corridor. Extensions of streetcar services to Johnson C. Smith University and north to the proposed Beatties Ford Road transit hub would connect the Seversville, Biddleville, McCrory Heights, Washington Heights, Lincoln Heights and University Park neighborhoods to Center City Charlotte.

## **1.4 How the Recommended Plan Fulfills System Principles**

Section 1.1 reviewed the principles upon which the System Plan is based. This section compares corridor components of the recommended System Plan to these system principles and provides the rationale for the selection of corridor elements.

### ***Center City***

The Center City components are designed to integrate the corridor components together as a system, promote inter-corridor travel and provide circulation and distribution throughout the Center City and adjoining communities and institutions. The recommended Center City Plan is consistent with the *Center City 2010 Vision Plan* and will support and enhance the growth projected for the Center City over the next 25 years and beyond. The components of the Center City Plan will facilitate access to Center City locations and enhance mobility within the area. They also will serve to improve transit system efficiency and enhance the convenience of transit for trips that pass through the Center City area.

### ***North Corridor – Commuter Rail to Mooresville and Enhanced Bus Service along the I-77 HOV Lanes***

Land Use. North Corridor Commuter Rail service supports and facilitates the implementation of adopted land use regulations and policies of Charlotte, Davidson, Huntersville, and Cornelius. Rail serves future development potential east of I-77 and the “O” line whereas Express Bus serves development west of I-77. Because of their respective locations in the corridor, BRT or Enhanced Bus along I-77 alone would not support TOD as effectively as Commuter Rail service along the “O” Line.

Mobility and Operations. The combination of Commuter Rail and Express Bus service supports regional mobility needs of both the east and west portions of the corridor. If only Commuter Rail or Enhanced Bus were implemented, less of the corridor mobility needs would be served. Because of the extended length of the corridor (29 miles) and less frequent stops, rail service would be an efficient transit alternative for commuters to Center City Charlotte.

Environment. There are no environmental issues that distinguish among the alternatives.

Finance. The Commuter Rail recommendation is a lower cost option from the commuter rail alternative considered in the North Corridor MIS. The estimated capital cost (in inflated dollars) is \$207 million. The recommendation also scales back the amount of service provided throughout the day, especially during off-peak periods, also lowering operating costs.

Commuter Rail service would operate on the available Norfolk Southern “O” Line. Although this rail line needs to be upgraded, it is a less expensive alternative than building a new guideway along a new right-of-way. Similarly, expanding Express Bus services along I-77 leverages NCDOT’s investment in the HOV lanes, enabling provision of improved transit service at minimal capital cost.

System Development. North Corridor Commuter Rail service would terminate in Center City Charlotte at the West Trade Multi-Modal Station where passengers could connect with the Southeast Corridor-West Corridor BRT, other bus services and the streetcar line using Trade Street. Enhanced Bus services from the North Corridor also could operate along Trade Street in the Center City.

***Northeast Corridor – LRT to I-485 & BRT in Kings Grant/University Research Park***

Land Use. The LRT recommendation yields more land use and economic redevelopment advantages over the BRT alternatives that would operate along I-85, due in part to the amount of auto dependent development that has occurred at I-85 interchanges.

Mobility and Operations. The recommendation includes LRT and BRT components that work together to serve the multiple markets in the corridor. The LRT line provides a line haul service from the corridor to Center City Charlotte and to the South Corridor as well as serves reverse trip market consisting of jobs and activities in the University/Research Park area. The BRT component acts as a local collector-distributor for the LRT service. It also serves the dispersed development pattern of jobs and households in the outer corridor including University City, University Research Park, and King’s Grant/Concord Mills.

Environment. There are no environmental issues that distinguish among the alternatives.

Finance. Because the Northeast recommendation contains both LRT and BRT components to serve the varied travel markets in this corridor, improvements in the Northeast Corridor are estimated to cost \$578 million (in inflated dollars). While there are single LRT and BRT options that were considered, they do not provide the land use, mobility, and system development advantages of the recommended alternative. Because the Northeast Corridor LRT could be built an extension of the South Corridor LRT line, it improves the operational effectiveness and leverages public investment in the South Corridor rail line. Northeast LRT service would use the tracks, guideway and stations that will be built through Center City Charlotte and the storage, maintenance, and operations facility that is being built for the South Corridor.

System Development. As mentioned previously, Northeast LRT is an extension of South LRT service and facilitates through-service and inter-corridor trips from South Corridor. Because it is an extension of the South Corridor LRT, the Northeast LRT line could be built incrementally. In addition, the Northeast LRT intersects with east-west BRT, bus and streetcar service on Trade Street.

***Southeast Corridor – BRT to I-485 and Streetcar Service to Eastland Mall area***

Land Use. BRT service along the Independence Boulevard-Independence Point Parkway alignment serves high levels of existing jobs and housing development as well as numerous special generators such as the Cricket Arena, Ovens Auditorium and CPCC Main and South Campuses. The BRT line supports redevelopment opportunities in the inner portion of the corridor as well as TOD in Matthews. The Central Avenue Streetcar connects Center City with Plaza-Midwood and a proposed transit hub in the Eastland Mall area. The primary goal of the

Eastland Area Plan is to provide support for new investment in the area and to demonstrate viable economic opportunities. To do this, one of the primary objectives is to encourage a multi-modal transportation system that accommodates pedestrians, bicyclists, automobiles and public transit.

Mobility and Operations. The recommended BRT alternative attracts the most riders (24,000 boardings) as well as the most new riders (almost 12,000 persons diverted from autos to transit). The existing bus lanes in the median of Independence Boulevard could be converted to a BRT facility with minimal modifications and transit service disruption. Conversion of the bus lanes to a LRT facility would displace transit service for two to three years and interrupt the trend of increasing bus ridership in this corridor. The Central Avenue Streetcar serves one of the busiest transit corridors currently in Charlotte and would reduce the number of buses needed to provide service. The combination of the BRT alignment to I-485 and the Central Avenue Streetcar serves the multi-faceted mobility needs of the corridor. The BRT serves both the longer distance trips from the Matthews and I-485 area to and from Center City Charlotte and the trips to the many special generators and attractions along the corridor. The Central Avenue Streetcar serves the shorter intra-corridor trips along Central Avenue as well as trips headed to Center City Charlotte.

Environment. There are no environmental issues that distinguish among the alternatives.

Finance. BRT is projected to attract more riders and new transit trips than even the best LRT alternative (15,800 riders per day and 9,000 new trips per day). BRT does this at a capital cost of \$212 million (in inflated dollars). The BRT recommendation takes advantage of the already constructed bus lanes in the Independence Boulevard median and leverages Independence Boulevard improvements already programmed by NCDOT to Idlewild Road by 2008. The Central Avenue Streetcar can reduce the operating cost of providing transit service in this corridor.

System Development. The BRT recommendation in the Southeast Corridor creates the east-west transit spine along Trade Street in Center City when coupled with the recommended BRT line in the West Corridor. By operating along Trade Street, Southeast BRT service would connect with the South-Northeast LRT spine at the Transportation Center, North Corridor rail at the West Trade Multi-Modal Station and the Trade Street Streetcars. The Central Avenue Streetcar is an extension of the proposed Trade Street Streetcar.

***West Corridor – BRT to Airport on Wilkinson Boulevard, Enhanced Bus on Freedom Drive, along Clanton Road, West Boulevard and Tyvola Road to the Coliseum area, and on Wilkinson Boulevard west of the Airport***

Land Use. The recommended BRT/Enhanced Bus improvements are along three “sub-corridors” - Wilkinson Boulevard, Tyvola Road, and Freedom Drive – and support more land development and redevelopment opportunities than the single-alignment alternatives that would only be along Wilkinson.

Mobility and Operations. Because it is implemented in three “sub-corridors,” BRT/Enhanced Bus provides greater transit service coverage and attracts more users (12,800 daily boardings) than the LRT alternatives (7,900 - 8,200 daily boardings) that operate along a single corridor. BRT/Enhanced Bus not only serves the existing transit dependent population but also attracts 5,300 new daily transit trips compared to the 3,100 new trips for LRT. As a combination, BRT guideway service along Wilkinson Boulevard and Enhanced Bus services elsewhere provide a higher level of transit service throughout the corridor, including the flexibility to serve both the

“front and back doors” of Charlotte/Douglas International Airport, the corridor’s major employment and activity center.

Environment. There are no environmental issues that distinguish among the alternatives.

Finance. The BRT/Enhanced Bus recommendation provides improved service in three sub-corridors at a capital cost of \$141 million (in inflated dollars).

System Development. Because it provides service along three “sub-corridors,” the BRT/Enhanced Bus recommendation provides an opportunity to connect to other corridors with multiple routes. By operating along Trade Street in Center City, West Corridor BRT service creates the east-west transit spine with the recommended BRT line in the Southeast Corridor. West BRT service would intersect with the South Corridor-Northeast Corridor LRT spine at the Transportation Center, the North Corridor rail at the West Trade Multi-Modal Station, and the Trade Street/Central Avenue and Center City Loop Streetcars.

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## 2.0 PLANNING CONTEXT FOR THE SYSTEM PLAN

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This chapter presents the goals and objectives, previous studies and plans that create the foundation for the vision and establish the principles for the development of the integrated land use plan and transit system. In addition, this is followed by a contextual description of the area, its land use and development trends and its transit system.

### 2.1 Goals and Objectives

Land use and development patterns are essential components in creating a successful transit system. Charlotte-Mecklenburg's adopted *Centers and Corridors Plan*, which identified five major transportation and development corridors, and the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg* provide the policy framework for the development of Charlotte-Mecklenburg.

The adopted *Centers and Corridors* vision identified a set of goals for the development of a transit system to support the land use vision:

- Sustain economic growth and vitality
- Expand ultimately to regional system
- Concentrate development in Center City and along Corridors and at key economic centers
- Combine Rapid Transit with enhancement of overall transit system

In addition to supporting these *Centers and Corridors* goals, the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg* established the following goals:

- Link the wedges to the corridors by an extensive feeder bus system so that every part of Charlotte-Mecklenburg has access to transit
- Combine transit solutions with road improvements
- Involve citizens extensively in the system development process

Enhanced accessibility, environmental quality, pedestrian friendliness and public safety are vital to successful transit systems and to the long-term health of Charlotte-Mecklenburg. The primary benefit of congregating housing, jobs, shops and other activities along transit corridors is to increase the convenience of transit, and build more livable, less auto-dependent communities.

These land use goals and objectives are incorporated into the System Plan Principles.

## 2.2 Description of Existing Regional Land Use and Future Growth Trends

### 2.2.1 Population and Employment Growth

During the past two decades, Mecklenburg County grew significantly more than its surrounding counties. This is in stark contrast to almost all other central counties of metropolitan areas throughout the nation. Other central counties have lost jobs and/or population, and many of these losses have been dramatic. Thus while other regions have experienced substantial decentralization, Mecklenburg County has captured a greater share of growth than its region.

The county has retained and expanded its share of regional employment growth for a number of reasons including its industry diversity, economic strength in key areas such as financial services, its ability to retain and attract upper-income households and its integrated city and county planning framework.

Strong regional growth is expected to continue. The seven-county Charlotte metropolitan area population was approximately 1.4 million in 2000 and is projected to grow to approximately 2.2 million by 2025, an increase of almost 60 percent. Regional employment will rise at a similar rate of growth to regional population, from approximately 850,000 workers in 2000 to over 1.3 million in 2025.

### 2.2.2 Growth Projections

**Table 2-1** shows the projected change in population and employment for Mecklenburg County, each of the five transit corridors, Charlotte's center city (CBD) and the wedge areas between the corridors. In 2000, the corridors and center city together comprise approximately 43 percent of the population in 2000 and 70 percent of the county's employment. By 2025, these rates are expected to remain about the same.

Of all the corridors, growth in absolute numbers is forecast to be greatest in the North Corridor for both total jobs and population.

**Table 2-1. Population and Employment, 2000 and 2025**

*Mecklenburg, CBD, Corridors and Wedges*

	2000	Mecklenburg	CBD	Corridors					Wedges Total
				North	West	South	S.East	N.East	
Sum of Population		660,126	4,748	76,835	26,403	47,041	77,786	52,370	374,943
% of Mecklenburg			0.7%	11.6%	4.0%	7.1%	11.8%	7.9%	56.8%
Total Employment		508,377	50,177	60,431	53,830	85,948	64,434	57,646	135,911
% of Mecklenburg			9.9%	11.9%	10.6%	16.9%	12.7%	11.3%	26.7%
	<b>2025</b>								
Sum of Population		944,649	11,680	135,330	36,009	60,447	87,674	71,175	542,334
% of Mecklenburg			1.2%	14.3%	3.8%	6.4%	9.3%	7.5%	57.4%
Total Employment		764,862	89,722	107,763	75,622	108,136	76,537	83,192	223,890
% of Mecklenburg			11.7%	14.1%	9.9%	14.1%	10.0%	10.9%	29.3%

Source: Charlotte Department of Transportation

Notes: The North Corridor includes a portion of Iredell County. 2000 Iredell pop.:15,258; Full corr pop.: 92,093.

2000 Iredell emp: 7,949; Full corr emp: 68,380. 2025 Iredell pop: 29,106; Full corr pop: 164,436.

2025 Iredell emp: 20,260; Full corr. emp: 128,023.

Difference between corridor population and employment and that in the 2025 Long-Range Transportation Plan is based on redefinition of corridor borders only. Traffic Analysis Zone data identical for both studies.

## 2.3 Need for Public Transit Improvements

It is estimated that the population in Charlotte-Mecklenburg will increase 43 percent and that employment will increase 50 percent by the year 2025. Although Charlotte-Mecklenburg has established the *Centers and Corridors* vision as its preferred future land use pattern, previous growth trends contradict that vision. Growth has been occurring in patterns that make transit and land use planning more difficult by scattering office and higher density housing throughout the County. This lower density, diffuse pattern of development causes people to drive more and make longer trips. As a result, the number of vehicle miles traveled is growing at a rate far in excess of population growth. Major roads across the region are experiencing serious congestion and delays, particularly during peak travel times. Air quality problems are increasing. As a result, the area's quality of life is being negatively impacted.

Addressing this situation requires changing land use patterns and giving people more mobility options which is what the *Centers and Corridors* vision and the *2025 Integrated Transit/Land-Use Plan* are designed to do.

Achievement of desired land use goals depends on availability of transit facilities and services to complement highways and to provide adequate access to the intended pattern of development. Transit improvements are needed not only to achieve transportation goals but also to promote the desired shape of development for the area.

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## 3.0 BUILDING ON THE 2025 INTEGRATED TRANSIT/LAND-USE PLAN

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This chapter presents the vision of an integrated land use plan and transit system that has been established for Charlotte-Mecklenburg, including accomplishments since the *2025 Integrated Transit/Land-Use Plan* was completed in 1998.

### 3.1 2025 Plan Recommendations

The recommendations contained in the 2025 Integrated Transit/Land-Use Plan can be summarized as follows:

#### *Land Use*

Office. Concentrate major office centers at stations along the corridors and in Center City Charlotte to serve as the key land use strategy supporting transit to enable more people to ride transit as an alternative to driving.

Multi-family Residential. Focus residential multi-family development at stations in the corridors and Center City Charlotte rather than dispersed throughout Mecklenburg County.

Early land use actions:

- Revise area plans/ordinances.
- Encourage continued jobs and housing growth in Center City Charlotte, and other key corridor locations and activity centers.
- Adopt incentive packages for station development.
- Acquire key parcels around selected stations.
- Initiate development of priority sites.

#### *Transportation*

Rail. Develop rail technology in the South Corridor along the existing rail alignment. Develop rail technology in the North Corridor along the existing rail alignment, but only if appropriate land use designations and development occur to support rail.

BRT. Establish BRT in the Independence (Southeast), Airport (West), and University (Northeast) corridors. BRT also complements the North Corridor rail service.

Feeder Bus. Provide feeder bus services to the “wedges,” the areas between the corridors, and link these services to transit centers and stations.

Local and Express Bus Services. Increase local and express bus services to supplement rapid transit operations and include expanded operating hours and special services for the elderly and disabled.

Town Services. Expand local and express services for the towns in the region.

## ***Governance***

**Organization.** Create an organizational structure, the Metropolitan Transit Commission, to plan and oversee future transit services countywide.

**Responsibility.** Elected bodies retain responsibility for approving long-range transit plans and capital and operating programs.

## **3.2 What Has Happened Since the 2025 Plan Was Completed?**

### **3.2.1 Land Use**

Numerous policies, tools and initiatives have been adopted or proposed by the City of Charlotte and the participating towns that further the goals of the *2025 Integrated Transit/Land-Use Plan*. These efforts promote concentrations of development around existing development centers, in regional transit corridors, and at proposed station areas.

#### ***City of Charlotte***

The *2025 Integrated Transit/Land-Use Plan* is the primary guidance document for the required changes in policies for the City of Charlotte and the participating communities. Among the recommendations are land use changes, actions and a new series of regulatory tools for implementing station area plans and promoting transit-oriented development.

- Transit-Supportive Plans and Policies

Updated and Revised General Development Policies (GDP). The GDP provide the policy framework that is used to guide future growth and development in Charlotte-Mecklenburg. The GDP were adopted in 1990 and are being updated to reflect new policy direction. The current update of the GDP will revise current policies that allow the dispersal of multi-family development, redirecting much of the higher density, multi-family and office development to major activity centers and transit corridors. The update effort has resulted in the adoption of general policies for station area development that serve as the basis for station area planning such as establishing minimum densities of 15 du/a in the one-quarter- to one-half-mile area and 20 du/a within the one-quarter mile area. One of the main purposes of the updated GDP is to provide guidance for managing growth according to smart growth principles by focusing development where infrastructure can best support it.

- Smart Growth Principles

The City of Charlotte's Smart Growth Principles, adopted by the City Council in February 2001, strongly support infill development and redevelopment, especially in Center City Charlotte and along the transit corridors:

- Maintain land use planning capacity,
- Sustain effective land use decisions,
- Strengthen community through healthy neighborhoods,
- Build a competitive economic edge,
- Design for livability,
- Safeguard the environment,

- Expand transportation choices, and
  - Advance public investment as a catalyst.
- Joint Development Principles (JDP)

The purpose of these Principles is to provide a framework to be used by local governments to promote and support development at transit stations. These principles will help achieve selected public policy objectives and priorities in a manner consistent with the *Centers and Corridors* vision and the *2025 Integrated Transit/Land-Use Plan* and will further support pedestrian-oriented urban design. The MTC, Charlotte City Council, Mecklenburg County Board of Commissioners and the Town Boards of Davidson, Cornelius, Huntersville and Matthews have adopted the JDP.

- Street Design Guidelines

The City is developing a new hierarchy of streets that will be overlaid on the City's existing, and more traditional, street classification. Two street types that will be utilized heavily in the transit station areas are "main streets" and "local access streets." These street types will have street design that is strongly oriented toward easy pedestrian circulation and low automobile speeds. In addition, pedestrian amenities such as sidewalks, street trees and pedestrian scale lighting will be emphasized.

- Zoning/Implementation

Zoning is fundamental to implementing station area plans and promoting compact, walkable, transit-oriented development. The following existing and proposed zoning districts provide the City with a strong array of implementation tools.

Uptown Mixed Use District (UMUD). It is the most intensive of Charlotte's zoning districts and is applied primarily to the Center City area. The main purpose of this district is "to strengthen the high density core of the central city." This district has no maximum Floor Area Ratio (FAR) or height limitation, allows a range of transit-supportive uses, and has resulted in the construction of numerous mid-rise and high-rise structures. All of the properties located along the portion of the South Transit Corridor that runs through Center City are zoned UMUD.

Mixed Use Development District (MUDD). As with UMUD, the MUDD district has no FAR limitation and permits a range of transit-oriented uses. Building heights are limited to 120 feet. Many property owners along the rail line in the SouthEnd area have requested and received MUDD zoning for their properties.

Pedestrian Overlay District (PED). The Charlotte City Council approved this new zoning district in March 2000. This district is designed to allow a mixture of transit-supportive uses developed in a pedestrian-friendly manner. The development standards allow a significant increase over the amount of development that is feasible under the more suburban zoning districts. For example, there is no maximum FAR for this district and, under certain conditions building heights can be up to 100 feet.

Transit Overlay Zoning District (TOD). New zoning districts designed specifically for transit station areas are being developed. These new districts will be adopted and applied around the South Corridor station areas in 2003. These zoning districts will be

based on specific station area plans, as well as the Transit Station Area Principles. In most cases, these new districts will designate minimum densities/intensities. Existing urban zoning districts, such as MUDD and PED, which encourages more intense development are available to be used until transit overlay zoning is implemented.

Interim Transit Overlay Zoning District (ITOD). An Interim Transit Overlay District (ITOD) is being developed, and adoption of this district also is expected in 2003. Unlike TOD, which is a permanent zoning district, ITOD is expected to be used on an interim basis in the four MIS corridors until station area plans are complete and the permanent TOD can be applied.

- **Funding to Support Plans and Policies**

Capital Improvement Budget for Transit-Supportive Infrastructure. The City's FY2003 Capital Improvement budget includes \$20 million for implementation of infrastructure improvements outlined in the seven draft transit station plans for the South Corridor. This is a model that the city expects to implement for other transit corridors as they move toward implementation. These funds are in addition to the expenditures that will be made by CATS as part of the construction of the transit system. This funding will be finalized through a November 2002 bond vote. The intent is to consider another \$30 million bond vote to complete the improvements. This approach is a model for future corridors.

Additional Funding. The City of Charlotte has identified \$2 million annually for pedestrian enhancements. Economic Development funding has been approved for joint development projects at transit stations. The Charlotte City Council approved the creation of a revolving fund that will provide \$2 million per year for the next five years to be used for joint development projects around stations

### ***Town of Cornelius***

The Town of Cornelius has adopted a Transit District-Overlay zone and has mapped the town center area. The intent is to produce compact areas of higher density, mixed use development within walking distance of a proposed transit station. Within one-quarter mile of transit stations, minimum residential densities are established at 12-16 du/ac and within the one-quarter- to one-half-mile area, the minimum density is set at 8-12 du/ac. The lower end of these ranges is for sites of less than two acres and the higher end is for sites larger than two acres.

### ***Town of Davidson***

The Town of Davidson's Town Center Master Plan, adopted in 1998, anticipated rapid transit and recommended a pedestrian-oriented transit station in the center of downtown. The Plan recommends substantial new development in support of transit with the addition of nearly 300,000 s.f. of retail/office space and 400-500 new residential units. Reuse of an existing mill near the proposed transit station also is envisioned. In June 2001, the Town adopted an innovative planning ordinance that ensures higher density mixed use development that is pedestrian oriented and transit supportive.

### ***Town of Huntersville***

The Town of Huntersville has adopted two TOD zoning districts to be implemented within one-half mile of transit stations. The intent of the residential zone (TOD-R) is to support higher density residential communities that include a mix of services within a pedestrian environment. A minimum of 15 dwelling units per acre (du/ac) is established. The intent of the employment

zone (TOD-E) is to accommodate office and supporting uses in a pedestrian-friendly setting. Minimum office intensity is established.

### ***Town of Matthews***

While the Town of Matthews currently does not have any specific transit-supportive land use policies or regulatory mechanisms, it does have a number of plans and existing zoning districts that could be adapted to support such development. For example, there is a Downtown Master Plan and an accompanying Downtown Overlay District. The Zoning Ordinance provides several districts, the Residential Varied Style (R-VS), the Residential Planned Unit Development (R-PUD) and the Innovative Development (ID) districts that could be reviewed as candidates for adaptation.

### **3.2.2 Governance**

Dedicated Transit Funding Source. Based on the *2025 Plan* and pursuant to Article 43 of Chapter 105 of the North Carolina Statutes, the Mecklenburg County Board of Commissioners called an advisory referendum on the levy of a one-half percent sales and use tax for the purpose of financing public transportation systems (i.e., transit sales tax). Mecklenburg County voters approved the measure on November 3, 1998. The tax was implemented in April 1999.

Transit Governance Interlocal Agreement. On February 16, 1999, the City of Charlotte, Mecklenburg County, and the towns of Cornelius, Davidson, Huntersville, Matthews, Mint Hill, and Pineville signed an agreement to implement coordinated transit operations, including budgeting and financing, for the transit sales tax. This agreement established the MTC to review long-range plans and capital and operating programs.

### **3.2.3 Transportation**

Center City 2010 Vision Plan. The City of Charlotte, Mecklenburg County, and Charlotte Center City Partners completed the *Center City 2010 Vision Plan* in 1999. The plan was adopted in 2000. It represents a collective effort of Charlotte residents, government staff, developers, landowners, public officials, and national planning experts to set a determined and visionary path for the future. The plan's vision was to create a livable and memorable Center City of distinct neighborhoods connected by unique infrastructure. In the area of transportation, the *Center City 2010 Vision Plan* recommends development of a system of transportation modes and services offering alternatives to commuters. The plan also stresses development of urban design solutions to maximize the livability, beauty, and distinctiveness of each transportation element.

South Corridor Preliminary Engineering/Environmental Impact Statement. In September 2000, CATS received approval from the FTA to initiate Preliminary Engineering (PE) and preparation of the Draft and Final Environmental Impact Statements (EISs) for the South Corridor. During this phase CATS will refine the design of the 11.5-mile LRT line extending from Center City Charlotte to the Town of Pineville. This project includes the preparation of plans up to a 30 percent level of design. Because this project involves the first LRT line in the Charlotte region, it includes establishment of LRT design criteria and preparation of selected technical documents required by the FTA.

Countywide Transit Services Study. From February 2000 to August 2001, CATS performed the Countywide Transit Services Study to provide a "blueprint" for the year-by-year expansion over the next five years of CATS transit services throughout Mecklenburg County. The study identified hub and mini-hub locations and regional transit opportunities. The study includes an

analysis of service delivery options for the elderly and disabled in Charlotte-Mecklenburg and opportunities for improved coordination. The study further addresses standards for evaluating and monitoring transit performance, and resulted in a new fare policy for CATS. In August 2001, the MTC approved the study and adopted the five-year development program.

Long Range Transportation Plan Update. In April 2002, the Mecklenburg-Union Metropolitan Planning Organization (MUMPO) completed an update of the area's Long Range Transportation Plan (LRTP) to a horizon year of 2025. The LRTP includes a financially constrained transit improvement plan based on the recommendations of the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg*.

Charlotte Multi-Modal Station Project. In early 2002, the NCDOT completed an engineering feasibility study of an improved rail and transportation center located on West Trade Street in Center City Charlotte. The study included an analysis of the number of tracks serving the station, the location of grade separations and whether these separations are feasible, and the right-of-way needs for the station. The study also assessed the preliminary space needs for intercity rail, intercity bus, commuter rail, local bus, and other uses. It includes a cost analysis, determination of the project's timeframe, and potential environmental impacts resulting from multi-modal station construction. NCDOT will begin preliminary engineering for the multi-modal station in early 2003.

### **3.2.4 Roadways**

I-77 High Occupancy Vehicle (HOV) Lane. In 2002, NCDOT approved adding a HOV facility between Brookshire Freeway (I-277) and I-485 as part of the design-build contract for this freeway widening project.

## **3.3 System Plan Refinements to the 2025 Integrated Transit/Land-Use Plan**

The recommended System Plan builds on the *2025 Integrated Transit/Land-Use Plan for Charlotte-Mecklenburg*, and while much of the System Plan recommendations are similar, there are some differences in proposed transit improvements in selected corridors. These refinements reflect further understanding of land use/development opportunities and system needs during the corridor Major Investment Studies, changing conditions and available funding sources.

- As noted earlier, two of the corridors now extend beyond Mecklenburg County, into Iredell County (North Corridor) and Cabarrus County (Northeast Corridor).
- The West Corridor has been expanded to now include three sub-corridors along Wilkinson Boulevard, Freedom Drive and Tyvola Road. The recommended route into Center City is along Morehead Street rather than an I-77 flyover.
- In the Southeast Corridor, the recommended BRT alignment parallels Independence Point Parkway instead of following the CSX right-of-way.
- The Central Avenue Streetcar to Eastland Mall was not a part of the previous *2025 Integrated Transit/Land-Use Plan* and is a new element in the recommended System Plan.

- In the Northeast Corridor, LRT to I-485 as an extension of the South Corridor LRT was not part of the 2025 Plan. BRT was in the 2025 Plan although it has been modified and includes an extension into Cabarrus County.
- North Corridor Commuter Rail is now extended to Mooresville.
- Because I-77 in the North Corridor is being widened sooner than anticipated and includes HOV lanes, the HOV facility can be utilized by Express Bus services rather than having to create a separate BRT guideway.
- In Center City, joint use of NCRR by Commuter Rail, BRT, LRT and the vintage trolley is no longer possible. It will be used by the LRT and vintage trolley.
- The West Trade Street Multi-Modal Station, not considered in the 2025 Plan, will be the Center City terminus of North Corridor Commuter Rail service as well as provide an additional bus terminal in Center City.
- The Trade Street pedestrian/transit concept is new (adopted in the *Center City 2010 Vision Plan*) and provides a corridor for Southeast and West BRT lines, Enhanced Bus services from all the corridors, express and local bus services from throughout the region and the Trade Street Streetcar.

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## 4.0 IMPLEMENTATION PLAN

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The implementation plan establishes priorities for scheduling the recommended System Plan improvements. The following criteria (derived from those adopted by the MTC) were used to guide development of the implementation plan.

### ***Land Use***

- Near-term opportunities to shape growth/redevelopment (that would be lost if investment is deferred)
- Land use policies in place

### ***Mobility and Operations***

- Immediate needs to improve access to employment
- Immediate need for congestion relief
- Opportunity to implement effective interim service improvements

### ***Environment***

- Air quality improvements
- Minimize disruption to communities, natural areas, and cultural resources
- Environmental justice

### ***Finance***

- Interim system cost relative to funding capacity
- Ability to attract federal and state funds
- Opportunities to leverage with other sources

### ***System Development***

- Synergy among corridors
- Phasing ability
- Corridor readiness for project implementation

The recommended System Plan will be in place before 2025. Because of financial constraints related to available funding for construction and operations, availability of right-of-way, scheduling of concurrent projects (such as the NCDOT improvements to Independence Boulevard and the West Trade Multi-Modal Station), timing of development and population/employment growth, System Plan implementation will be phased over the years leading up to 2025. Improvements for each corridor that would be completed within the first ten years and the first fifteen years are outlined in **Figure 1-2**.

**Table 4-1** below summarizes the Implementation Plan outlined for the first ten years, first fifteen years and by 2025.

**Table 4-1. Implementation Plan Summary**

<b>Corridor</b>	<b>First Ten Years</b>	<b>First Fifteen Years</b>	<b>By 2025</b>
<b>South</b>	<ul style="list-style-type: none"> <li>▪ LRT to I-485</li> </ul>		
<b>North</b>	<ul style="list-style-type: none"> <li>▪ Commuter Rail to Mooresville</li> <li>▪ Enhanced Bus services on I-77 HOV lanes</li> </ul>		
<b>Northeast</b>	<ul style="list-style-type: none"> <li>▪ LRT to 36<sup>th</sup> Street (NoDa)</li> </ul>	<ul style="list-style-type: none"> <li>▪ LRT to I-485</li> </ul>	<ul style="list-style-type: none"> <li>▪ BRT/Enhanced Bus to University Research Park area</li> </ul>
<b>Southeast</b>	<ul style="list-style-type: none"> <li>▪ BRT to Sardis station</li> <li>▪ Central Avenue Streetcar to Plaza/Midwood</li> </ul>	<ul style="list-style-type: none"> <li>▪ BRT to I-485</li> <li>▪ Central Avenue Streetcar to Eastland Mall</li> </ul>	
<b>West</b>	<ul style="list-style-type: none"> <li>▪ BRT to Charlotte/Douglas International Airport</li> <li>▪ Beginning of Enhanced Bus along Freedom Drive and Tyvola Road</li> </ul>	<ul style="list-style-type: none"> <li>▪ BRT to Airport</li> <li>▪ Enhanced Bus on Tyvola Road</li> <li>▪ Enhanced Bus on Freedom Drive</li> </ul>	<ul style="list-style-type: none"> <li>▪ Enhanced Bus on Wilkinson Boulevard west of Airport</li> </ul>
<b>Center City</b>	<ul style="list-style-type: none"> <li>▪ Trade Street Facilities and Streetscape</li> <li>▪ Trade Street Streetcar</li> <li>▪ West Trade Multi-Modal Station</li> <li>▪ Transportation Center improvements</li> </ul>		<ul style="list-style-type: none"> <li>▪ Center City Streetcar Loop</li> </ul>

## 5.0 FINANCIAL PLAN

The recommended System Plan is comprised of corridor capital investments that total \$1.99 billion in dollars inflated to the time of construction. The corridor investments are supported by expansion of the CATS bus fleet and general capital expenditures that provide for replacement of revenue and non-revenue vehicles at the end of their useful lives, two new bus garages, park-and-ride lots, bus facilities and state-of-good-repair improvements. These non-corridor capital outlays of \$952 million (inflated) raise the CATS capital investment program for the years 2002 – 2025 to a total of \$2.94 billion (inflated).

**Table 5-1. CATS 2002-2025 Capital Summary**  
*Millions of Inflated Dollars*

<b>Corridor</b>	<b>Capital Cost</b>
South Corridor LRT	\$371
North Corridor Commuter Rail	\$207
Southeast Corridor – BRT	\$212
Southeast Corridor – Central Avenue Streetcar	\$174
Northeast Corridor – BRT	\$51
Northeast Corridor – LRT	\$527
West Corridor – BRT	\$141
Center City – Facilities and Streetscape	\$83
Center City – Trade Street Streetcar	\$99
Center City – Streetcar Loop	\$125
Subtotal, Corridors	\$1,989
Core Bus Fleet	\$332
General Capital	\$620
<b>TOTAL PROGRAM</b>	<b>\$2,941</b>
<b>FUNDING SOURCES</b>	
Federal – Discretionary	\$990
Federal – Formula	\$643
State	\$766
CATS	\$543
<b>TOTAL SOURCES</b>	<b>\$2,941</b>

The financial plan assumes that 50 percent, or \$990 million (inflated), of the corridor investments will be funded under the FTA's Section 5309 New Starts program. The non-federal share is evenly split between CATS and the State of North Carolina. The only exception to this distribution assumed in the financial plan involves the intermodal facility improvements in the center city, which are split equally between CATS, federal, and state sources.

Over two-thirds of the resources for the general capital program are derived from FTA formula allocations under the Section 5307 Urban Area and Section 5309 Fixed Guideway Modernization programs (the latter funding becomes available after fixed guideway corridors are in revenue service the requisite number of years). The State of North Carolina and CATS provide the local match for the federal formula allocations, generally on an 80-10-10 basis. CATS bears a somewhat higher proportion of the bus expansion and replacement costs for its core bus fleet. The distribution of capital costs and revenues is summarized in **Table 5-1**.

Operating and maintenance costs for the recommended system will total \$4.31 billion (inflated) between 2002 and 2025. Fares collected will cover about 27 percent of operating costs. Average fares are assumed to escalate over the 2002 – 2025 period at the rate of inflation. Operating subsidies for the Core Bus system comprise about 60 percent of the total, with operating subsidies for all of the proposed corridor investments making up the other 40 percent.

**Table 5-2. CATS 2002-2025 Operating Summary**  
*Millions of Inflated Dollars*

<b>Corridor</b>	<b>Operating Expense Less Fare Revenue</b>
South Corridor LRT	(\$340)
North Corridor Commuter Rail	(\$178)
Southeast Corridor – BRT	(\$190)
Southeast Corridor – Central Avenue Streetcar	(\$102)
Northeast Corridor – BRT	(\$14)
Northeast Corridor – LRT	(\$107)
West Corridor – BRT	(\$123)
Center City – Facilities and Streetscape	(\$44)
Center City – Trade Street Streetcar	(\$123)
Center City – Streetcar Loop	(\$24)
Core Bus/STS	(\$1,886)
<b>TOTAL PROGRAM</b>	<b>\$3,130</b>
<b>SUBSIDY SOURCES</b>	
Service Reimbursements	\$180
State and Other Grants	\$479
Maintenance of Effort	\$453
CATS & Other Local Resources	\$2,018
<b>TOTAL SOURCES</b>	<b>\$3,130</b>

The CATS sales and use tax will pay for approximately 45 percent of all operating and maintenance outlays, with the balance paid from Maintenance of Effort allocations (11 percent) required from the local jurisdictions as a condition of the sales and use tax, state operating assistance and other intergovernmental transfers (11 percent), interest earned on capital balances, service reimbursements, joint development revenue and miscellaneous sources.

The allocation of operating and maintenance costs is summarized in **Table 5-2** above.

A financial model has been developed that forecasts CATS' revenues and expenses each year for constructing the capital program and operating the transit system. Revenues from fares and grants from other governmental sources are subtracted from outlays, and the balances are paid from CATS' sales and use tax. The one-half cent sales and use tax is estimated to generate over \$2.55 billion (inflated) in revenues for transit investment and operating subsidies between 2002 and 2025. Approximately \$1.93 billion (inflated) will be devoted to operating subsidies and the balance to capital investment.

Surpluses at the end of each year are maintained in a capital account that is invested to earn interest. Any annual deficits after capital expenditures are paid from the capital account. Financial feasibility is determined by examining the annual ending balances in the capital account to assure that they are positive and that an ample reserve remains to address unforeseen contingencies.

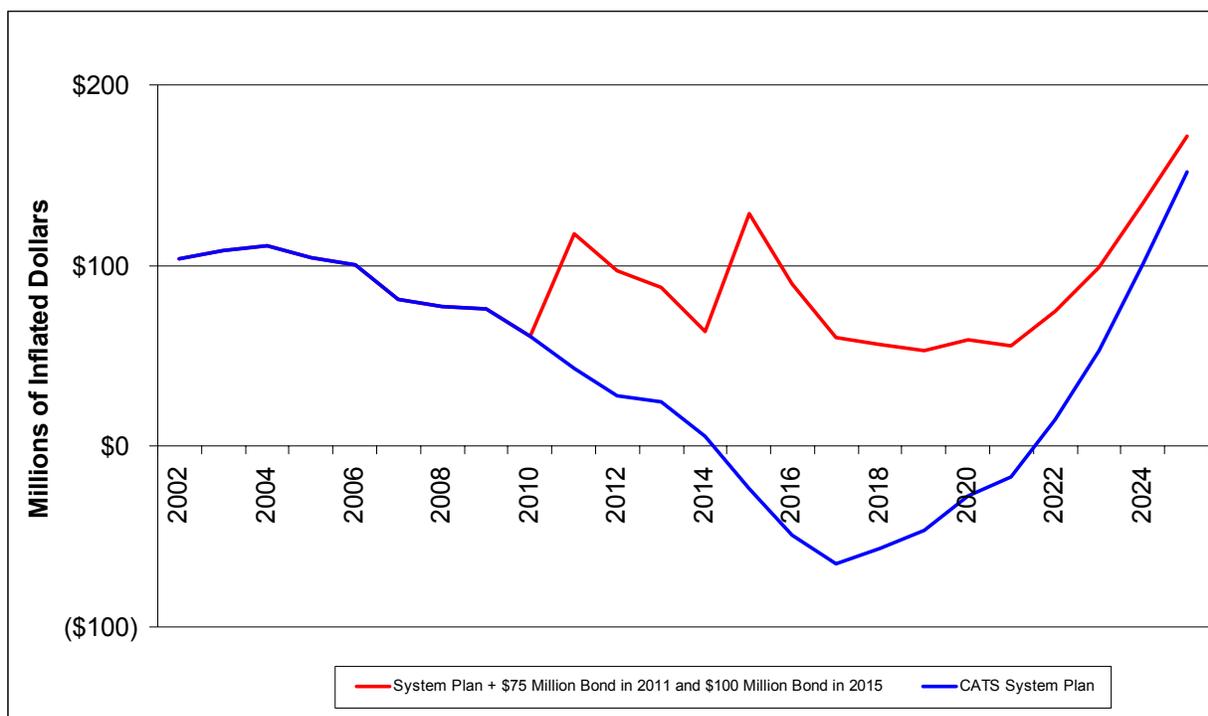
A series of analyses were performed to examine CATS' ending balances and assess strategies for managing cash flows. The results are shown in **Figure 5-1**.

The lower line represents the ending balance in CATS' capital account at the end of each year of the recommended System Plan with only limited financing for the non-corridor portion of the capital program assumed. The core bus fleet is assumed to be acquired using 10-year leases through Certificates of Participation (COPS). Two new bus garages totaling about \$90 million (inflated) also are assumed to be financed using 30-year COPS.

Despite a strong ending balance position, heavy cash flow requirements for operating subsidies and corridor investments coming on line in 2017 cause CATS to incur negative balances in the capital account between 2014 and 2021. In addition, in the years immediately prior to 2014, cash balances fall to low levels, leaving little cushion for contingencies.

In order to steady the cash flow requirements of the corridor portion of the capital investment program, it is assumed that CATS will issue two series of 30-year revenue bonds, one in 2011 and one in 2015. The revenue bonds are backed by future receipts of CATS' sales and use tax. The first issue would be for approximately \$75 million, and the 2015 bond issue would be for \$100 million, for a total of \$175 million (inflated). By using debt to stabilize cash flows, CATS is able to maintain ending balances adequate to meet contingencies and emerge from the 2025 period with a strong position in its capital account.

**Figure 5-1. CATS Cumulative Ending Balances**



Gross coverage for the sales and use tax revenue bonds is approximately 8.5 times annual debt service in 2016 and increases each subsequent year due to growth in the sales and use tax revenue stream. With the addition of debt service payments on non-corridor COPS issued for buses and the two new garages, gross coverage by sales and use tax revenue alone is approximately 3.15 in 2016 and 4.16 in 2025.

Any major capital expansion program involving heavy construction carries risks and contingencies. In the CATS System Plan, there are several key considerations. The most significant variables are: future growth rates for the sales and use tax, the ability of federal and state funding partners to meet the forecast levels of participation, escalation in the costs to operate and maintain the transit network, capital costs of corridor development projects and achieving anticipated levels of ridership on the core bus network.

Due to the high concentration of operating expenses in the core bus network (about 60 percent of the total) and the large proportion of fare revenues derived from core bus services (about 64 percent of the total), the ability of CATS to meet its financial targets is more heavily influenced by the rate of expansion of the core bus system (which also includes vanpool and special transportation services) and the level of ridership achieved than by the operating results from individual corridors as recommended in the System Plan.

Forecasts for sales tax revenues have been scaled-back in light of economic conditions and remain below historic growth rates. After incorporating a 7 percent decline in sales and use tax revenues between 2001 and 2002, the financial model anticipates a gradual ramp-up from the lower base level to a long-term growth rate of 6.0 percent per year by 2007. An historical time

series prepared by the City of Charlotte Finance Department indicates an average annual growth rate of 8.9 percent between 1979 and 2002.

Growth in capital costs for corridor investments is a risk that CATS may have to underwrite. If the escalation occurs after Full Funding Grant Agreement commitments have been made to the FTA and the State of North Carolina, CATS will have to absorb the increases. There may be opportunities to share the exposure for higher capital costs if they emerge earlier in the planning and engineering process.

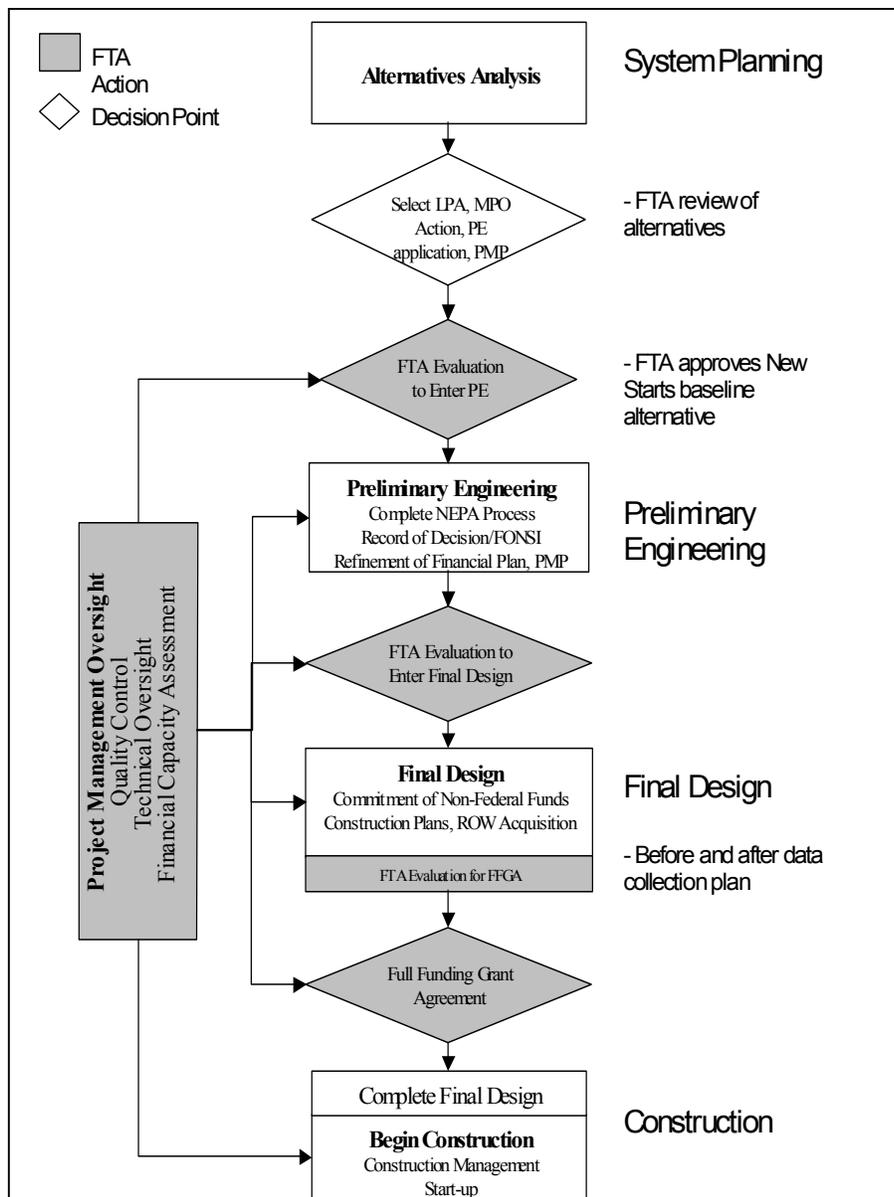
Peaking in annual cash flow demands for the corridor investment program in order to bring large elements of the System Plan on line in 2012 and 2017 could affect the ability of the funding partners to meet the matching assumptions in the financial plan. Jurisdictions such as New Jersey Transit and Bay Area Rapid Transit in San Francisco have negotiated Full Funding Grant Agreements with their funding partners that permit the federal share to be extended over a longer time frame in order to smooth out funding peaks. The grant agreements have then been used as collateral for grant anticipation financing to maintain construction schedules.

The ending balances in CATS' capital account and its additional debt capacity to issue bonds/COPS offer adequate margins of contingency to address these risks and deliver the recommended System Plan. In addition, adjusting the core bus system to match fleet expansion with the ridership response will require active management in the years ahead.

# 6.0 NEXT STEPS IN ADVANCING THE RECOMMENDED SYSTEM PLAN

Planning for the transit improvements to be made in Charlotte-Mecklenburg has been conducted in accordance with a process established by the FTA in order to retain eligibility for future FTA funding of the improvements. This process has four phases and is shown in **Figure 6-1**. The planning work that is the subject of this report represents the completion of the first phase of the FTA process – System Planning.

**Figure 6-1. FTA Process**



The four corridor Major Investment Studies have analyzed a series of alternative transit improvements in each of the corridors. The results of these studies were combined with an analysis of how the corridor transit improvements can be forged together into a transit system that will work and is affordable. This report presents the results of this work and along with input from the community will provide a foundation for the major decisions that must be made locally before Charlotte-Mecklenburg can proceed to the next phase of the FTA process.

## 6.1 Local Decision-Making Context

In accordance with the Transit Governance Interlocal Agreement, the MTC has been established as the policy making body for public transit in Charlotte-Mecklenburg. In this capacity, the MTC approves transit development plans for the area.

Under US DOT and FTA requirements, the MTC-approved plans must then be reviewed and concurred in by the region's metropolitan planning organization (the MUMPO) in order to become part of its Transportation Improvement Program (TIP). In order for the transit plans to become part of the region's TIP and be eligible for federal funding, the transit plans must be "financially feasible," meaning that they must be accomplishable within available financial resources and those reasonably expected to be available in the future.

## 6.2 MTC Decisions

The MTC has two major decisions to make to establish the transit component of the Charlotte-Mecklenburg integrated transit/land use plan for the future:

### *Select the System Plan*

The System Plan for transit will identify the LPA in each of the four MIS corridors, including the LPA alignment and the extent of services and facilities. These LPAs will be linked together through a Center City transit plan and combined with the South Corridor LRT project and other planned transportation improvements to form the overall system plan.

### *Approve the Implementation Plan*

The implementation plan will identify the general sequencing of improvements and strategies that will be utilized to implement the selected System Plan. A key component of the Implementation Plan will be a financial plan for carrying out the improvements.

## 6.3 Next Steps

Following the MTC's decision on the System Plan and the corresponding Implementation Plan, the next steps generally will be as follows:

1. FY2004-05 Transit Program Submittal. CATS staff will incorporate the MTC decisions into the proposed FY2004-05 Transit Program.
2. MUMPO Review and Action. The MTC's decision will be formally submitted to the MUMPO for review and concurrence. Assuming that MUMPO concurs with the MTC's decisions, then the steps set forth below would be undertaken.

Should MUMPO not approve the MTC decisions, then the System Plan and related Implementation Plan would have to be reconsidered by the MTC.

3. System Plan Submission to FTA. Following approval by the MUMPO, the approved System Plan, Implementation Plan and corridor MIS reports will be submitted to the FTA.
4. FY2004-05 Transit Program Approvals. Assuming MTC approval of a FY2004-05 Transit Program in March, the Program then would be submitted to the Charlotte City Council and the Mecklenburg Board of County Commissioners for review and approval.

5. Approval to Proceed with Preliminary Engineering. Following final approval of the FY2004-05 Transit Program, CATS staff would submit to the FTA formal requests to enter into Preliminary Engineering for the corridor and Center City improvements called for in the Implementation Plan.
6. Organizational Development. In anticipation of FTA approval to enter into Preliminary Engineering, preparations would be made to carry out this next phase including:
  - Recruitment of additional staff (job descriptions, hiring process, office space, equipment, etc.)
  - Negotiation of contracts with consultant teams to undertake engineering tasks or the procurement of new consultant teams