DOWNTOWN ORLANDO
TRANSPORTATION PLAN

The Downtown Orlando Transportation Plan

Final Report

November 2006

Prepared for: The City of Orlando Public Works Department
Prepared by: HDR Engineering, Inc.

HDR

Project Team

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The City of Orlando

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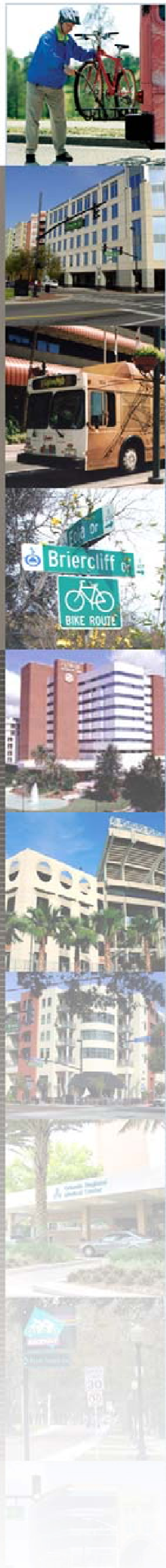


Section 1

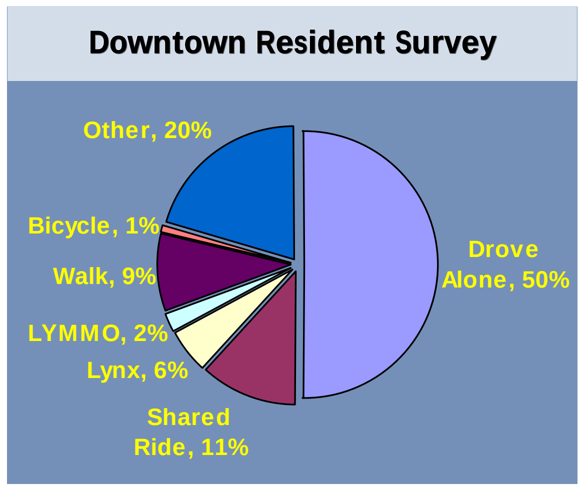
Executive Summary

1.1 The Vision

By the year 2025, Orlando will be a world class City with a diverse population, thriving economy and a vibrant, culturally rich Downtown. Much of the Downtown's success and appeal will be due to the ease of getting around. The intelligent signal system adapts to changing traffic conditions to efficiently move traffic into the downtown and dynamic message signs guide drivers to a variety of parking options. Walking is the preferred way to make most trips. Streetscape and awnings provide shade and weather protection along streets complete with wide, safe, inviting sidewalks. A modern transit circulator system makes getting almost anywhere downtown possible without a car and seamlessly integrates with regional transit and commuter rail. Freight traffic is seldom seen except on designated corridors to support a Downtown that is a great place to live, work and play.

1.2 The Challenge

To achieve the transportation vision for Downtown requires coordination, commitment and leadership. For decades we have made transportation investments to move cars instead of moving people. Today, only a fraction of all Lynx ridership begins and ends in the Downtown —about 7,000 riders a day on Lynx and LYMMO combined. Residents living downtown seldom walk other than for recreation making less than 10% their trips as pedestrians. Bicycling by downtown residents is nearly non-existent. Regional improvements by OOCEA and FDOT to add open toll lanes on the widened Expressway and add new lanes to I-4 will facilitate 30%-50% higher peak hour volumes at the access ramps into the Downtown, however, very few physical improvements can be made on the Downtown surface streets to handle the load from these super-highways.



The City has enjoyed a dramatic rise in downtown residential development and this new population will bring demands for new and increased services. However, the course we are on is not sustainable given the current state of our transportation system. As the Downtown resident population increases by 157% in 20 years adding 36,500 more residents, how will all of these people attend to their everyday needs– picking up groceries, a doctor appointment, the coffee shop, and dry-cleaning, taking in a movie or going to see a game or performance in the evening? If most of these simple, everyday trips are made by car—a chain reaction begins to occur. Necessary road improvements to increase traffic capacity displaces on-street parking making a quick "in and out" trip by car impossible, major roadways become heavily congested causing traffic diversion into neighborhoods, parking pressures lead to more parking construction which reduces development density and the synergy that makes businesses and shopping thrive. Street congestion and density reduction make transit ineffective. Ineffective transit makes walking less practical for getting around.

The only sustainable solution is to provide a comprehensive multi-modal transportation system that supports the growth and generates redevelopment opportunities that will produce a vibrant Downtown.

1.3 Guiding Principles for the Downtown Transportation Plan

The Downtown Transportation Plan addresses transportation across all modes. Most importantly, the plan recognizes that regardless of individual travel preferences, all trips begin and end as a pedestrian. Transit is a natural extension of a pedestrian trip and vastly expands the range a pedestrian can cover in a short time. Transit becomes practical and attractive to auto owners when the same trip can be made by walking and transit faster and/or cheaper than by driving and parking. Moreover, available roadway capacity solutions will be costly and can provide only limited net new capacity to the Downtown.

Guiding Principles	
Streets	Complete, Connected, Intuitive
Transit	Reliable, Convenient, Attractive
Parking	Visible, Accessible, Balanced
ITS	Priority, Real-Time, Informative
Bicycle & Pedestrian	Positive, Connected, Inviting
Signalization	Flexible, Visible, Efficient
Demand Management	Continuing, Collaborative, Comprehensive
Freight	Supportive, Efficient, Invisible
Land Use	Density, Intensity, Vibrant

The Downtown Plan identifies projects and strategies following these principles that result in plans, programs and policies for adoption and implementation by the City Land Development Regulations, Capital Improvement Plan, Growth Management Plan and coordination with regional transportation agency plans.

Implementation Strategies

The following plans, programs and strategies are a means to implement the DTTP in a manner that is consistent with current City priorities and compatible with adopted plans and existing standards of the City and its transportation partners.

Plans and Programs

- METROPLAN Orlando 2025 Long Range Transportation Plan
- LYNX Comprehensive Operations Plan (Transit System Plan) and Transit Development Plan (TDP)
- City’s Capital Improvement Plan

Vehicle Circulation Guiding Principles: *Complete, Connected, Intuitive*

- Increase connectivity within the Downtown by extending and reconnecting existing streets.
- Minimize re-circulating traffic in the Downtown Core by providing two-way traffic on all east-west streets .

- Reduce through traffic on Orange Avenue by coordinating parallel road improvements, investing in transit options and integrating system and demand management measures to allow two-way traffic to occur, where feasible.
- The majority of automobile trips to/from the Downtown are via I-4 and SR 408. Traffic from access ramps should be efficiently directed to parking with minimal circulation.
- Apply the Hierarchy of Major and Minor traffic streets for related on-street parking, freight zone and streetscape requirements.
- Minimize traffic diversion onto neighborhood streets by prioritizing signals and capacity for Major and Minor Traffic streets

Parking Guiding Principles: *Visible, Accessible, Balanced*

- Preserve and create on-street parking supply, where feasible.
- Implement Smart Parking technology to efficiently direct motorists to the parking supply available on a real-time basis using ITS.
- Coordinate off-street parking supply with economic development objectives.
- Parking structures and access system must be designed and managed to support the objectives for streets and transit.
- Balance parking supply with transit service and development needs with convenient locations out of the Core.
- Utilize financial strategies to support parking as incentive for employment and retail development.
- Use transportation and parking strategies to support growth and intensification of various land uses.
- Implement Demand Management to encourage carpools and HOV usage.

Transit Guiding Principles: *Reliable, Convenient, Attractive*

- Use Downtown transit circulators as a feeder/distributor system for commuter rail and regional transit to increase regional transit accessibility to residential, office, retail and entertainment venues.
- Utilize transit circulator system to reduce traffic and parking demands and connect destinations and attractions for residents and visitors.
- Downtown circulators should maintain a unique identity from other regional and local transit options for branding, marketing and user recognition.
- Support expanded and intensified mixture of transit supportive land uses and as a catalyst for quality redevelopment and support mobility goals.

- ❖ Amend and revise land development requirements for transit oriented development within 1/4 mile of designated transit corridors.
- ❖ Emphasize mobility and vitality of streets providing clear connections to regional transit systems.
- ❖ Integrate recommendations for primary pedestrian streets along transit corridors.
- ❖ Use roadway improvements and signal priority to make transit travel times competitive with other modes.

Bicycle and Pedestrian Circulation Guiding Principles: *Positive, Connected, Inviting*

- ❖ Every trip begins and ends as a pedestrian and should be a first class experience.
- ❖ Create an environment that generates a positive pedestrian culture.
- ❖ Apply the Hierarchy of Primary and Secondary Pedestrian Streets.
- ❖ The built roadway environment requires five key elements for success: Security, Convenience, Efficiency, Comfort and Welcome.
- ❖ Update streetscape guidelines and building code for shade, awning and canopy/building design requirements on primary and secondary pedestrian streets to reinforce hierarchy.
- ❖ Update Land Development Code for ground level building transparency requirements.
- ❖ Create a network of dedicated bicycle lanes and signed routes.
- ❖ Modify gateway underpasses and overpasses of I-4 and SR 408 to enhance pedestrian and bicycle connectivity between Downtown and surrounding neighborhoods.

Freight Mobility Guiding Principles: *Supportive, Efficient, Invisible*

- ❖ Implement a freight loading zone policy.
- ❖ Coordinate street designations for freight and truck traffic with freight parking permits and provide physical improvements for turning radii and loading zones.
- ❖ Apply the freight village concept to centralize freight delivery and distribution to minimize heavy vehicle presence in the downtown core, relieve on-street freight loading demands and make freight delivery more cost efficient.

1.4 Key Projects

Phase 1

1. **Citrus Bowl-Thornton Park Loop** – fixed route transit circulator running counter-clockwise on Central Boulevard and Church Street.
2. **Pine Street Extension** – Garland Avenue to Hughey Avenue
3. **South Street*** – two-way from Terry Avenue to Rosalind Avenue.
4. **Anderson Street***- two-way from Terry Avenue to Magnolia Avenue.
5. **Carter Street and Long Street Extension** – extend Carter Street to Division Avenue and Long Street to Terry Avenue as one-way pairs.
6. **Citrus Bowl Garage** –general location for remote public parking, joint use development, and multi-modal operations center.
7. **Orlando Urban Trail** – multi-use recreation trail connects from Dinky Line Trail to Gertrude's Walk and Parramore Avenue.
8. **Commuter Rail** *– 55-mile service from DeLand to Poinciana with four planned stops within Study Area.

Phase 2

9. **Downtown-Uptown Loop** – fixed route transit circulator running on Orange Avenue and Magnolia Avenue between Weber Street and South Street.
10. **Terry Avenue Extension** – Realign and improve existing roadway from Colonial Drive to Gore Street.
11. **Freight Village** – general location for centralized freight receiving and distribution.
12. **ITS Wayfinding and Smart Parking**- dynamic variable message signs direct drivers from entry points to available parking spaces in real-time (not shown on map).
13. **Potential Two-way Conversions** – Reduces circulation time, improves access and accommodates other improvements.

    a. Pine Street – Orange Avenue to Rosalind Avenue.

    b. Church Street – Orange Avenue to Rosalind Avenue.

    c. Orange Avenue – Ivanhoe Boulevard to SR 50.

    d. Magnolia Avenue – Livingston Street to Anderson Street.

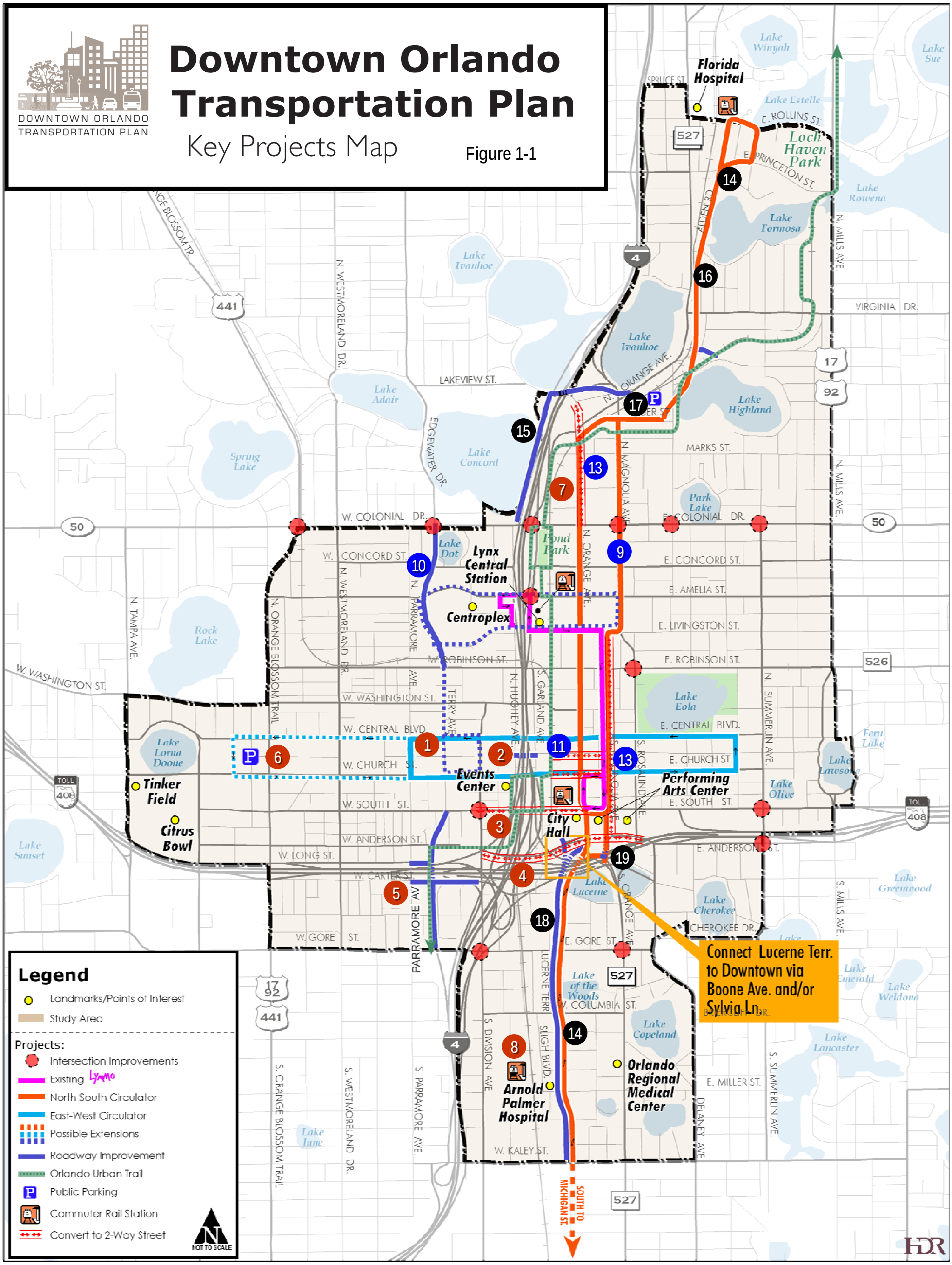
Phase 3

14. **Florida Hospital-ORHS Loop** – fixed route transit interlined with Downtown-Uptown Loop. Extends to the north on *Alden Road* corridor, and to the south along *Lucerne Terrace Corridor*. Also serves Commuter Rail.
15. **Hughey Avenue Extension** – improve direct access to Hughey Avenue southbound from I-4, Orange Avenue and Ivanhoe Boulevard.
16. **Alden Road Corridor** – Realign and improve existing roadway from Princeton Street to Weber Street as premium transit corridor.
17. **Uptown Garage** – general location for remote public parking, joint use development multi-modal center.
18. **Lucerne Terrace Extension** – Realign and improve existing roadway from SR 408 to Michigan Street as premium transit corridor.
19. **Magnolia Avenue Extension** – Extend south from Anderson Street to Orange Avenue following existing alignment beneath SR 408.

All Phases

20. **Primary & Secondary Pedestrian Corridors** – all developed roadways within ¼ mile walk of transit corridors complete with wide sidewalks, shade trees, awnings, building transparency, aesthetics and safety enhancements (not shown on map).
21. **Spot Intersection Improvements** – turn lane, geometric and signalization improvements at 13 critical intersections (red dots on map).

**Projects Currently planned by FDOT.*


DOWNTOWN ORLANDO TRANSPORTATION PLAN
Downtown Orlando Transportation Plan
Key Projects Map
Figure 1-1
Legend
Landmarks/Points of Interest
Study Area
Projects:
Intersection Improvements
Existing Lymmo
North-South Circulator
East-West Circulator
Possible Extensions
Roadway Improvement
Orlando Urban Trail
Public Parking
Commuter Rail Station
Convert to 2-Way Street
NOT TO SCALE
Connect Lucerne Terr. to Downtown via Boone Ave. and/or Sylvia Ln.
Florida Hospital
Loch Haven Park
Lynx Central Station
Centroplex
Events Center
Tinker Field
Citrus Bowl
City Hall
Performing Arts Center
Arnold Palmer Hospital
Orlando Regional Medical Center
SOUTH TO MICHIGAN ST.
Lake Winyah
Lake Sue
Lake Estelle
Lake Rowena
Lake Formosa
Lake Ivanhoe
Lake Adair
Lake Concord
Spring Lake
Lake Highland
Park Lake
Lake Dot
Pond Park
Rock Lake
Lake Eola
Lake Lorna Doone
Lake Sunset
Fern Lake
Lake Lawsona
Lake Olive
Lake Lucerne
Lake Cherokee
Lake Greenwood
Lake of the Woods
Lake Copeland
Lake Emerald
Lake Weldona
Lake Lancaster
Lake June
E. ROLLINS ST.
E. PRINCETON ST.
SPRUCE ST.
ALDEN RD.
N. MILLS AVE.
VIRGINIA DR.
ORANGE AVE.
LAKEVIEW ST.
N. WESTMORELAND DR.
ORANGE BLOSSOM TR.
EDGEWATER DR.
MARKS ST.
N. MAGNOLIA AVE.
W. COLONIAL DR.
E. COLONIAL DR.
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
E. LIVINGSTON ST.
W. ROBINSON ST.
E. ROBINSON ST.
W. WASHINGTON ST.
W. CENTRAL BLVD.
E. CENTRAL BLVD.
W. CHURCH ST.
E. CHURCH ST.
W. SOUTH ST.
E. SOUTH ST.
W. ANDERSON ST.
E. ANDERSON ST.
W. LONG ST.
W. CARTER ST.
W. GORE ST.
E. GORE ST.
CHEROKEE DR.
W. COLUMBIA ST.
E. MILLER ST.
W. KALEY ST.
N. TAMPA AVE.
N. ORANGE BLOSSOM TRAIL
N. PARRAMORE AVE.
TERRY AVE.
N. HUGHEY AVE.
S. GARLAND AVE.
N. ORANGE AVE.
S. ROSALIND AVE.
N. SUMMERLIN AVE.
S. MILLS AVE.
PARRAMORE AVE.
LUCERNE TERR.
SLIGH BLVD.
S. DIVISION AVE.
S. ORANGE BLOSSOM TRAIL
S. WESTMORELAND DR.
S. PARRAMORE AVE.
S. SUMMERLIN AVE.
DELANEY AVE.
1 2 3 4 5 6 7 8 9 10 11 13 14 15 16 17 18 19
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Section 2

The Transportation Challenge

2.1 City & Regional Context

The Downtown Renaissance

Exciting changes are happening in Downtown Orlando. Construction cranes have become a seemingly permanent fixture among the City's skyline for the last several years while the condominium boom has brought high-rise residential into the Central Business District of Orlando. Along with it has come all the amenities a downtown residential population needs to thrive—a grocery store, movie theatre, restaurants and shopping. New hotels and office towers have also been completed during what some have called a downtown renaissance.

Cranes that rise above Orange Avenue between Pine and Church Streets in March of last year for constructing the mixed use development Premiere Trade Plaza.
(ROBERTO GONZALEZ/ORLANDO SENTINEL FILE) March 18, 2005

These same types of changes are happening around the country in cities like Portland, Miami, Atlanta, and Charlotte. The downtown residential boom in many cities seems to be driven by the desire to have close, convenient choices for arts, culture, entertainment, shopping, dining and employment without the burden of a long commute. The return of residents is not just the young urban professional either. Recent polls conducted with USC found that the 55+ age group represents the largest demographic looking at living in downtown. These trends from around the country are similar to what is happening in Orlando.

The study area for the Downtown Transportation Plan extends from the Citrus Bowl (west) to Thornton Park and from the Orlando Regional Healthcare System (south) to Florida Hospital (north). The growth targets for the study area were derived from the micro-traffic zone data developed by the City that indicate that the resident population will more than double in the next 20 years growing from 23,200 to 59,700 people (see **Table 2-1**). Condominium and multi-family units will increase by over 18,000 units and employment is projected to climb to more than 100,000 workers.

Table 2-1
Downtown Study Area Growth Projections

Downtown Study Area Growth Projections	2005	2025	% Growth
Population	23,200	59,700	157%
Single Family Homes	1,911	1,931	1%
Condo/Apartment	9,568	27,981	192%
Hotel Rooms	2,004	3,182	59%
Employment	75,500	102,600	36%

A key challenge facing downtown is how these new residents will get around within the downtown to enjoy all the amenities and conveniences of an urban lifestyle. The mobility solution cannot solely rely upon the private automobile. Downtown streets are already experiencing peak periods of congestion and shortages of convenient parking—problems that will only be exacerbated with more traffic. The solution has to be multi-modal and oriented towards making pedestrian travel a first-class experience.

The Regional Context

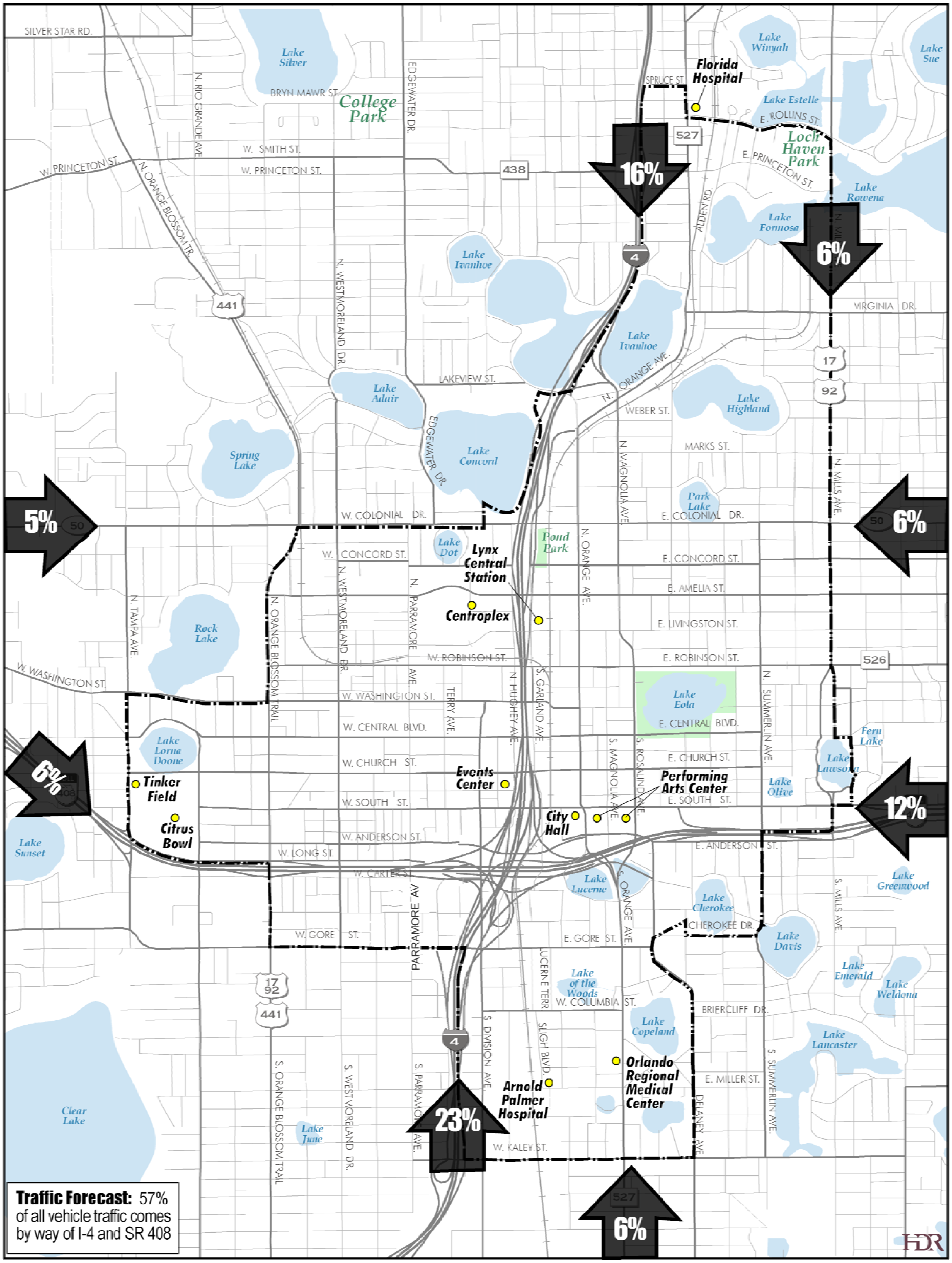
Exciting changes are also happening in the Central Florida region. New home sales have risen in the past several years throughout the region with major new subdivisions and developments of regional impact constructing homes in the rural areas of Orange, Seminole, Osceola, Lake, Volusia, and Polk Counties. The consequence of this suburban growth is longer daily commutes for thousands of employees and visitors to Downtown Orlando. The primary access routes to Downtown from the suburbs are Interstate 4 and SR 408 (East-West Expressway Toll Road). The Orlando Urban Area Transportation Study regional traffic model estimates that 57 percent of all vehicle trips to/from the study area are via I-4 and SR 408 (**Figure 2-1**). Traffic along Interstate 4 and the SR 408 crawls along every morning and afternoon as the commuting rush hours have spread to cover more than 6 hours per day.

Interstate 4 has a major impact on Downtown transportation. Morning and afternoon traffic delays are common through the Downtown interchanges and at the SR 408 interchange. The quality of traffic flow on I-4 affects drivers using the Downtown streets. Drivers commonly travel the full length of Downtown along Orange Avenue or Rosalind Avenue/Magnolia Avenue to avoid I-4 congestion and gain access at ramps ahead of reported bottlenecks. This results in high traffic volumes and congestion at the ends of Orange Avenue and Rosalind Avenue during commuter peaks.

Interstate 4 has nine access points (entrances or exits) to the downtown study area at Kaley Street, Gore Street (WB on/off), Anderson Street (WB/EB off), South Street (WB on/off, EB on), Robinson Street (WB on to be closed, EB off to be closed), Amelia Street (EB on/off), Colonial Drive (WB on/off, EB on), Lakeview Street/Ivanhoe, and Princeton Street. The East-West Expressway has five access points (entrances or exits) to the downtown study area at Tampa Avenue (WB on, EB off), Orange Blossom Trail, Orange Avenue (WB on, EB off), Rosalind Avenue (WB off, EB on) and Mills Avenue (WB off, EB on/off—note: the WB on ramp from Mills Avenue was permanently removed as part of the SR 408 widening that is underway).

Several transportation projects are under way or are in advanced planning stages to move commuters more quickly and efficiently to and from the downtown. The most significant projects include the I-4 Master Plan, the SR 408 widening and Central Florida Commuter Rail. Each of these projects will have a profound impact on transportation in Downtown Orlando.

Figure 2-1
Traffic Distribution to and from Downtown Orlando



Rendering of I-4/SR 50 interchange improvements looking SB toward Downtown. SOURCE: www.trans4mation.org

I-4 Master Plan

The Interstate 4 Master Plan calls for major changes to the interstate through Downtown. The project maintains a website (www.trans4mation.org) which provides detailed information about the plan. The informative website reads, "Over the next few decades, FDOT will reconstruct 73 miles of Interstate 4 from the Central Florida attractions area (Osceola/Polk County line) to Daytona (I-95). This Trans4mation of I-4 is essential to Central Florida as traffic volumes increase along with the number of people that are projected to move to the area. FDOT officials recognized that the existing I-4 could not support this growth, and began the Project Development and Environmental Study (PD&E) in 1997. This study was completed in 2002 and provided a blueprint called the "Ultimate Plan" for the "Future I-4," including concepts for roadway design, noise walls, and Intelligent Transportation Systems (ITS). The projects have already begun to shape the way the Interstate feels and looks, but more importantly, how it flows. For example, one concept in the future plan, auxiliary lanes, has been added to the existing I-4. These new lanes add safety and efficiency for entering and exiting traffic."

The I-4 improvements are underway. Construction of the I-4/SR 408 interim interchange, Central Florida's largest roadway project to date, began on April 3, 2006 with major improvements to the original design that enhance safety and traffic flow. The I-4/SR 408 interchange will be completely replaced and reconfigured to improve traffic operations with the widening of both of these highways. The project is a partnership between the Florida Department of Transportation (FDOT) and the Orlando-Orange County Expressway Authority and will add a flyover ramp from each direction of SR 408 to eastbound Interstate 4, reducing an existing bottleneck and decreasing travel time for commuters. The $119 million SR 408 interim interchange improvements are scheduled for completion in three years (year 2009).

SR 408/I-4 Interchange Design Improvements

The interchange improvements will encompass better drainage by incorporating new ponds, a new two-way Anderson Street Bridge and enhanced aesthetic treatments to maintain the sense of style associated with downtown Orlando. The specific design improvements include:

- New flyover ramps from SR 408 in both directions to eastbound I-4
- Redesign of South Street to two-way traffic from Division Avenue to Magnolia Avenue
- Reconstruction of the Anderson Street bridge including two-way traffic from Division Avenue to Rosalind Avenue

Rendering of I-4/SR 408 interchange improvements looking NE towards Downtown. SOURCE: www.trans4mation.org.

- Reconfigured I-4 westbound exit ramp to Anderson Street and new I-4 eastbound entrance ramp from Anderson Street
- Closing of the existing westbound I-4 entrance ramp from South Street
- Closing of the westbound I-4 exit ramp at Gore Street
- Closing of the westbound I-4 entrance ramp from Robinson Street
- Closing of the eastbound I-4 exit ramp to Robinson Street
- Two new westbound I-4 entrance ramps from Hughey Avenue (near Amelia Street and from South Street)
- New eastbound I-4 exit ramp to downtown at Garland Avenue and South Street

SR 408 Widening

Construction is underway to improve the SR 408 through downtown and west and east of downtown. The improvements include additional lanes, aesthetic and architectural treatments such as sound walls and decorative pylons, and the installation of open toll lanes at the main-line plazas. The project newsletter distributed by OOCEA provides the following details for the Segment I East (Rosalind Avenue to Cystal Lake Drive):

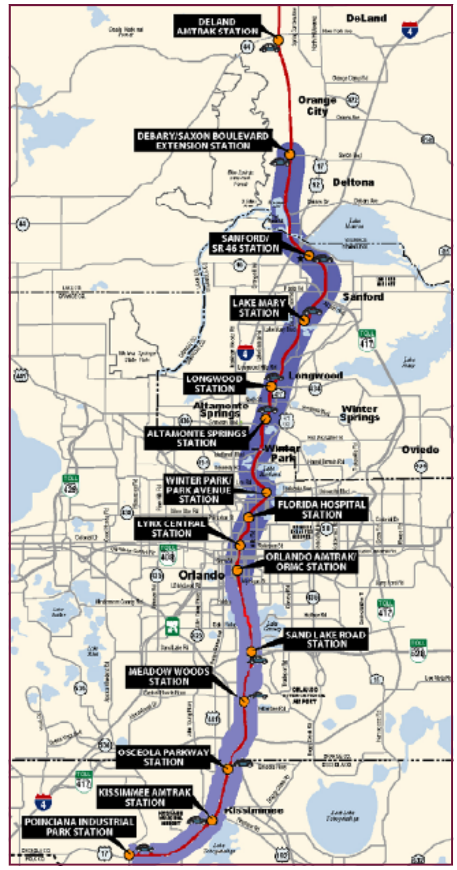
More than 100,000 vehicles a day currently travel through this project area. That traffic volume is expected to double by 2025. To relieve increasing congestion, the Expressway Authority is widening SR 408 to six lanes and to eight lanes between major interchanges - from Rosalind Avenue east to Crystal Lake Drive. The two-mile widening will be accomplished within the existing right-of-way and by reconfiguring the median and the road shoulders. Work also includes widening and/or resurfacing ramp lanes along this stretch.

- As part of this project, which began in March 2006, the westbound on-ramp at Mills Avenue has been permanently closed. The area is being used for a safer, reconfigured Rosalind Avenue exit ramp. Motorists wishing to enter westbound SR 408 east of downtown Orlando need to use the Bumby Avenue ramp. The next available westbound on-ramp is at Orange Avenue.
- The project also includes widening four bridges over Summerlin Avenue, Mills Avenue, Bumby Avenue and Primrose Drive. Additionally, the new Rosalind exit ramp will create a bridge over Summerlin Avenue.

Commuter Rail Transit

A current commuter rail study is underway – the Central Florida North/ South Commuter Corridor Alternatives Analysis – that proposes using existing CSX railroad tracks as its main artery. This route would consist of 60.8 miles of service to DeLand, Orlando and Kissimmee. The initial operating segment proposed is on CSX tracks from DeBary to LYNX Central Station in downtown Orlando. The corridor would provide a higher speed transportation option for commuters traveling from as far as Daytona Beach on the northern end and from Polk County on the southern end. The train would provide at least five trips during "peak" morning (6:00 AM to 8:30 AM) and afternoon (4:00 PM to 6:30 PM) rush hours. It would operate on a 30-minute frequency during those peak hours and a two-hour frequency during non-peak hours.

The proposed commuter rail system would have as many as four stations serving the downtown study area; Florida Hospital Station, Lynx Central Station, South Street (near City Hall), and ORMC at the Amtrak Station. These stations provide key linkages for local circulation systems to connect to the regional transit system. These locations also provide prime development opportunities to create transit oriented development in the downtown complete with residential, shopping and employment uses concentrated along these transportation hubs.



The planned Commuter Rail runs from DeLand to Poinciana (60.5 miles) and includes 4 Downtown Orlando stations. Source: FDOT.

Regional Issues and Opportunities

Three major issues emerged from the review of the City and Regional context.

1. The increase of residents in the Downtown mandates an improved local transit system. The Institute of Transportation Engineers (ITE) Trip Generation Manual estimates that an increase of 18,400 townhouse/ condominiums could generate as much as 54,000 new daily vehicle trips creating excess demand for roads and parking. The plan must identify a convenient local transit circulator system to connect residents, businesses, shopping, entertainment and recreation.

2. Improvements to I-4 and SR 408 will increase the intensity of traffic at the interstate and expressway interchanges to Downtown. In addition, existing ramps will be removed in certain locations to make way for the widening. The plan must identify projects and strategies to better handle commuter traffic flow to and from the Downtown.

3. The planned Commuter Rail system provides a unique opportunity to link downtown development to the regional transit system via an enhanced circulator system. The downtown stations for Commuter Rail will become a focal point for pedestrian activity and multi-modal trip chaining. The plan must address the needs for enhanced transit and pedestrian amenities around these locations. In addition, the plan should seek to develop complementary transit circulation services to promote commuter rail use to/from the Downtown.

2.2 Transportation Trends

The process for the Downtown Orlando Transportation Plan included surveys of downtown residents, employees and visitors to gauge issues regarding traffic, parking, and transit. Two separate surveys were conducted. The first survey was administered as a transit preference survey via a questionnaire that was distributed at local eating establishments, the public library, churches and the senior towers. This same questionnaire was distributed through a web-based survey program and was distributed to several major employers in the downtown. The means by which this survey was administered, however, did not provide for the statistical validity controls that would otherwise be achieved through random sampling techniques. Nonetheless, the survey was widely distributed and collected 899 complete responses. The complete questionnaire is contained in Appendix 2-A.

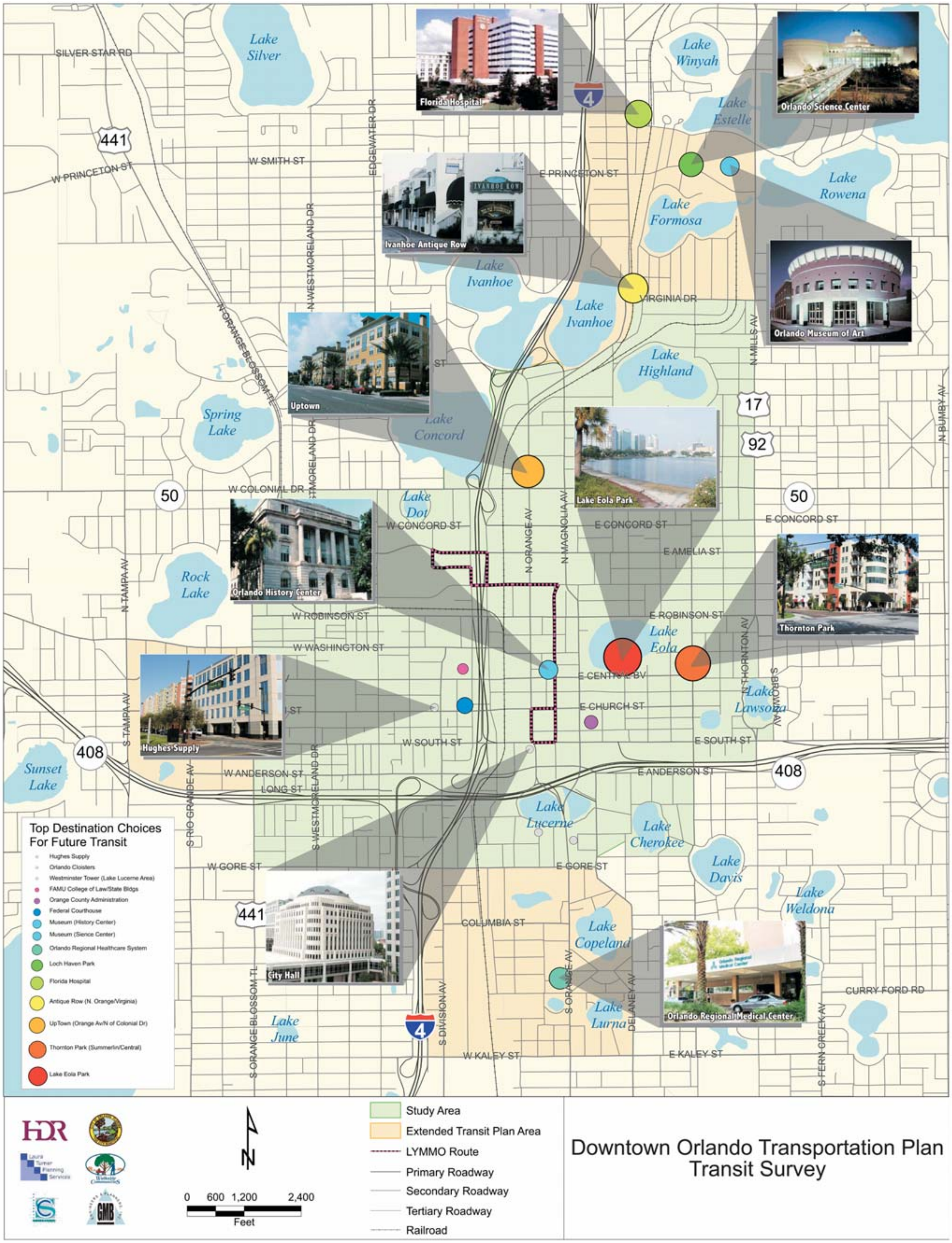
The survey identified locations that residents, employees and visitors would most like to see transit service, how frequently they would use the service, what they would be willing to pay to ride transit to these locations and what style of system would be most appealing. **Figure 2-2** summarizes the locations respondents identified for expanded transit service. The size of the points indicate the frequency of the choice. It is important to note that these survey responses are based upon people's perception and understanding of Downtown as it exists today, not as it will be in 20 years.

The survey also found that respondents prefer (52 percent) a modern or futuristic looking transit system as opposed to a historic or heritage styled system (31 percent) or the existing LYMMO bus system (31 percent).

The Downtown Orlando Traveler Survey was designed and implemented as a computer-assisted telephone interview of phone-accessible households in the Central Florida Region (Orange, Osceola, Seminole, and Lake) including a sample of downtown Orlando residents.

The survey questionnaire evolved through multiple revisions, each pre-tested for length, comprehensibility, and other features. The final version was then transformed into an interview script and installed on computers at the UCF Institute for Social and Behavioral Sciences (ISBS). Interviews were conducted between November 5 and 22, 2005, at the ISBS Survey Research Lab. All interviewers were prescreened for their telephone interviewing skills then participated in a 90-minute training session including two practice interviews. Surveys were conducted between 3:00 and 9:00 PM seven days a week. A Spanish-language version of the survey was available and two surveys were completed in Spanish.

Figure 2-2
Transit Survey - Top Destinations for Future Transit Service



Following IRB approval on November 1, 2005, data collection for the Downtown Orlando Traveler Survey began on November 5, 2005 and concluded on November 22, 2005. A sample of names and telephone numbers for the region (Downtown Orlando, Orange County (excluding downtown Orlando), Osceola County, Seminole County, and Lake County) was purchased from Survey Sampling, Inc., a nationally reputable sampling firm. The sample list contained 6,000 names and numbers that our interviewers attempted to contact 9,225 times. Out of the 6,000 names 841 were unusable numbers (disconnects, changed to unlisted, fax lines).

In addition to the familiar problems with response rates in telephone surveys, some difficulty was encountered obtaining a sample of commuters for this survey. The original survey design called for a sample comprised of 45 percent Downtown Orlando residents (as defined by the survey), 20 percent commuters, and 35 percent visitors. **Table 2-2** below shows the actual sample breakdown by sample group. **Table 2-3** shows the gender split with women accounting for two thirds of the respondents. Of the respondents who live outside downtown Orlando, a majority, 66 percent were residents of Orange County (**Table 2-4**). Survey results were tabulated from the raw data and later normalized by gender and age to reflect the current demographics of the Downtown and the region. Normalized survey results are noted in the summary tables in this section.

Table 2-2
Sample Group Breakdown

Sample Group	Number	Percent
Commuter	96	16.2%
Resident	265	44.6%
Visitor	233	39.2%
Total	594	100.0%

Table 2-3
Gender of Respondents (N=594)

Male	198	33.3%
Female	396	66.7%
		100.0%

Table 2-4
Representative Population Surveyed

County	Number	Percent
Orange	216	65.7%
Seminole	70	21.3%
Osceola	20	6.1%
Lake	23	7.0%
Total	329	100.0%

Travel Characteristics

Downtown Orlando Residents

Besides work, the main purposes that people traveled downtown were for personal business and recreation and entertainment. **Table 2-5** shows the percent split for the various purposes among residents of downtown Orlando. The average travel time to ranges from 5 to 30 minutes for downtown residents and varies by purpose. **Figure 2-3** shows the average travel time for various trip purposes. Work trips average less than 10 minutes, shopping trips have the maximum travel time.

Table 2-6 shows the mode split by purpose for residents of Downtown Orlando. As can be seen from the table, except for school or university trips, driving alone is the most popular mode of transportation around Downtown Orlando. LYNX is most used for conducting personal business or shopping, whereas for recreation and entertainment purposes,

Table 2-5
Trip Purposes for Downtown Orlando Residents (Normalized)

Purpose	Percent	Percent
Work or Work-related Business	23.6%	65.7%
Personal Business	24.1%	21.3%
School/University	1.1%	6.1%
Shopping	18.9%	7.0%
Recreation or Entertainment	26.5%	100.0%
Other/Don't Know/Refused	5.9%	

Figure 2-3
Resident Average Travel Time by Purpose (Normalized)

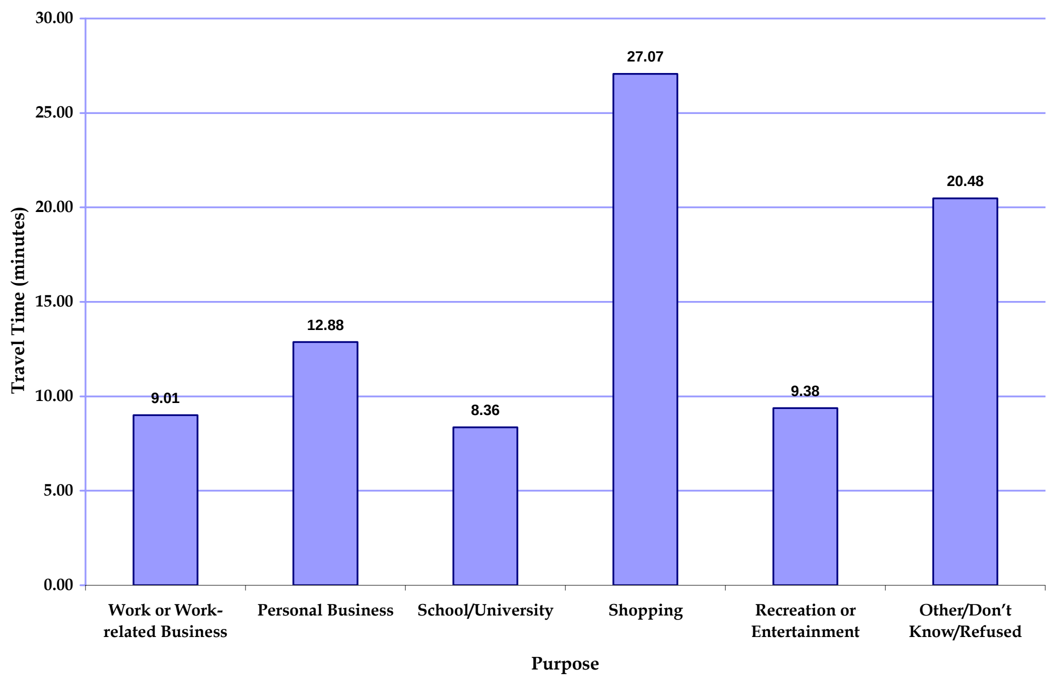


Table 2-6
Resident Mode by Trip Purpose (Normalized)

Mode	Work or Work-related Business	Personal Business	School/University	Shopping	Recreation or Entertainment
Drove Alone	76.7%	52.3%	18.2%	61.2%	41.8%
Shared Ride 1	4.6%	14.5%		8.3%	16.6%
Shared Ride 2+		5.3%			8.1%
Lynx	3.7%	11.7%		10.6%	1.5%
LYMMO	3.7%			5.4%	1.9%
Dedicated Van Service		0.8%		5.2%	0.7%
Taxi		0.8%			1.9%
Walk	7.6%	8.2%		6.7%	24.6%
Bicycle	3.7%				0.8%
Other		6.3%	81.8%	2.7%	1.9%
Total	100.0%	100.00%	100.0%	100.0%	100.0%

walking is most popular. However, walking represents less than 10 percent of all resident trip purposes within the Downtown. This indicates that there is potential for increased walking mode share with improved pedestrian friendly streets.

Commuters

Most commuters (62 percent) arrive between 7:00 AM and 8:30 AM and have an average travel time of 33.4 minutes. 88.5 percent of commuters either drove alone or carpooled. Only 7.3 percent of commuters used LYNX. Similar to Downtown Orlando residents, commuters walked to and from the transit stops to their final destination. However, in comparison to Downtown residents, commuters had to make an average of 1.64 transfers.

Visitors

Most of the visitors to Downtown Orlando either had personal business or came for recreation and entertainment. **Table 2-7** shows the percentage of trips by purpose for visitors. As can be seen in **Figure 2-4**, the average travel time for all purposes are similar to each other and around 30 minutes.

Less than 20 percent of respondents paid for parking at their destinations. A significant majority (64 percent) were able to park for free. This group included employees that have employer provided parking. Among those paid for parking at their destinations, 76 percent paid for parking at every instance whereas 14 percent and 2 percent paid for parking on a monthly or annual basis, respectively. Among the 76 percent who did pay for parking, the average parking fees at their destination end was $2.25.

In terms of transit usage, 51 percent used transit due to the lack of availability of personal vehicles. This indicates that a majority of the population who used transit are transit dependent and not choice riders. The most popular form of access to and egress from the transit stop was walking. The average number of transfers was 0.84 (40 percent made no transfers, 38 percent made one transfer, and 2 percent made three or more transfers).

Table 2-8 shows the mode split by purpose for visitors to Downtown Orlando. As can be seen from the table, for all purposes, driving alone is the most popular mode of transportation around Downtown Orlando. LYNX is most used for conducting personal business, but has a very low share of less than 4 percent.

Around 30 percent of respondents paid for parking at their destinations. A significant majority (63 percent) were able to park for free. Among those who paid for parking at their destinations, 83 percent paid for parking at every instance whereas 1 percent and 3 percent paid for parking on a monthly or annual basis, respectively. Among the 83 percent who did pay for parking, the average parking fees at their destination end was $4.45.

In terms of transit usage, 87 percent used transit due to the lack of availability of personal vehicles. Again, this indicates that a majority of the population who used transit are transit dependent and not choice riders. The most

Table 2-7
Trip Purpose for Visitors

Purpose	Percent
Work or Work-related Business	9.5%
Personal Business	46.9%
School/University	0.9%
Shopping	5.6%
Recreation or Entertainment	34.2%
Other/Don't Know/Refused	2.9%

Figure 2-4
Average Travel Time by Purpose for Visitors

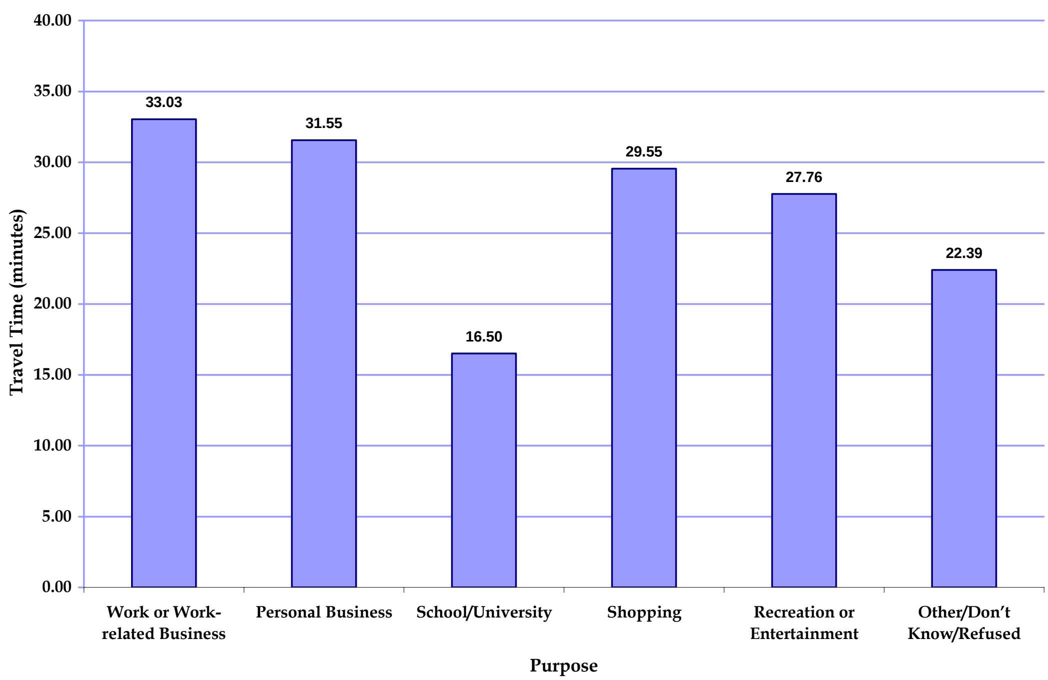


Table 2-8
Mode by Trip Purpose for Visitors

Mode	Work or Work-related Business	Personal Business	School / University	Shopping	Recreation or Entertainment
Drove Alone	97.1%	68.9%	100.00%	66.9%	39.8%
Shared Ride 1		20.8%		21.8%	32.8%
Shared Ride 2+	2.9%	4.6%		11.3%	26.6%
Lynx		3.9%			0.8%
Dedicated Van Service		0.6%			
Other		1.2%			
Total	100.0%	100.0%	100.0%	100.0%	100.0%

popular form of access to and egress from the transit stop was walking. The average number of transfers was 0.83, and 57 percent made one transfer.

Interest in Expanded LYMMO

One of the first questions asked in this section of the survey was the awareness of respondents about the existing Downtown Circulator. Overall, two-thirds of the respondents were aware of the circulator. **Table 2-9** shows the split among the various markets regarding awareness of the circulator. As can be expected, downtown residents were the most aware of the circulator, whereas a majority of visitors were not aware of it.

Nearly 20 percent of surveyed residents indicated that they would use and expanded transit service on a weekly basis. **Table 2-10** shows the market split in terms of interest for the expanded circulator service. As expected, residents of Downtown Orlando show the most amount of interest in taking the expanded service whereas visitors show the least interest.

The various markets were split as to when they were most likely to use the expanded service. **Table 2-11** shows the most distribution of market by time of service usage. Among residents morning (between 6 and 10 AM) and midday (between 10 AM and 3 PM) services were of the most interest. Both commuters and visitors were most likely to use the midday service (between 10 AM and 3 PM). All three markets showed minimal interest in using the service during the afternoon (3 to 7 PM). Overall, the average fare that was considered reasonable for the expanded service was $0.79. However, when looking at the fare that each market would consider as reasonable, the market with the **most** interest in the service (Downtown residents) gave an average fare of $0.69 whereas the market with the **least** interest in the service (visitors) were willing to pay $1.00

The final question asked of respondents was whether the expansion of the circulator service would make them more or less interested in living in Downtown Orlando (see **Table 2-12**). While a majority indicated that it would make no

Table 2-9
Awareness of LYMMO

	No (Percent)	Yes (Percent)
Residents	19.7%	80.3%
Commuters	34.3%	65.8%
Visitors	55.6%	44.4%

Table 2-10
Interest in Expanded Service

North-South Expanded Shuttle	Resi-dents	Commuters	Visitors
Never	43.2%	64.8%	69.4%
Rarely	18.0%	15.6%	16.9%
Once or twice a month	18.7%	3.1%	8.2%
Once or twice a week	7.8%	9.9%	3.0%
Three or four times a week	12.3%	6.6%	2.5%

East-West Expanded Shuttle	Residents	Commuters	Visitors
Never	49.8%	66.7%	76.1%
Rarely	17.1%	15.3%	15.7%
Once or twice a month	14.0%	5.0%	3.5%
Once or twice a week	6.9%	9.7%	3.0%
Three or four times a week	12.1%	3.1%	1.7%

Table 2-11
Service Usage by Time of Day

Service Time	Residents	Commuters	Visitors
Morning	27.5%	25.4%	19.0%
Midday	27.6%	47.1%	35.3%
Afternoon	20.2%	13.5%	15.1%
Evening	24.8%	14.1%	30.6%

Table 2-12
Interest in Living in Downtown Orlando due to LYMMO Expansion

Interest	Residents	Commuters	Visitors
Less Interested	0.4%	0.0%	0.0%
No Difference	57.8%	71.4%	63.9%
More Interested	41.8%	28.6%	35.8%

difference if the LYMMO were to be extended, significant portions of the sample expressed an interest in living in Downtown Orlando if the LYMMO service was extended. Again, current downtown residents expressed the most interest compared to the other two markets.

Demographic Characteristics

Most of the sample living in Downtown were born before 1946 (Pre-WW2). Baby Boomers (born between 1946 and 1964) and Gen Xers (born between 1964 and 1981) dominate the commuters and visitors markets. Gen Y (born after 1981) are the smallest population in the area. **Table 2-13** shows the age groups by market.

Most of the Downtown households have approximately two people and one worker. The commuter market has the most number of workers in the household. Again, the commuter market has the most number of available vehicles in the household. **Table 2-14** gives the household demographics for the sample.

Most of the sample is employed full-time, with the occurrence of retired people highest among Downtown Orlando residents (see **Table 2-15**). In terms of income, the people with the lowest income live in downtown Orlando. About 19 percent of the population earn average household incomes more than $100,000 (see **Table 2-16**).

Survey Highlights

- **52 percent** of survey respondents prefer a modern style transit circulator system over standard bus or historic trolley.
- **44.6 percent** of the surveys were collected from study area residents. The information gathered provides a good basis for planning systems that will be oriented towards a new Downtown residential population.
- **20 percent** of the residents surveyed indicated that they would use an expanded transit circulator system on a weekly basis. Downtown residents represent the largest market segment for future transit riders in the downtown. Most of this existing market of residents reside outside of the Magnolia Avenue corridor that contains LYMMO. The current system has been in operation for nearly 10 years and attracts over 4,360 riders per day (2005 average weekday riders).
- **27 minutes** is the average travel time for downtown resident shopping trips. This is the longest travel time for all resident trip purposes. The average travel time for residents traveling to work or work related business is 5 minutes. This result reflects the lack of shopping opportunities in the downtown area for residents.
- **22 to 24 percent** of non-residents are more interested in living Downtown if the LYMMO system were expanded.

Table 2-13
Age Group by Market

Age Group	Residents	Commuters	Visitors
Pre WW2	34.7%	10.6%	30.7%
Baby Boomers	27.5%	49.2%	31.7%
Gen X	30.2%	37.6%	31.7%
Gen Y	7.6%	2.6%	6.0%

Table 2-14
Household Demographics

Market	Residents	Commuters	Visitors
Total Household Size	2.19	2.84	2.96
Number of Children in Household	0.46	0.84	0.81
Number of Workers in Household	1.22	1.82	1.46
Number of Household Vehicles	1.57	2.29	2.09

Table 2-15
Employment Status

Employment Status	Residents	Commuters	Visitors
Full-time	46.2%	88.9%	48.8%
Part-time	9.0%	8.0%	10.9%
Unemployed	4.7%		4.3%
Retired	29.6%		26.0%
Homemaker	3.4%		4.2%
Student	1.4%	1.5%	1.4%
Disabled	3.5%		1.8%
Other	1.6%		0.6%
Refused	0.5%	1.6%	1.9%

Table 2-16
Household Income

Household Income	Residents	Commuters	Visitors
< $10,000	8.8%		4.2%
$10 to $20,000	9.8%	4.4%	6.2%
$20 to $40,000	7.5%	11.1%	10.9%
$40 to $60,000	11.0%	13.5%	12.5%
$60 to $80,000	9.5%	17.7%	13.7%
$80 to $100,000	6.7%	14.1%	9.8%
$100 to $150,000	9.5%	14.2%	11.9%
$150 to $200,000	1.6%	0.7%	3.9%
$200,000 +	7.1%	4.6%	3.2%
Refused	24.3%	14.9%	19.0%
Don't Know/NA	4.2%	4.7%	4.8%

2.3 The Downtown Vision

The 2000 Downtown Outlook plan established the following vision for Downtown Orlando:

A Place for Families and Individuals to Live, Work and Enjoy

The Downtown Outlook further described this vision with key transportation characteristics including; "...easily navigated roads, accessible transit and pathways", "lakes and other open spaces will be connected with a series of greenways and pathways...providing pedestrian and bicycle connections amongst homes, workplaces, cultural events, and shopping."

The Downtown Outlook prescribed several important transportation enhancements to realize the overall vision that included strengthening pedestrian connections between business activity and recreation areas, installing gateway features at the downtown entrance roadways, making all land uses accessible by all modes, and realigning Division Avenue as a fourth access point to the CentroPlex.

The concepts of "sustainability" and "livable communities" were established as guiding principles for the plan. Other successful livable cities have embraced these concepts. The City of Vancouver for example, recognized as one of the most livable cities in the world, established in their Downtown Transportation Plan that "Sustainability is a direction rather than a destination….Sustainability requires integrated decision making that takes into account economic, (environmental) and social impacts as a whole."

The City of Orlando is working towards sustainability as a direction for future growth and development. To become a sustainable city, it will require implementing policies and plans to provide guidance and incentives that will modify our current travel patterns and behaviors.

Section 3

Foundations of the Plan

3.1 Goals and Objectives

Transportation Mission Statement

The Downtown Outlook vision and the Mayor's 20 Point Downtown Transition Team Report was reviewed to develop a mission statement for the Downtown Orlando Transportation Plan.

"To use transportation improvements as a catalyst to create quality "people places," to promote the downtown experience and to make Orlando a great place to live, work and play."

The mission statement recognizes the role of transportation in creating a sense of place in Downtown and that properly planned transportation can energize development and redevelopment. The opposite is also true. Poorly functioning transportation systems can lead to blight, stall growth and detract from the Downtown experience. Therefore, it is critical for the transportation system to be integrated into the existing and future development framework of the Downtown.

Transportation Goals Developed By the Mayor's Downtown Transition Team

GOAL 1. To develop a comprehensive and current Downtown Transportation Plan.

<u>Purpose</u>: To advance the completion of a comprehensive and current Downtown Transportation Plan that can guide transportation-related issues in the downtown area. There are a number of existing local and regional transportation planning agencies and existing plans to shape Downtown Orlando. These plans encompass road, transit, bicycle, and pedestrian issues and opportunities. While the City has a comprehensive transportation plan for the entire City, the current plan does not specifically provide details on a number of transportation issues specific to Downtown. A plan must exist specifically to provide details on transportation issues in Downtown. Recommendations are intended to address Downtown road network improvements and changes specific to roadway/intermodal connections to Downtown; ITS opportunities; signal enhancements; pedestrian, bicycle, bus routing, and rail plans; and circulator/ streetcar and parking facility expansion opportunities.

GOAL 2. To create vibrant, interconnected "people places" that ensure Downtown Orlando is a pedestrian, bicycle, transit, and automobile friendly environment.

<u>Purpose</u>: To establish planning and implementation efforts in order to make Orlando more accessible for visitors and residents in regards to walking, parking and bicycling. The goal's basic steps and action items place a significant emphasis on ensuring that "downtown walkability" is a top priority. Recommendations are intended to make downtown walkability" a priority in short-term and long-term decision making; to ensure that parking needs and programs are coordinated with market needs; and to create community bike programs, walking tours, assigned jogging routes, and recreational opportunities in order to ensure that Downtown accommodates all users and attracts new residents and visitors.

GOAL 3. To ensure that the redevelopment of Interstate 4 is an asset to Downtown.

Purpose: To promote the redevelopment of I-4 as a project that will advance Downtown connectivity, maximize urban green space and commercial areas, and will result in acceptable Downtown traffic circulation. The I-4 project will dramatically change many elements in the Downtown area, and if designed appropriately can be the catalyst for many transportation and quality of life improvements. Recommendations are intended to ensure that City staff and Downtown stakeholders are involved in key design issues that implement an I-4 project that advances the City's vision.

GOAL 4. To ensure a transit-rich environment for Downtown Orlando.

Purpose: To monitor the Downtown area and identify, understand and address transit opportunities, and to ensure that Downtown Orlando serves as the region's transportation hub. Recommendations are intended to achieve a comprehensive review of the proposed regional and Downtown transit plans and opportunities to ensure that Downtown remains a critical hub for regional transit.

Transportation Element Goals, Objectives & Policies

The City's current Growth Management Plan (GMP) provides relevant goals, objectives and policies that reinforce the mission statement and transition team goals. The referenced GMP polices, as approved by the City Commission, provide support for development of projects and strategies in this plan. These policies should be reviewed and amended as necessary to implement the plan.

Intermodal System

GOAL 1

To develop a balanced transportation system that supports building a livable community and improves access and travel choices through enhancement of roads, public transit, bicycle and pedestrian systems, intermodal facilities, demand management programs, and traffic management techniques.

Objective 1.2 Every metropolitan activity center shall be served by internal public transit, bikeway, and pedestrian systems by 2010, and every urban activity center shall integrate such systems to the maximum extent possible.

Policy 1.2.2 New or expanded metropolitan activity centers shall only be approved in conjunction with the approval of financially feasible plans for internal transit, bikeway, and pedestrian systems that reduce reliance on automobiles for access and internal circulation.

Policy 1.2.3 New or expanded urban activity centers shall only be approved in conjunction with the approval of financially feasible plans for bikeway and pedestrian systems that reduce reliance on automobiles for access and internal circulation.

Objective 1.3 Within the City of Orlando, 5 percent of work trips shall be by public transit, and 20 percent of non-home based internal trips within metropolitan activity centers shall be by means other than the single-occupant vehicle by 2015.

Objective 1.4 The City shall maintain within the Land Development Code standards for access to public transit, bicycle and pedestrian systems. Such standards shall apply to new developments, substantial enlargements and substantial improvements of existing developments, and to road improvements.

Roadway System

Policy 1.8.3 When major thoroughfares located outside the Transportation Concurrency Exception Area are added to Figure TE-1 (in the GMP), the default Level of Service (LOS) Standard shall be as follows: 1) LOS Standard "E", or 2) If the roadway is operating at LOS "F", to maintain or improve the roadway performance at time of inclusion in Figure TE-1 (in the GMP).

Policy 1.8.4 The City shall develop roadway projects based on the need to improve transportation system efficiency balanced with quality urban design, whether inside or outside the Transportation Concurrency Exception Area. Where appropriate, roadways will be designed to ease the flow of buses by using turn-out bays, pre-emptive signals, high-occupancy vehicle lanes, and bus-only lanes.

Policy 1.8.5 Improvements to the transportation system shall be prioritized based on safety considerations, existing deficiencies, multimodal and environmental considerations, physical, economic and policy constraints, contribution to quality urban design, required right-of-way needs, level of service, and appropriate system continuity.

Policy 1.10.1 The City shall ensure that existing and new residential developments are connected by roadways, bikeways, and pedestrian systems that encourage travel between neighborhoods and access to transit without requiring use of the major thoroughfare system.

Public Transit System

Objective 1.13 The City shall prioritize transit headway improvements along designated transit corridors throughout the planning period.

Policy 1.13.1 The City shall strive to maintain or improve a 30-minute weighted average headway on fifty-nine percent (59 percent) of the designated transit service corridors with the Transportation Concurrency Exception Area (TCEA) by 2005.

Policy 1.14.4 The City shall require that transit facilities, such as turn-out bays, pre-emptive signals, high-occupancy vehicle lanes, bus-only lanes, and transit shelter locations, be included in roadway design proposals, as appropriate.

Policy 1.14.5 The City shall seek opportunities for development around transit centers, including rail stations, in an effort to encourage public transit ridership.

Policy 1.14.9 The City may eliminate on-street parking from thoroughfares as required to enable the development of public transit, bicycle, and pedestrian systems.

Objective 1.16 The City shall become the hub of the statewide intercity rail system by 2010.

Policy 1.16.1 The City shall work with the Florida Department of Transportation to identify appropriate corridors and sites for stations and ancillary development for statewide intercity rail systems. Statewide intercity rail stations located Downtown, at Orlando International Airport, and at the International Drive activity centers are considered highly desirable by the City to provide access to the greatest number of users.

Policy 1.16.2 The City shall work with the Central Florida Regional Transportation Authority (dba Lynx) to make available appropriate types and levels of public transit service to interconnect with the statewide intercity rail system at stations within or near the City and to help mitigate the traffic impacts of such stations.

Financing

Policy 3.2.5 The City shall support the construction of transit centers and park-and-ride lot projects related to the area's expressway facilities expansion. These projects will benefit current system users and encourage use of alternative transportation modes.

Policy 3.3.5 First priority for funding transit improvements shall be based upon improving headways on existing routes. The City also shall consider funding expanded coverage of the transit system within the city limits as well as service enhancements which improve ridership, accessibility and travel time.

Intergovernmental Coordination

Policy 4.1.3 The City shall actively participate in station area planning, design work, and siting of statewide intercity rail stations and ancillary facilities consistent with future regional consensus plans and the Future Land Use Element

Transportation Plan Objectives

The following are the objectives for the plan:

- Develop a plan that supports the Transportation Vision for Downtown
- Develop Transportation Strategies and Policies that Support a World Class City
- Plan a Transportation System that will Sustain Growth and Enhance Mobility
- Provide Transportation Improvements and Transportation Options
- Develop a Plan to Accommodate All Users and Modes
- Develop a Plan and Process for Implementation

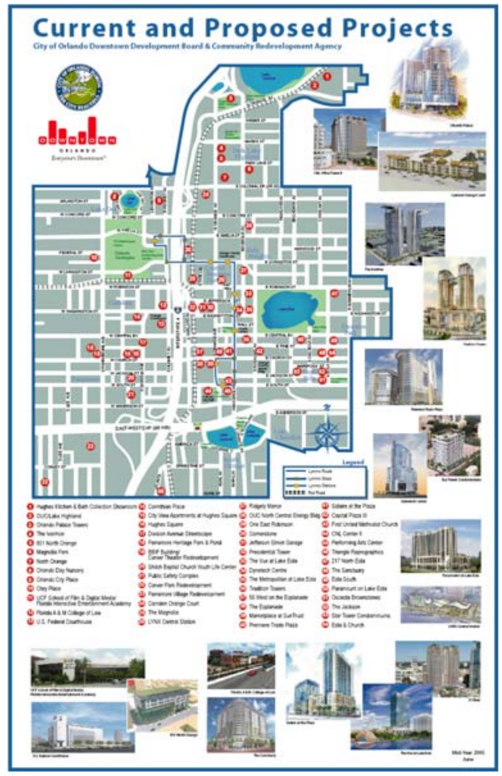
3.2 Study Methodology

A number of transportation planning tools were used to develop and assess the Downtown Transportation Plan. One of these was the METROPLAN ORLANDO OUATS 2025 travel demand model (FSUTMS/Tranplan). Other tools included the development of a year 2015 SYNCHRO/SimTraffic peak hour roadways and intersections model for the study area, and various Geographic Information System (GIS) data sets were developed for land use and transportation analysis. These are briefly described below.

OUATS 2025 Travel Demand Model

The Orlando Urban Area Transportation Study (OUATS) 2025 travel demand model was adopted in 2003 and contains the projected future land use of the region by discrete traffic zones and includes the cost-feasible set of transportation improvements planned by year 2025. The main function of the OUATS model is to assign trips to a multi-modal transportation network (including automobile, transit and walking) to connect origins and destinations based upon the least path of resistance that is calculated as a function of travel time and cost. This model replicates actual person trip behaviors for seven different trip purposes, such as trips made from home to work or home to shopping. The model is a reasonable estimation tool for predicting daily roadway volumes and daily transit ridership on a regional scale and predicting changes in travel patterns and travel behaviors in response to land use, mode and network changes. The model is less accurate, however, at predicting volumes for all roadways on a dense roadway network.

The model is most accurate as a comparative tool and was used primarily for that purpose in the plan. The results of the models were used to evaluate different transportation options and to calculate network statistics such as transit ridership of system volume/capacity ratios. These types of performance measures contributed to the overall evaluation of the network and system options.



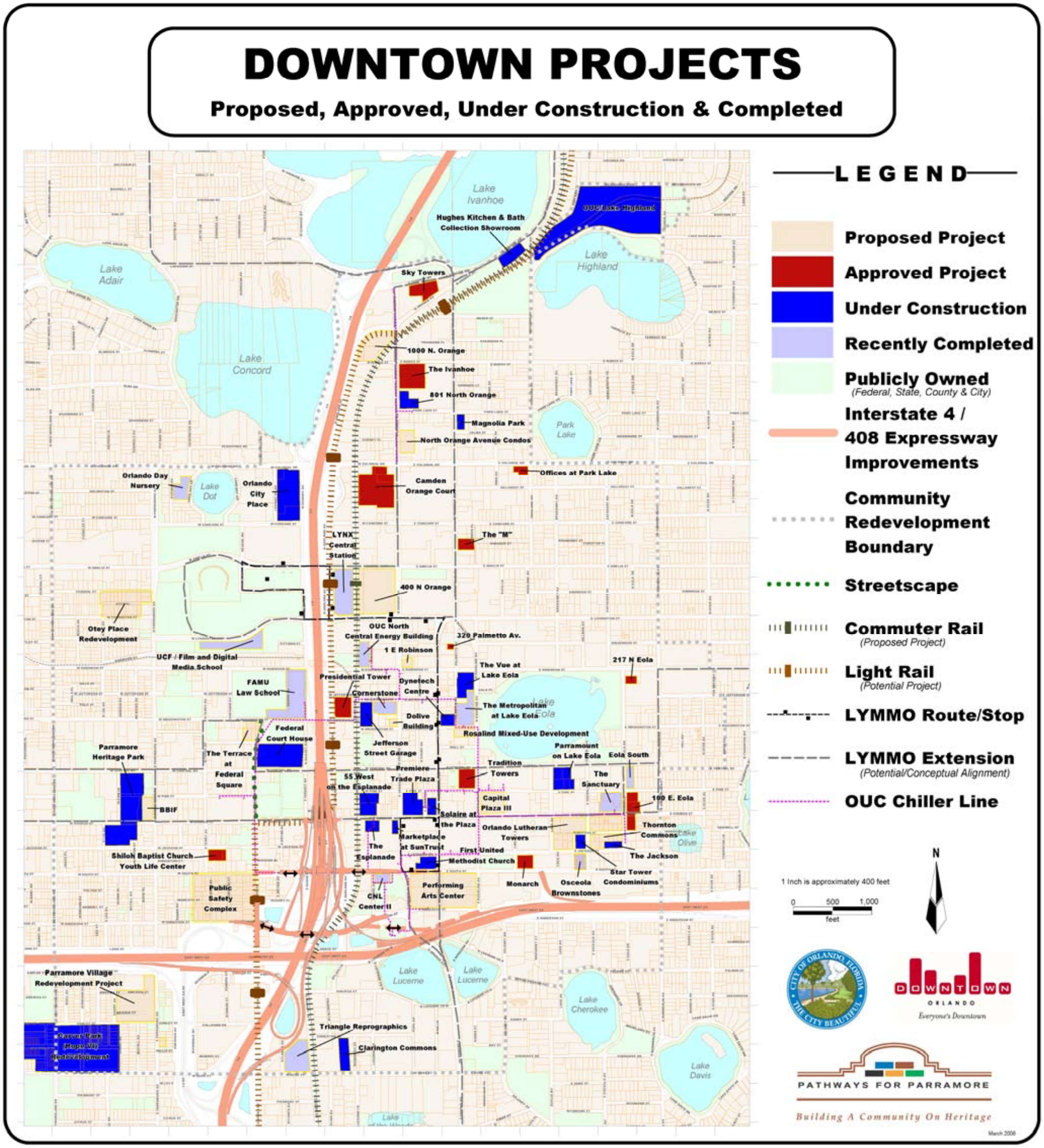
The OUATS 2025 adopted land use data sets were reviewed against the City's Growth Management Plan 2004-2030 Growth Projections Report, February 1, 2005 and determined that the overall development targets for the study area were reasonably represented but in several instances development was not located in the proper traffic analysis zone or was of a different land use category. For example, the City has converted office development entitlements from the Downtown DRI into Multi-Family development entitlements to accommodate the demand for more condominium units. These changes were updated in the OUATS model data to better reflect these types of changes. A year 2025 replacement data set was developed for the OUATS model and used for all model network alternatives in the plan. Only one land use plan was assumed in the study for the year 2025 horizon, however, it should be noted that new locations for major civic uses such as the Centroplex Arena and Performing Arts Center are being considered by the City. These plan recommendations should be examined with the potential locations of these venues and refined as needed to accommodate major changes to the land use assumptions.

SYNCRHO/SimTraffic Model

The plan includes an analysis of peak hour roadway traffic conditions for year 2015. The purpose of this analysis was to evaluate the near-term impact of growth on Downtown street congestion and to identify near-term improvements that will provide congestion relief. The project team developed the base year 2015 SYNCHRO model of the Downtown Orlando Transportation Plan study area by expanding the City's 2008 SYNCRHO model. The study team collaborated with the City at the outset of the study to collect existing models and relevant data for the Downtown Plan. The models included the I-4 Master Plan CORSIM model for Downtown, the CSX Freight Relocation Study intersection delay SYNCHRO model, and gathered various SYNCHRO models that have been provided to the City in traffic studies required as part of the development review process.

The expanded area extended north to Lake Ivanhoe, west to US 441, south to Gore Street and east to Summerlin Avenue. The 2015 Downtown Orlando SYNCHRO model incorporated the intersection geometric and traffic control characteristics (i.e., number of lanes on each intersection approach, length of turning lanes, and traffic signal controller and coordination timing plans). SYNCHRO is a traffic simulation and analysis tool that traffic engineers use to evaluate traffic flow characteristics along an arterial corridor or through a roadway grid network. Traffic data in the model was populated from models gathered during the data review of previous studies. The network alternatives

Figure 3-1
Downtown Development Activity



analysis conducted using the regional travel demand model was also used as an input for modifying the peak hour traffic assignments in the SYNCHRO/SimTraffic models for the near-term improvements assessment.

3.3 Downtown Development

In mid-2005 there were approximately 54 projects currently underway in planning or construction within the limits of the CRA including condominium, office and retail adding to over 4,400 business presently located in the Downtown. A number of these projects are shown in **Figure 3-1**. In addition, the Florida Hospital Orlando Campus is under construction and expansion to add a new 15-story patient tower that will contain the Florida Hospital Cardiovascular Institute, 440 patient beds, and one of the largest Emergency Departments in the country. The Florida Hospital expansion has included a 500 space parking garage and realignment of Rollins Street to make way for the new buildings. In addition, Orlando Regional Healthcare recently opened the 11-story, 273 bed Winnie Palmer Hospital for Women and Babies. ORHS is currently evaluating additional expansion plans for the Medical Arts District at the south end of the study area.

3.4 Key Issues to be Addressed

Several important ideas and issues were discussed with City Staff, the public and with the Downtown Transportation Plan stakeholder committee. Most of these are not new ideas but rather ideas that have surfaced in previous plans and studies. Where appropriate, these key issue are being reviewed again in the context of this comprehensive study of Downtown Transportation. The key issues are described below.

Orange Avenue—circa 1920-1930.
Source: Orange County Regional History Center.

Converting Orange Avenue to Two-Way Traffic

Many view Orange Avenue as the Downtown Main Street in a conventional sense, although, historically Magnolia Avenue was actually called Main Street up until the early 1900’s. A traditional Main Street has a very active street scene with highly walkable streets, shops, boutiques, civic and government buildings. Historically, Main Streets were two-way streets and provided on-street parking. Some argue that Orange Avenue should become two-way once again in order to foster the types of street activities and support the types of development characteristic of a traditional Main Street.

The counter to this view is that Orange Avenue is now a state highway (SR 527) facility that handles the majority of southbound trips within the City. It is currently a three lane, one-way roadway through the length of Downtown and it has on-street parking north of Jefferson Street and between South Street and Anderson Street near City Hall. At night time, on-street parking is permitted between Jefferson Street and Church Street and on some weekends it is closed to through traffic altogether. Converting this section to two-way traffic would diminish the traffic carrying capacity of the roadway and create additional traffic delays.

Section 7 evaluates roadway network alternatives and considered converting Orange Avenue to two-way within the Downtown core. The analysis does not support the conversion of the entire length of Orange Avenue or Rosalind Avenue south of SR 50 at this time for several reasons.

- Orange Avenue is critical for improved transit circulator service and the potential for future Premium Transit to the Downtown.
- Current predictions of traffic delays on Orange Avenue would impact the ability for transit operating in mixed traffic on other impacted streets to effectively serve the downtown and prevent ridership from growing and maturing into a successful transit system.
- Orange Avenue is physically constrained between Jefferson and Church Street and cannot accommodate transit, 2-way traffic, parking and adequate sidewalks and streetscape.

Magnolia Avenue between South Street and Anderson Street

Magnolia Avenue is a critical component to the Downtown future transit system and traffic circulation plan. The plans for the Performing Arts Center have considered the potential of closing Magnolia Avenue between South Street and Anderson Street. Section 7 of the report provides an analysis of traffic circulation and transit circulation options with this block open and closed. The expanded transit circulation plan must extend south to the Orlando Regional Healthcare System and north to Florida Hospital—both major employers and interface locations to commuter rail. The extension south uses the existing Magnolia Avenue block to connect below the SR 408 and make it’s connection to Lucerne Circle. Several transit options were considered and were reduced to two options, both of which connect through the Performing Arts Center block. This roadway section also serves to improve travel from Orange Avenue, Magnolia Avenue and Rosalind Avenue for access to SR 408 and I-4 by reducing intersection delays at Orange Avenue/South Street and Orange Avenue/Anderson Street.

Expanding LYMMO Service

The need to expand transit circulator options is a major component of the overall plan. The expanded service is discussed in Section 5 and provides for four new circulator systems connecting from Florida Hospital to ORHS and from the Citrus Bowl to Thornton Park. The expanded service connects convenient parking with downtown activities and connects commuter rail with centers of employment.

3.5 Public Involvement

Stakeholder Steering Committee

Working closely with the area's stakeholders is an important component of this study. To make sure that all transportation issues are considered, a Stakeholder Steering Committee was created. This group advised the study team at key decision points by sharing firsthand knowledge of the area while also providing feedback related to the technical activities.

Initially, the following groups were invited to join this Committee:

Employers & Businesses

- Florida Hospital
- Orlando Regional Healthcare System
- Florida A & M University Law School
- Valencia Community College
- Orlando Utilities Commission
- Orange County Administrator
- Downtown Property Managers
- Downtown Developers
- U.S. Department of Justice
- University of Central Florida – Downtown Campus

Neighborhood Associations & Community Organizations

- Parramore
- Callahan
- Delaney Park
- Colonialtown
- Lake Davis
- Orwin Manor
- Lake Dot
- Cherokee
- Thornton Park
- Park/Lake Highland
- Lake Formosa
- METROPLAN Orlando

Agencies and Boards

- Downtown Development Board
- Development Review Committee
- Orlando Municipal Planning Board
- LYNX
- Florida Department of Transportation
- Downtown Strategic Transition Team
- Downtown "Get Around Team"

Destinations

- Orlando Museum of Art
- Menello Museum of Art
- Shakespeare Festival
- Centroplex (Arena, Bob Carr, Expo Center)
- Orange County Regional History Center
- Orange County Public Library (Central Boulevard Branch)

Associations

- Downtown Orlando Partnership
- Greater Orlando Chamber of Commerce

The Committee's first meeting was held on July 7, 2005, introducing the study to the group. The meeting also provided the format for the exchange of ideas, thoughts, and concerns about transportation within this study area. This group met two more times during the course of the study. Meeting minutes and handouts were posted on the City's web site (www.cityoforlando.net).

Community Workshops

Two community workshops were held during this study. The first workshop was held in September 2005 as data collection activities concluded and as initial solutions were taking shape. This information was shared with the public in an informal, open house setting. This format allowed for individuals to review information, to ask study team members specific questions, and to share reactions with the team. Input received has been used to guide the study team as they worked to develop detailed strategies to address Downtown's transportation issues.

A second workshop was held after the Plan was drafted in October 2006. Using the informal, open house setting, participants were able to see how input was used in addressing issues while also asking questions, and sharing reactions. This input was used to refine the Plan as it was finalized. For both workshops, the Stakeholder Steering Committee was given a preview of materials that were used. Individuals learned about the workshop through mailings, articles in local newspapers, newsletters, web sites, and advertising.

Other Communication Tools

To effectively address the transportation issues for the Downtown Area, there needs to be the open exchange of information. In addition to the Stakeholder Steering Committee and community workshops, other communication tools were used to make sure that information is accessible and questions are answered as they surface.

- ***Briefings*** were made before small groups and local boards (such as the Downtown Development Board, METROPLAN Orlando's Board and Advisory Boards, and the City's Community Redevelopment Agency) and City Council. These meetings provided additional opportunities to share study updates and to receive input.

- ***Articles in Existing Newsletters*** tapped into existing readership to provide updates and to direct readers to more information.

- ***Updates on Orlando's Web Site*** (www.cityoforlando.net) are posted so that the most current study information is available at any time. Links are also available to other existing web sites.

- ***Press Releases and Packets*** were used to share information with the media. The following outlets were contacted.

Television

- WESH – Channel 2
- WKMG – Channel 6
- WFTV – Channel 9
- CFN – Channel 13
- WOFL – Channel 35
- WMFE – Channel 24
- Telemundo
- Univision 26

Print

- The Orlando Sentinel
- The Orlando Times
- El Nuevo Dia
- La Prensa
- The Orlando Weekly
- Orlando Business Journal
- Associated Press

Radio

- WDBO
- WMFE/NPR
- WFLA

Availability to respond to questions and to provide project information has occurred throughout the study through the City's Project Manager.

Design Work Sessions

This study addresses the following technical transportation areas: freight, parking, transit, pedestrian environment, bicycling, traffic, and roadways. A series of one-day work sessions were held to provide the opportunity to have focused discussions for each transportation topic, following this schedule: freight and parking (July 12, 2005); transit, pedestrian environment, and bicycling (July 13, 2005); and traffic and roadways (July 13, 2005). The study team, City staff, and citizens participated in these sessions. Each session began with an overview of the day's topics, including the input received at the July 7 Stakeholder Steering Committee meeting. After this briefing, small groups worked on developing initial approaches, and the day's work efforts were shared with the group in a final presentation at the end of each work day.

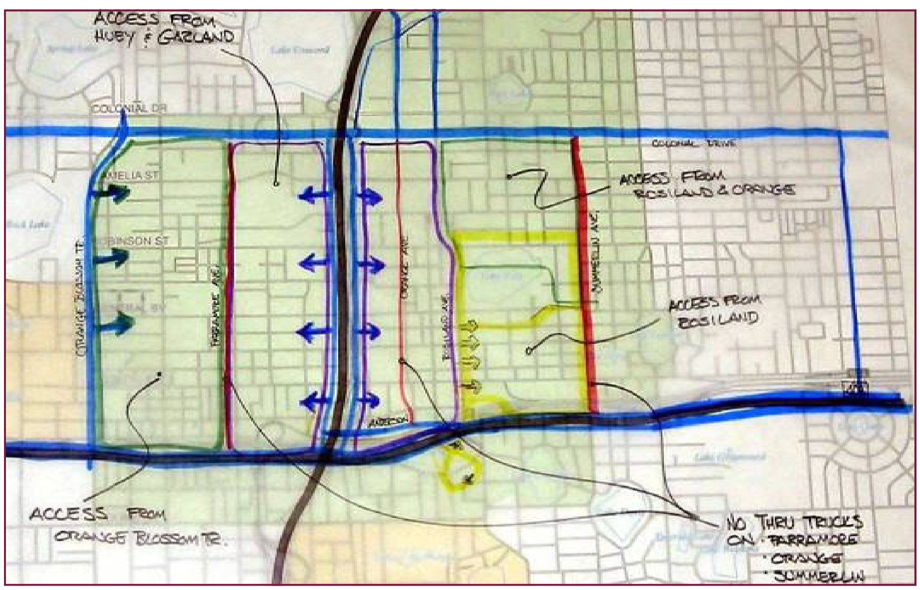
Work Session Outcomes

The primary outcomes of the work sessions are presented below. A full summary the work sessions is provided in Appendix 3-A including strategies and concepts.

Freight

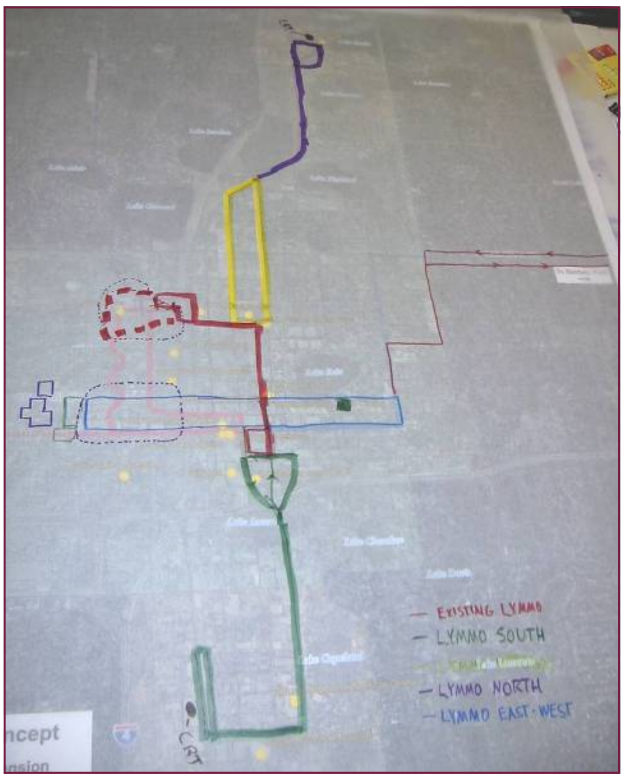
Six primary ideas were discussed regarding freight:

- Truck routes and restrictions
- Time-of-day restrictions
- Downtown Transshipment Center
- Loading zone strategies
- Truck parking



Proposed truck routing concept in the Downtown core.

The proper dimensions of back-in angle parking were tested during one work session on this Orlando street with a landscape buffer between the sidewalk and the roadway.



Preliminary concepts for improved transit circulator routes.

Parking

The session involving parking included work on the following:

- Managing parking demand
- Identifying existing and future locations of high, medium, and low parking demand
- Accommodating motorcycle and moped parking
- Model parking project locations for parallel parking, back-in and front-in angle parking, and municipal garages
- Preferred design elements and criteria for parallel parking, back-in angle parking (on both one-way and two-way streets), and off-street parking

Transit

The transit session included a number of tasks such as:

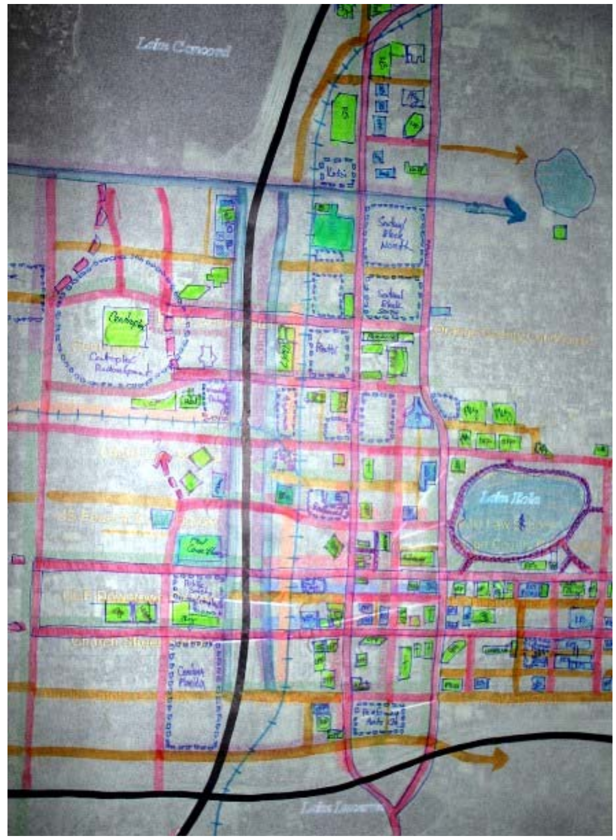
- A review of Downtown employment and population densities in the existing travel demand model, as well as differences between the model and programmed development
- Identifying potential transit circulator routes for further analysis and evaluation
- Identification of transit roadway requirements, such as horizontal and vertical bus clearances, and platform areas

Bicycling and Walking

The bicycling and walking work session focused on the following elements:

- Bicycle parking
- The Downtown bicycle network

- New policies to address bicycling and walking
- Addressing barriers to bicycle connectivity along I-4 and SR 408
- Pedestrian emphasis zones and street designations
- Pedestrian interaction with transit
- Criteria for prioritizing the elimination of gaps in the bicycle and pedestrian networks
- Recommendations for improving the walkability of Downtown, including establishing defensible space through design, sidewalk elements and preferred design characteristics, driveway design, pedestrian-friendly intersections, pedestrian crossings, and street characteristics such as lane widths.



Roadways and Traffic

The primary elements discussed during the roadways and traffic work session were as follows:

- Roadway connections
- Roadway network needs to accommodate special events in the Downtown
- The existing and proposed future roadway hierarchy
- Roadway conversions to two-way streets
- Traffic engineering recommendations including traffic progression and signal upgrades
- Benefits and potential applications of "road diets" within Downtown

Concepts for new and improved roadway connections.

Section 4

Bicycle & Pedestrian Plan

Bicycle Facility Plan

The plan recommends a network of bicycle facilities that will provide access to, from, and within Downtown, and accommodate a wide variety of users from advance-level to novice cyclists, and adults to children.

The facilities proposed include a combination of paved multi-use trails, on-street bicycle lanes, and signed and marked bicycle routes. Primary bicycle corridors are the major routes intended for bicycle travel into and within Downtown.

The Dinky Line Bridge over Lake Formosa is among the first completed sections of the Orlando Urban Trail, which is proposed to be a primary spine for bicycle travel into and through Downtown.

On-street bicycle lanes provide the safest form of travel for bicyclists in urban areas because they allow separation from traffic lanes, and in clear view of traffic.

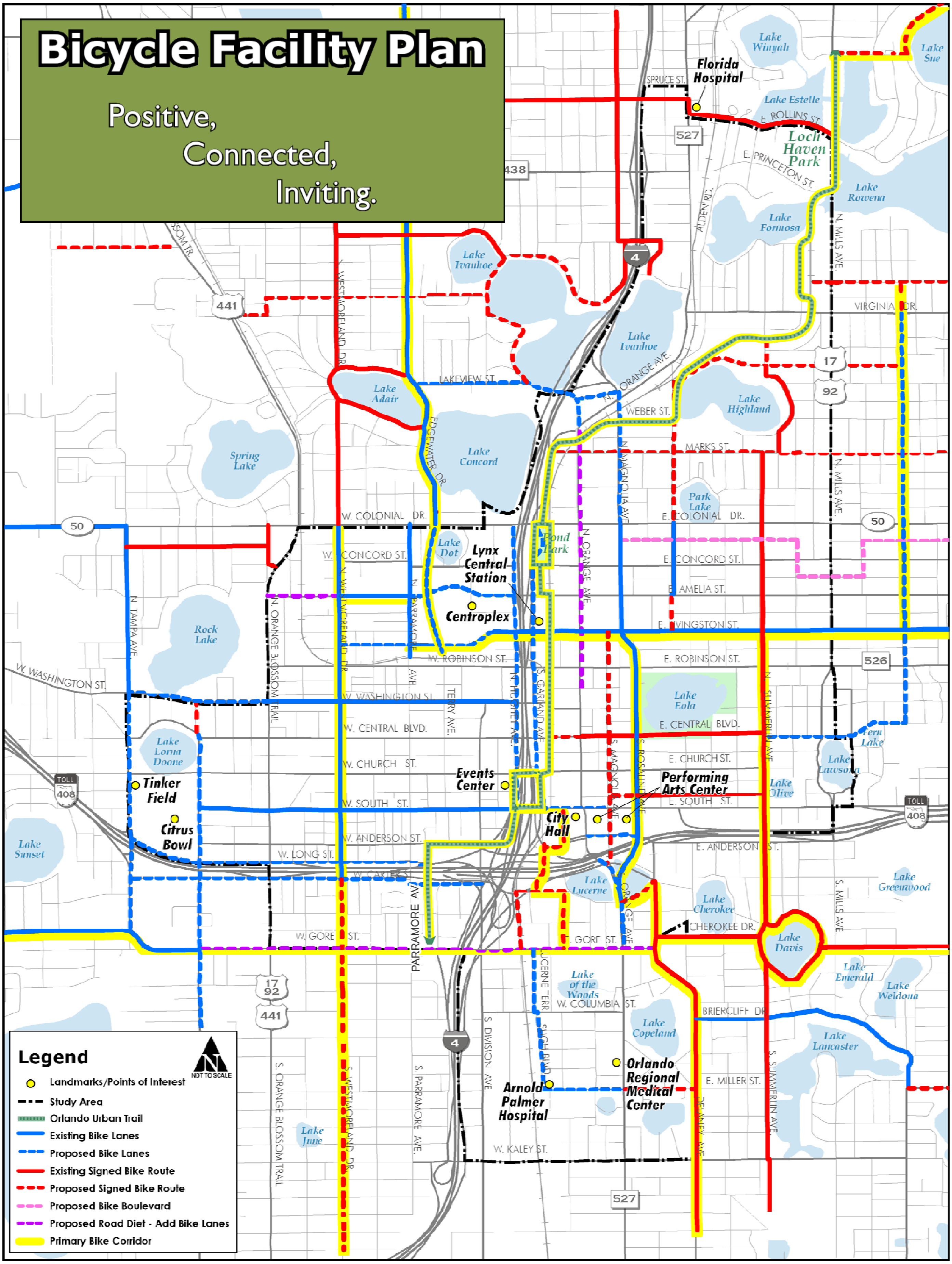
When it is not feasible to include exclusive bike lanes, desirable bicycle routes will be signed with bicycle route markers and marked with pavement markings.

A "bicycle boulevard" is proposed for Hillcrest Street, one block south of SR 50; it is essentially a signed and marked bike route on a series of well connected local streets that give bicyclists preference over vehicular traffic.

The model for brick streets with smooth concrete bike lanes on Livingston Street is recommended for use on other brick roadways having sufficient width or those that may be converted to brick.

An adequate number of bicycle racks shall be placed conveniently to destinations as part of a street's hardscape, and out of pedestrian walking areas.

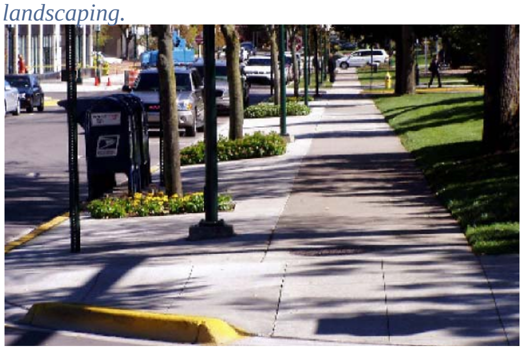
The plan recommends proper accommodation of bicycles with transit, including the potential for either shared bike/bus lanes or a bicycle lane located to the left of the transit lane.


Bicycle Facility Plan
Positive,
Connected,
Inviting.
Legend
Landmarks/Points of Interest
Study Area
Orlando Urban Trail
Existing Bike Lanes
Proposed Bike Lanes
Existing Signed Bike Route
Proposed Signed Bike Route
Proposed Bike Boulevard
Proposed Road Diet - Add Bike Lanes
Primary Bike Corridor
NOT TO SCALE
Florida Hospital
Loch Haven Park
Lake Ivanhoe
Lake Adair
Lake Concord
Spring Lake
Rock Lake
Lake Lorna Doone
Tinker Field
Citrus Bowl
Lynx Central Station
Centroplex
Events Center
City Hall
Performing Arts Center
Lake Eola
Lake Lucerne
Lake Davis
Lake Cherokee
Lake Copeland
Orlando Regional Medical Center
Arnold Palmer Hospital
Lake Highland
Park Lake
Pond Park
Lake Dot
Lake Winyah
Lake Sue
Lake Estelle
Lake Rowena
Lake Formosa
Lake Lawsona
Fern Lake
Lake Olive
Lake Greenwood
Lake Emerald
Lake Weldona
Lake Lancaster
Lake of the Woods
Lake Sunset
Lake June
W. COLONIAL DR.
E. COLONIAL DR.
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
E. LIVINGSTON ST.
W. ROBINSON ST.
E. ROBINSON ST.
W. WASHINGTON ST.
W. CENTRAL BLVD.
E. CENTRAL BLVD.
W. CHURCH ST.
E. CHURCH ST.
W. SOUTH ST.
E. SOUTH ST.
W. ANDERSON ST.
E. ANDERSON ST.
W. LONG ST.
W. GORE ST.
E. GORE ST.
W. COLUMBIA ST.
W. KALEY ST.
E. MILLER ST.
BRIERCLIFF DR.
CHEROKEE DR.
VIRGINIA DR.
MARKS ST.
WEBER ST.
LAKEVIEW ST.
SPRUCE ST.
E. ROLLINS ST.
E. PRINCETON ST.
ALDEN RD.
ORANGE AVE.
N. MILLS AVE.
S. MILLS AVE.
N. SUMMERLIN AVE.
S. SUMMERLIN AVE.
N. MAGNOLIA AVE.
S. MAGNOLIA AVE.
S. ROSALIND AVE.
N. ORANGE AVE.
S. ORANGE AVE.
S. GARLAND AVE.
N. HUGHEY AVE.
TERRY AVE.
N. PARRAMORE AVE.
S. PARRAMORE AVE.
N. WESTMORELAND DR.
S. WESTMORELAND DR.
N. ORANGE BLOSSOM TRAIL
S. ORANGE BLOSSOM TRAIL
N. TAMPA AVE.
EDGEWATER DR.
S. DIVISION AVE.
LUCERNE TERR.
DELANEY AVE.
50
441
438
527
526
17
92
408
4

Pedestrian Plan

A positive pedestrian culture will be created in Downtown Orlando by improving the security, convenience, efficiency, comfort, and welcome of the pedestrian environment. The plan recommends numerous treatments and improvements to successfully accomplish this goal.

Primary Pedestrian Streets will include 15-foot minimum sidewalks widths (includes planting strip, if used), attractive and integrated street furniture, awnings or overhangs, a minimal number of driveways, low traffic speeds, and great use of street trees and ground cover landscaping.



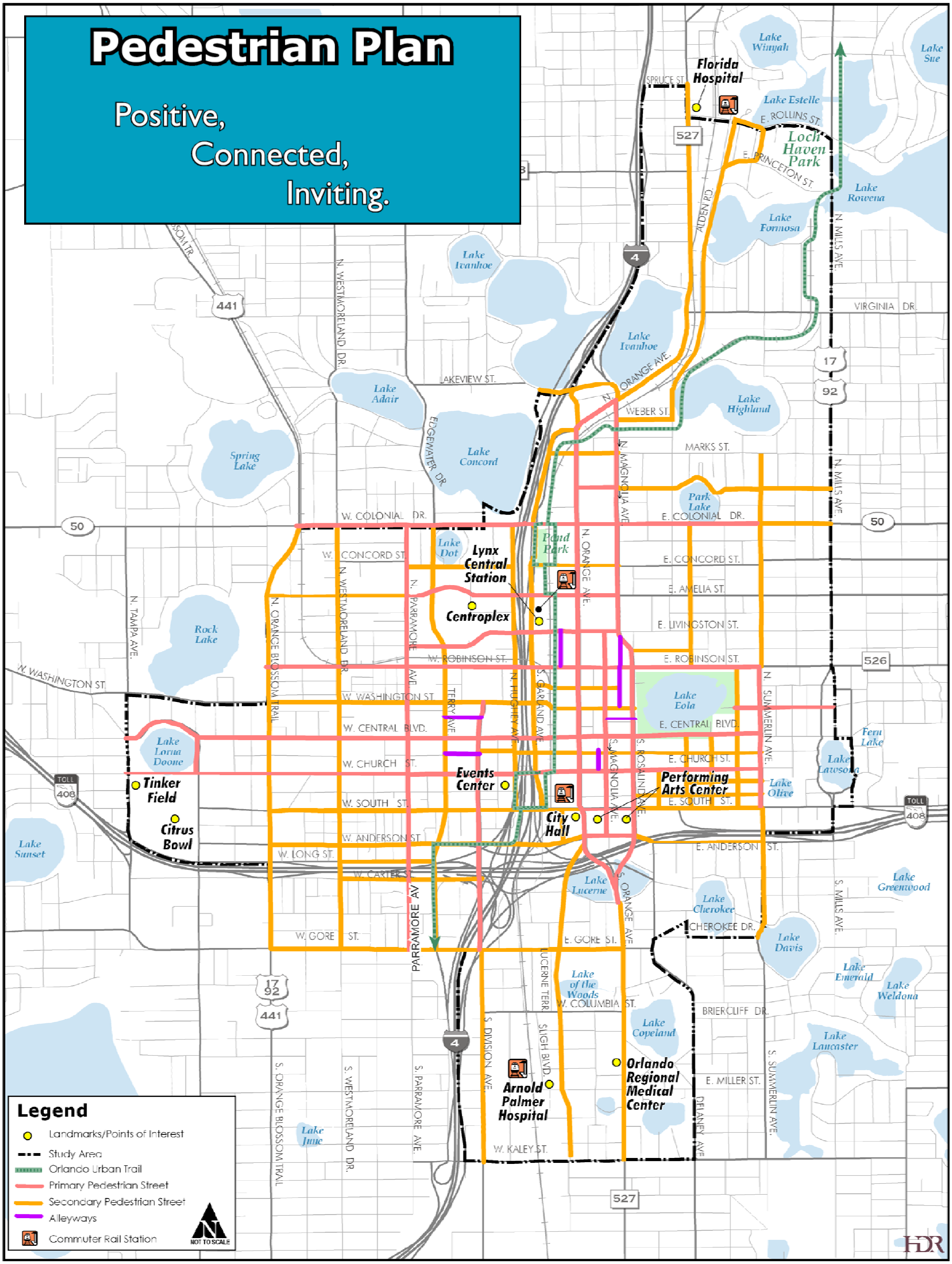
Secondary Pedestrian Streets will include 11-foot minimum sidewalk widths (including a minimum 6-foot wide planting strip, if used), buildings built to the street or with modest setbacks, a minimal number of driveways, low traffic speeds, and good use of trees with lots of shade.

Street trees will be used liberally in Downtown to provide numerous benefits, including shade and cooler temperatures for pedestrians.

Improved building transparency will provide for natural surveillance of streets ("eyes on the streets") and improved security for pedestrians in Downtown.

The plan recommends integration of the transit and pedestrian corridors to enhance the use and effectiveness of both modes.

Intersections will be constructed compactly to help pedestrians cross easily and safely, and will accommodate people of all abilities. Compact intersections may include narrow lanes, appropriate curb radii, channelizing islands, medians, and curb extensions.



Pedestrian Plan
Positive,
Connected,
Inviting.
Florida Hospital
Lake Winyah
Lake Sue
Lake Estelle
E. ROLLINS ST.
Loch Haven Park
E. PRINCETON ST.
Lake Rowena
Lake Formosa
Lake Ivanhoe
Lake Adair
Lake Concord
Spring Lake
Lake Highland
Park Lake
Lake Dot
Lynx Central Station
Centroplex
Rock Lake
Lake Eola
Lake Lorna Doone
Tinker Field
Citrus Bowl
Events Center
City Hall
Performing Arts Center
Fern Lake
Lake Lawsona
Lake Olive
Lake Sunset
Lake Lucerne
Lake Cherokee
Lake Davis
Lake Greenwood
Lake Emerald
Lake Weldona
Lake of the Woods
Lake Copeland
Lake Lancaster
Orlando Regional Medical Center
Arnold Palmer Hospital
Lake Jume
W. COLONIAL DR.
E. COLONIAL DR.
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
E. LIVINGSTON ST.
W. ROBINSON ST.
E. ROBINSON ST.
W. WASHINGTON ST.
W. CENTRAL BLVD.
E. CENTRAL BLVD.
W. CHURCH ST.
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W. ANDERSON ST.
E. ANDERSON ST.
W. LONG ST.
W. CARTER ST.
W. GORE ST.
E. GORE ST.
CHEROKEE DR.
W. COLUMBIA ST.
BRIERCLIFF DR.
E. MILLER ST.
W. KALEY ST.
LAKEVIEW ST.
WEBER ST.
MARKS ST.
VIRGINIA DR.
N. ORANGE AVE.
S. ORANGE AVE.
N. MAGNOLIA AVE.
S. MAGNOLIA AVE.
S. ROSALIND AVE.
N. MILLS AVE.
S. MILLS AVE.
N. SUMMERLIN AVE.
S. SUMMERLIN AVE.
N. ORANGE BLOSSOM TRAIL
S. ORANGE BLOSSOM TRAIL
N. WESTMORELAND DR.
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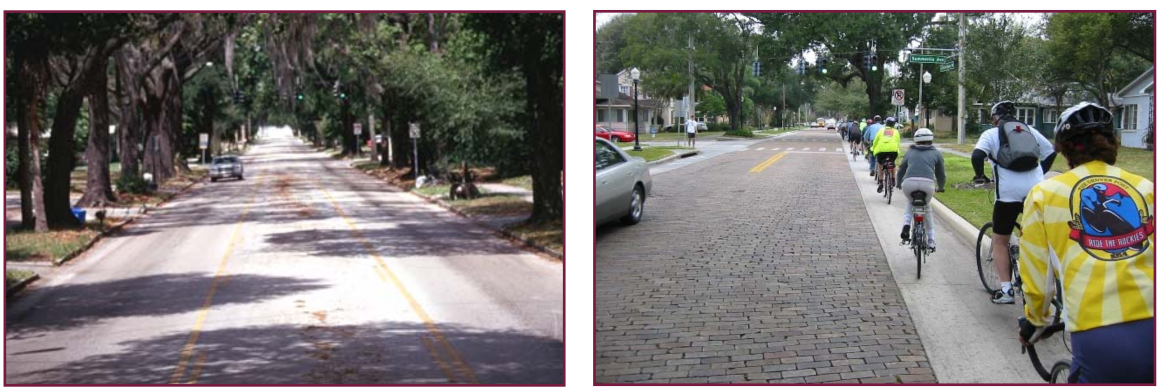
N. PARRAMORE AVE.
PARRAMORE AV
S. PARRAMORE AVE.
N. TAMPA AVE.
N. HUGHEY AVE.
S. GARLAND AVE.
TERRY AVE.
EDGEWATER DR.
ALDEN RD.
SPRUCE ST.
S. DIVISION AVE.
LUCERNE TERR.
SLIGH BLVD.
DELANEY AVE.
W. WASHINGTON ST.
441
50
527
17
92
526
408
4
Legend
Landmarks/Points of Interest
Study Area
Orlando Urban Trail
Primary Pedestrian Street
Secondary Pedestrian Street
Alleyways
Commuter Rail Station
NOT TO SCALE
HDR

4.1 Introduction

Bicycling and walking are becoming increasingly more important components of the transportation system in Downtown Orlando. Walking is an integral part of all trips, whether they are made by transit, car, or bicycle, as all begin and end with a walk trip. Making all Downtown streets more accessible, comfortable, and safe for walking is crucial to developing a liveable city where the streets become a place of interest and focus for the community life. In addition, a growing number of people are using bicycles for transportation purposes into and within the Downtown area for health reasons or to help offset the increasing cost of fuel. The number of trips made by walking and bicycling will continue to grow, especially as more people are choosing to live Downtown closer to places of employment, entertainment, and a growing retail market. With increasing roadway congestion, it is important to provide streets that are comfortable and welcoming to users of all modes, including bicycling and walking. Continuing to rely on the automobile for all trips, particularly those that are short and could be made by alternative modes, is not sustainable. By providing convenient and safe walkways and bikeways in Downtown, Orlando can become a world-class livable city.

Orlando has had the dishonorable distinction of appearing on more than one list of the worst or most dangerous places in the nation to walk or ride a bike. In 1991, Bicycling Magazine ranked Orlando as one of the worst cities in the nation for bicycling. More recently in 2004, a report released by the Surface Transportation Policy Project (STPP) cited Orlando as the most dangerous large metropolitan area for walking in the U.S. It should be noted that these rankings represent overall conditions in the Orlando metro area, and not Downtown specifically. However, the City has responded to this criticism and is actively working to implement projects, policies, and programs to transform Orlando into a great place to walk or ride a bike. Since the early 1990's, the City has made tremendous strides in providing safe facilities for bicyclists, and encouraging bicycle use for commuting and recreation. This effort has resulted in the City being designated as a Bicycle Friendly Community by the League of American Bicyclists in October 2004. However, the City's designation at the bronze award level indicates that there are further improvements that can be made to make the community more bicycle friendly. The more recent report of the STPP indicates that work clearly needs to be done to address existing pedestrian infrastructure and safety issues.



As part of the City's effort to become more bicycle friendly, Livingston Street in Downtown Orlando was converted from a three-lane facility (left image) to a two-lane brick street with concrete bike lanes (right image).

The objective of the Bicycle and Pedestrian Plan for Downtown Orlando is to provide a network for bicyclists and pedestrians that is secure, convenient, efficient, comfortable, and welcoming. Merely adding sidewalks is not enough to encourage people to walk – they need shade, places to sit, convenient ways to cross the street and more. When a place has the right qualities, people will walk. Similarly, bicyclists need more than just improvements in the bicycle network, but places to conveniently and securely park their bikes once at their destination.

Getting more people bicycling and walking in Downtown Orlando will inherently lead to the area becoming safer for cyclists and pedestrians. Studies have shown that there is safety in numbers; a motorist is less likely to collide with a person bicycling or walking when there are more people bicycling and walking.

This plan emphasizes the implementation of "complete streets" – streets that balance safety, convenience, and mobility for all road users. It is intended to build on the Downtown Area Bicycle Plan previously prepared by the City in 2002 to help set a course for Orlando to increase bicycling and walking in the Downtown area and help build a world class livable community.

Downtown Orlando Resident Walk and Bike Characteristics

To determine some of the travel characteristics of Downtown residents, commuters, and visitors, a Downtown Orlando Traveler Survey was conducted as a component of this plan. Relevant bicycle and pedestrian mode share data for Downtown Orlando residents are shown in **Table 4-1**. The numbers shown reflect what may be considered typical for walking trips; however with the exception of work or work-related trips, the percentages of trips by bicycle are very low, with no trips for personal business or shopping recorded. These results show that Downtown residents are rarely inclined to make non-recreation trips by walking or bicycling. Streets within the Downtown must be made to be more pedestrian and bicycle friendly in order to increase the capture of trips made by walking and bicycling.

Table 4-1
Bike & Walk Statistics of Downtown Residents

Trip Purpose	% by Mode	
	Walk	Bike
Work/Work-Related Business	7.6%	3.7%
Personal Business	8.2%	0.0%
Shopping	6.7%	0.0%
Recreation/Entertainment	24.6%	0.8%

4.2 Bicycle Parking

Providing adequate, convenient, and secure parking facilities for bicycles is an important component in creating a successful Downtown. Eighty-eight (88) percent of Orlando area bicycle owners surveyed said having a good place to park their bicycle was an important or very important consideration when deciding whether or not to travel by bicycle. In fact,

Well placed bike racks keep bikes out of pedestrian walking areas (Photo: Mighk Wilson).

bicycle parking was rated as more important factor than having either trails (77 percent) or bike lanes (70 percent).

There are numerous benefits to providing quality bicycle parking, including:

- ❖ 6 or more bicycles can fit in the space taken up by one parked car.
- ❖ Well placed bike parking encourages use and keeps parked bikes out of conflict with pedestrians; without bike parking, bicyclists will use trees and other structures not intended or properly placed for bike parking.
- ❖ Bike parking promotes cycling and supports the needs of up to 35 percent of residents that are unable to own or operate a motor vehicle.

(upper left) Bike lockers located in the City Hall parking garage.

(lower left) Example of Class I enclosed cage bike parking (Photo: Dan Burden).

(upper right) An "inverted U" bike rack (Photo: Mighk Wilson).

(bottom right) Bike rack is located too close to a wall (Photo: Mighk Wilson).

Types of Bicycle Parking

Bicycle parking can generally be divided into two categories. Class I parking is intended for long-term parking such as for employees, tenants, or residents, and protects against the theft of the entire bicycle as well as its components and accessories. Class I facilities also protect the bicycle from inclement weather. While Class I facilities include restricted access rooms and enclosed cages, the preferred facilities are bicycle lockers. Bicycle lockers should be made from a durable material such as galvanized steel or reinforced composites such as fiberglass.

Class II facilities are bicycle racks intended for short-term parking. Good bicycle racks support the bicycle upright by two points on the frame above the hubs, allow better securing of bikes, don't have sharp edges that may damage bikes, and encourage proper use and discourage improper use. The "inverted U" is one of the most common types of good bicycle racks and one of the preferred rack types permitted for use within the City of Orlando.

Location of Bicycle Parking

Bicycle racks should always be installed on a paved surface. Unpaved surfaces are inconvenient for users, as they may stay wet and muddy long after a paved surface has dried. Racks should be located with sufficient clearance (at least 18 inches) to walls or other obstructions. They should also be placed in a location that is convenient to the front door of buildings – racks should optimally be located no further from the front door than the nearest non-ADA vehicle parking space. Bicycle racks should be located out of the normal path of pedestrians, and should not require their users to walk

up or down steps to access them. Security and rain protection are two other important considerations for locating bicycle racks – racks should be clearly visible from the building entrance they serve, and should be covered to protect them from sun and rain.

Other ideas related to bike parking and their locations include the following:

❖ New high rise residential and condo development should be required and/or given incentives to provide a "bike room" within each building – a secure storage area to allow residents a place to store their bikes (preferably on the ground floor) outside their units. This could be a requirement of a Downtown Orlando Transportation Management Association (TMA), which could be administered by the City or Downtown Development Board (DDB).

(upper left) This "ribbon" style rack is conveniently located near the front door of a grocery store (Photo: Mighk Wilson).

(upper right) A "wheel bender" rack (Photo: Mighk Wilson).

(lower left) Bike parking can become a component of a street's hardscape (Photo: Dan Burden).

(lower right) A creative and functional bike rack (Photo: Dan Burden).

❖ A "Bike Station" is a place that offers secure bike parking as well as other related services such as lockers, showers, and repair shops to make cyclists' lives easier. Bike Stations have been implemented in a number of cities across the nation within their downtowns, including Chicago, Denver, Seattle, Washington D.C., Berkeley, Long Beach, and Palo Alto. An Orlando Bike Station could potentially be located centrally within Downtown at the LYNX Central Station, one of the proposed commuter rail stations, or the 400 North Orange property and would include lockers, showers, bicycle storage, and perhaps bike rentals. Bike rentals may not be practical in Downtown now, but there may be a future market for them with the successful implementation of the Orlando Urban Trail. The City should support the idea of bike tourism in Downtown Orlando, which could be tied to the Bike Station.

❖ More employers should be required and/or given incentives to provide showers and lockers as part of their employee benefit and wellness programs. This is another potential requirement of a Downtown Orlando TMA.

Existing and Proposed Bicycle Parking in Downtown

There are currently about 50 locations where bicycles can be parked in the Downtown area, encompassing both public and private facilities and a total capacity of more than 350 bicycle parking spaces. However, the majority of the available facilities consist of undesirable "ribbon" racks that only support bikes at one point, or "wheel bender" racks that only support a bike by the front and bottom of a wheel. In addition, many of the facilities are poorly located, do not provide protection from the weather, and do not provide adequate security. **Figure 4-1** provides the existing locations of bicycle parking facilities within the Downtown area. **Table 4-2** provides a summary of the existing bicycle parking, including location, type and capacity of the facility, weather protection, public/private, and a general assessment of its placement and security.

To build a successful multimodal Downtown, bicycle parking must become an integral part of our land uses and streets. Several locations on each block of the Downtown areas, as well as all activity centers should have bicycle parking. Parking should be attractive, convenient, in plain view of everyone (for security reasons), creative and fun. All transit stops should have parking. Major transit stops should provide bicycle lockers. Parking garages and all employment centers with 25 or more employees should have secure parking (bicycle lockers, garage space for bike racks, or interior building parking). In addition to existing bicycle parking locations, **Figure 4-1** also shows where additional bicycle parking is needed within Downtown. Specific locations are identified for both short term and long term parking. These locations include the Centroplex, Orange County Courthouse, Orlando Regional Medical Center, Florida Hospital, and the proposed Performing Arts Center. Additionally, corridors have been identified for short term parking to be provided as part of the street furniture along the corridor.

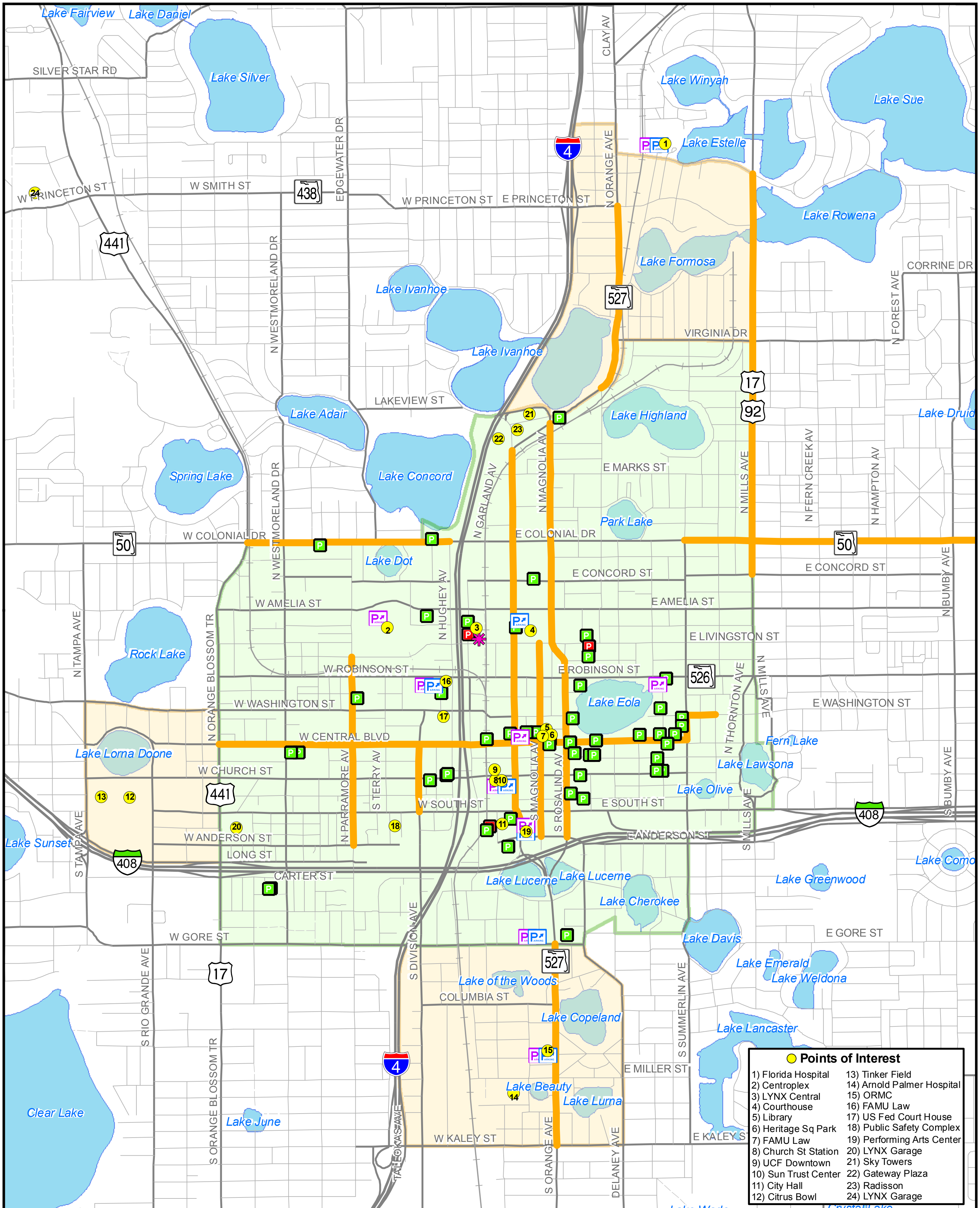
The City has recently completed a comprehensive update of their bicycle parking ordinance. The revised ordinance is provided in **Appendix 4-A**

4.3 Bicycle & Pedestrian Level of Service

Bicycle Level of Service (BLOS) – Research Background

Research by Landis, Vattikuti, and Brannick (Transportation Research Record 1578) has led to the development of a model that estimates bicyclists' perceptions of safety with respect to motor vehicle traffic. The model identifies the quality of service that currently exists in urban on-road cycling environments. The **Bicycle Level of Service (BLOS)** model is not a measure of vehicle flow or capacity, but is based on human responses to measurable roadway and traffic stimuli. Approximately 150 bicyclists participated in a study that placed them in actual urban roadway and traffic conditions to obtain feedback regarding the perception of hazard or level of comfort on a variety of different roadway segments. Participants evaluated roadway segments on a scale from A to F based on how safe or comfortable they felt as they bicycled on each segment. Level A was considered the least hazardous, while level F was considered the most hazardous. While this study focused on the quality, or level of service, of the roadway links, the conditions at intersections were not addressed.

The result of the research was the calibration of a statistically reliable mathematical model that quantifies bicyclists' perceptions of the quality of service on shared use roadway environments. This model has been adopted by the Florida Department of Transportation as the recommended standard methodology for determining existing and anticipated bicycling conditions throughout Florida. It is the most accurate method of evaluating the bicycling conditions of shared



Existing Bike Parking

- Locker
- Rack
- Study Area
- Extended Transit Plan Area

Proposed Bike Parking

- Short Term (Rack) at Specific Location
- Long Term (Locker / Garage) at Specific Location
- Short Term (Rack) along Corridor
- Bike Station

Downtown Orlando Transportation Plan

Figure 4-1

Existing and Proposed Bicycle Parking

N

0 625 1,250 2,500 Feet

Table 4-2

Inventory of Existing Bicycle Parking Facilities in Downtown Orlando

ID #	Location 1 (Intersection, Feet from Intersection, or Address)	Location 2 (Business, Park, Organization, Agency, Etc.)	Type (Brand, Design, Describe)	Capacity (Number)	Weather Prot.	Placement	Security	Private./ Public	Date	Comment
1	Orange & Magnolia	Dr Phillips Performing Arts	ribbon	6	No	Fair	Fair	Public	12/29/2005	none
2	Orlando Sentinel south side	Orlando Sentinel south side	wheelbender	6	No	Good	Good	Private	12/29/2005	none
3	Orange County Court House west side	Orange County Court House	cora	8	No	Good	Fair	Public	12/29/2005	none
4	20 North Orange		ribbon	6	No	Good	Fair	Public	12/29/2005	none
5	City Hall plaza	City Hall	ribbon	9	No	Good	Fair	Public	12/29/2005	none
6	OUC back	OUC	wheelbender	8	No	Fair	Fair	Public	12/29/2005	none
7	Beardall Center back entrance	Beardall Center	wheelbender	8	No	Good	Fair	Public	12/29/2005	none
8	Jackson & Rosalind	Orange Co. Admin.	ribbon	3	No	Fair	Fair	Public	12/29/2005	none
9	Washington & Rosalind	Lake Eola Park	ribbon	6	No	Good	Fair	Public	12/29/2005	none
10	Robinson & Rosalind	Eola Park Center	ribbon	2	No	Fair	Fair	Public	12/29/2005	damaged
11	Livingston & Garland	Lynx Central Station	ribbon	30	No	Fair	Fair	Public	12/29/2005	none
12	Livingston & Garland	Lynx Central Station	lockers	24	Yes	Good	Good	Public	12/29/2005	none
13	Eola & Robinson	Panera Bread	wheelbender	6	No	Poor	Fair	Public	12/29/2005	none
14	Eola & Washington	Lake Eola Park	cora	12	No	Good	Fair	Public	12/29/2005	none
15	Washington & Summerlin	7-Eleven	wheelbender	5	No	Poor	Fair	Public	12/29/2005	none
16	Summerlin between Washington & Central	Thornton Park Central	ribbon	4	No	Good	Fair	Public	12/29/2005	none
17	Central between Summerlin & Eola	Thornton Park Central	ribbon	4	No	Good	Fair	Public	12/29/2005	none
18	Eola & Central	Lake Eola Park	cora	6	No	Fair	Fair	Public	12/29/2005	none
19	Eola & Central (SE corner)	condo	wheelbender	6	Yes	Poor	Poor	Private	12/29/2005	none
20	Eola & Pine (150 ft w of Eola)	Sanctuary	ribbon	3	No	Poor	Fair	Public	12/29/2005	none
21	Eola & Church	Sanctuary	ribbon	3	No	Fair	Fair	Public	12/29/2005	none
22	Eola & Church (75 ft w of Eola)	Sanctuary	ribbon	2	No	Poor	Fair	Public	12/29/2005	none
23	Lake & Central	Lake Eola Yacht Club	wheelbender	6	No	Poor	Fair	Public	12/29/2005	none
24	Central between lake and Rosalind	Capital Plaza	saddle-susp t-bar	16	No	Poor	Fair	Public	12/29/2005	none
25	Rosalind & Central	Embassy Suites	ribbon	3	No	Poor	Fair	Public	12/29/2005	none
26	Central between Rosalind & Magnolia	Orlando Public Library	inv U	16	No	Poor	Fair	Public	12/29/2005	1 bike not at rack
27	Wall St & Magnolia	Heritage Park	ribbon	8	No	Fair	Fair	Public	12/29/2005	none
28	Wall St & Court Ave.	Heritage Park	ribbon	10	No	Poor	Fair	Public	12/29/2005	none
29	Central & CSX RR	City Garage	cora	3	Yes	Fair	Good	Public	12/29/2005	need better signage
30	Central between Rosalind & Magnolia	Library Garage	cora	3	Yes	Good	Good	Public	12/29/2005	none
31	Pine & Rosalind	Embassy Suites	ribbon	3	No	Good	Good	Public	12/29/2005	none
32	Pine (200 ft e of Rosalind)	Capital Plaza	ribbon	4	No	Fair	Fair	Public	12/29/2005	none
33	Pine (200 ft e of Rosalind)	Capital Plaza	saddle-susp t-bar	16	No	Good	Fair	Public	12/29/2005	none
34	Church (100 ft e of Rosalind)	Orange Co. Admin.	ribbon	4	No	Good	Fair	Public	12/29/2005	none
35	Jackson (150 ft e of Rosalind)	City Garage	cora	3	Yes	Good	Good	Public	12/29/2005	none
36	Boone betw South & Anderson	City Hall Garage	lockers	19	Yes	Good	Good	Public	12/29/2005	none
37	Boone betw South & Anderson	City Hall Garage	cora	5	Yes	Poor	Good	Public	12/29/2005	none
38	Ruth & Livingston	office	winder	6	No	Fair	Fair	Private	12/29/2005	none
39	Ruth & Livingston	Landmark Garage	lockers	4	Yes	Fair	Good	Private	12/29/2005	none
40	Ridgewood betw Broadway and Rosalind	Landmark Garage	wheelbender	8	No	Poor	Good	Public	12/29/2005	none
41	301 W Colonial	301 W Colonial	suspended ring	4	No	Poor	Fair	Public	12/30/2005	none
42	Colonial & Hayden	Burger King	wheelbender	5	No	Good	Fair	Public	12/30/2005	none
43	Westmoreland S of SR 408	Jackson Community Center	wheelbender	4	Yes	Good	Fair	Public	12/30/2005	none
44	Westmoreland S of SR 408	Jackson Community Center	ribbon	10	No	Fair	Fair	Public	12/30/2005	none
45	Centroplex Garage	Centroplex Garage	cora	3	Yes	Poor	Good	Public	12/30/2005	need better signage
46	Washington & Parramore	Callahan Center	inv U (flat)	12	No	Fair	Good	Public	12/30/2005	need better signage
47	Hughey betw Robinson & Washington	State Regional Service Center	wheelbender	10	No	Good	Good	Public	12/30/2005	1 bike not at rack
48	Church & Bryan		cora	3	No	Fair	Fair	Public	12/30/2005	none
49	Central E of Westmoreland	Orange Co. Health Dept.	ribbon	3	No	Poor	Poor	Public	12/30/2005	none
50	Central & Westmoreland	Orange Co. Medical Clinic	ribbon	4	No	Poor	Fair	Public	12/30/2005	none
51	Church & Garland	parking lot under I-4	inv U (flat)	2	Yes	Good	Fair	Public	12/30/2005	none
52	Church & Garland	parking lot under I-4	inv U (flat)	2	No	Good	Fair	Public	12/30/2005	none

roadway environments. Part of the reason for the model's widespread acceptance is that it uses the same measurable traffic and roadway factors that transportation planners and engineers use for other travel modes. With statistical precision, the model clearly reflects the effect on bicycling suitability or "compatibility" due to factors such as roadway width, bike lane widths and striping combinations, traffic volume, pavement surface conditions, motor vehicle speed and type, and on-street parking. Statistically, the most important variables involved the separation of the bicyclist from motorized traffic, such as the presence of a designated, striped bicycle lane. The results from the BLOS model are applicable to all urban streets, not just arterials, and have been applied in Florida and large U.S. cities with favorable results.

Pedestrian Level of Service (PLOS) – Research Background

There is a general consensus that pedestrians' sense of safety and comfort within a roadway corridor is based on a complex assortment of factors including personal safety, security, aesthetics, pathway or sidewalk shade, pedestrian-scale lighting and amenities, presence of other pedestrians, and conditions at intersections. In part to fulfill a state mandate to establish level of service standards for all transportation modes, the Florida Department of Transportation sponsored the development of the **Pedestrian Level of Service (PLOS)** model (Transportation Research Board Paper No. 01-0511 by Landis, Vattikuti, Ottenberg, McLeod, and Guttenplan). This model was developed in a similar manner to the BLOS model. The research focused on the physical roadway and traffic characteristics within the right-of-way that significantly influence the pedestrians' feeling of safety and/or comfort. The collection of these factors into a mathematical expression, tested for statistical reliability, thus provides a measure of the roadway segment's level of service to pedestrians. However, this level of service truly represents only one aspect of the walking experience – other factors such as accident history, security, and aesthetics are not included. As with the BLOS model, the PLOS model has been adopted by the Florida Department of Transportation as its standard methodology for determining the level of accommodation for pedestrians. The conditions at intersections and their immediate approaches were not considered in this study.

Step-wise regression analyses were conducted using the more than 1,300 real-time responses obtained from the participants to calibrate a statistically significant mathematical model. The factors contained in the model include lateral separation elements between pedestrians and motor vehicle traffic (i.e., width of sidewalk, width of buffer, etc), motor vehicle traffic volume, and motor vehicle speed. While driveway access frequency and volume was evaluated as another potential factor, it was not found to be significant at the 95 percent confidence level.

Similar to the BLOS model, the most important variable was found to be the lateral separation between pedestrians and motor vehicle traffic. A pedestrian's sense of safety or comfort is strongly influenced by the presence of a sidewalk. Furthermore, the value of the sidewalk varies according to its location and buffering (separation) from the motor vehicle traffic. In general, as the buffering increases, the pedestrian's comfort level increases. Additionally, a pedestrian's comfort level increases further with the presence of a barrier within the buffer, such as on-street parking, a line of trees, or a roadside swale.

Scores from both the BLOS and PLOS models resulting from the final calibrated equations are pre-stratified into service categories A through F, reflecting users' perception of the road segment's level of service for bicycle and pedestrian travel. The results can be used to conduct a benefits comparison among proposed roadway cross-sections, identify roadway re-striping or reconfiguration candidates for bicycle or pedestrian improvements, and to prioritize and program roadways for improvements

Downtown Orlando Data

Activate Orlando! is one of 25 Active Living by Design programs funded in communities across the country by the Robert Wood Johnson Foundation. The program seeks to encourage changes in the environment, design, and transportation as well as policies that cultivate and support active living – a way of life that integrates at least 30 minutes of physical activity into daily life. The study area encompasses all of the City's Downtown Community Redevelopment Area (CRA).

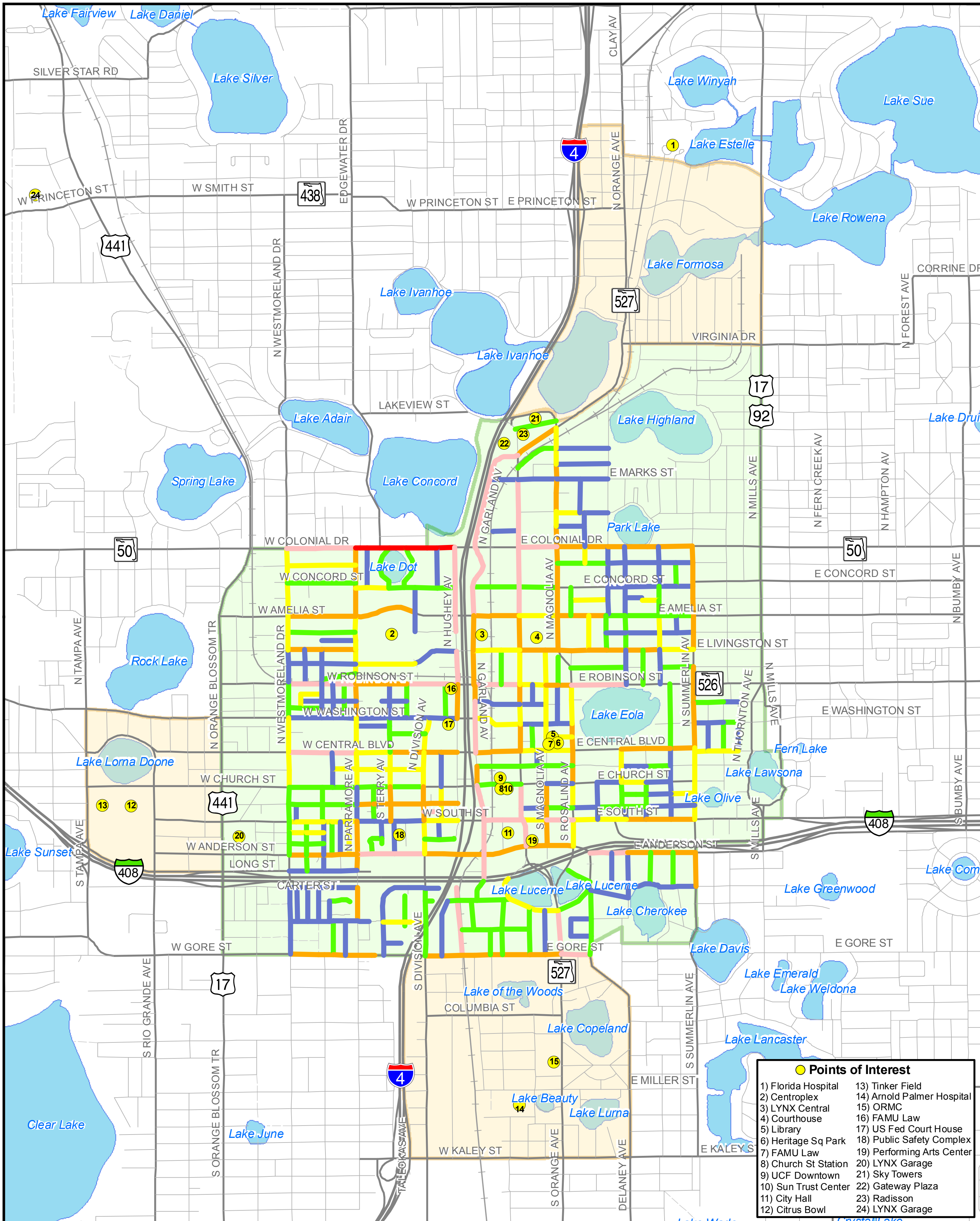
One of the components of the Activate Orlando! program was an assessment of the physical infrastructure of the Downtown Active Living District to fully comprehend the assets and impediments to active living and to target priority improvements. To facilitate the assessment, a survey of all Downtown streets and sidewalks was completed in October 2004 which included collection of the data necessary on all Downtown streets for use in the **BLOS** and **PLOS** models. In addition, the survey asked perception questions in order to gather qualitative data on the sense of safety, shade, and visual appeal offered by the existing Downtown streets. BLOS and PLOS grades are shown for the Downtown streets on **Figures 4-2 and 4-3**, respectively. **Appendix 4-B** provides a complete list of all the data used and the results of the BLOS and PLOS calculations including numerical score and letter grade for all Downtown streets.

The Downtown Orlando Active Living by Design project included collection of data for bicycle and pedestrian LOS calculations.

A total of 48 miles of roadway were evaluated using the BLOS and PLOS models. **Table 4-3** provides a summation of the data showing the total number of miles of roadway and percentage of total miles at each level of service. As shown, conditions overall in Downtown are good for bicyclists and pedestrians as more than half of all roadways evaluated score as either an "A" or "B" in BLOS or PLOS. There are more roadways that scored poorer in Downtown for bicyclists (32 percent with a BLOS of "D" or worse) than pedestrians (90 percent of roadways with PLOS of "C" or better). This is primarily due to the few roadways that have exclusive bicycle lanes or wide curb lanes. Conversely, most roadways in Downtown have sidewalks, and many also have buffers to vehicle traffic in the form of landscaping strips, trees, or on-street parking.

Table 4-3
Downtown Orlando BLOS & PLOS Summary

BLOS	miles	%	PLOS	miles	%
A	13.7	29%	A	4.3	9%
B	10.6	22%	B	23.3	49%
C	8.1	17%	C	15.4	32%
D	9.8	20%	D	3.8	8%
E	5.4	11%	E	1.3	3%
F	0.4	1%	F	0.0	0%



Points of Interest

1) Florida Hospital	13) Tinker Field
2) Centroplex	14) Arnold Palmer Hospital
3) LYNX Central	15) ORMC
4) Courthouse	16) FAMU Law
5) Library	17) US Fed Court House
6) Heritage Sq Park	18) Public Safety Complex
7) FAMU Law	19) Performing Arts Center
8) Church St Station	20) LYNX Garage
9) UCF Downtown	21) Sky Towers
10) Sun Trust Center	22) Gateway Plaza
11) City Hall	23) Radisson
12) Citrus Bowl	24) LYNX Garage

Level of Service

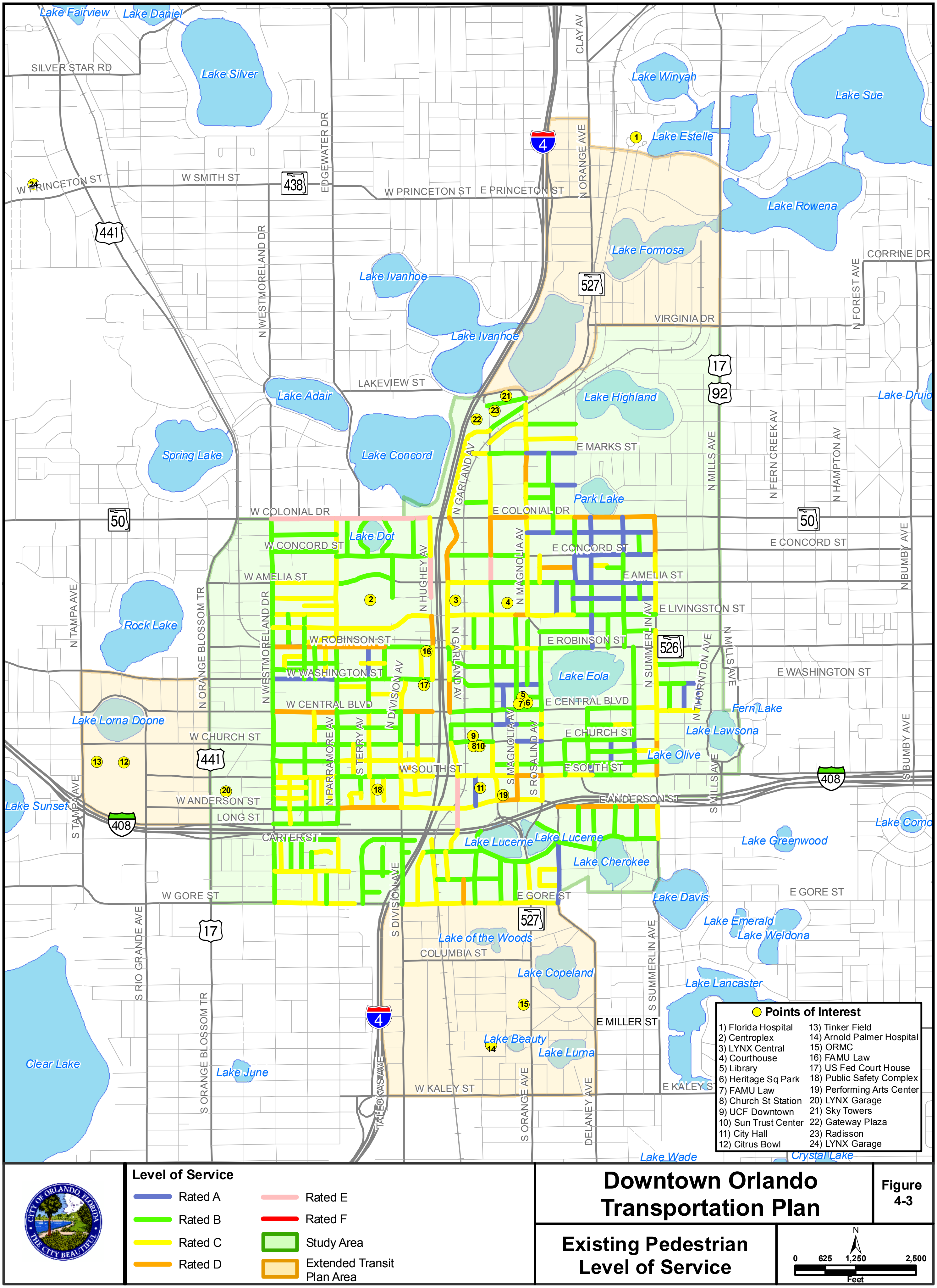
- Rated A
- Rated B
- Rated C
- Rated D
- Rated E
- Rated F
- Study Area
- Extended Transit Plan Area

Downtown Orlando Transportation Plan

Figure 4-2

Existing Bicycle Level of Service

0 625 1,250 2,500 Feet



Downtown Orlando Transportation Plan

Figure 4-3

Existing Pedestrian Level of Service

4.4 Gaps & Deficiencies in the Downtown Bicycle Network

To help encourage more travel by bicycle, the City needs to address gaps and deficiencies in its bicycle network and work towards implementing a connected system of bicycle friendly facilities and routes that provide bicycle access from the surrounding areas into Downtown. In addition, the bicycle network needs to allow for safe and convenient bicycle mobility within the Downtown core.

Phase 1 of the Dinky Line Trail, which crosses Lake Formosa.

The network of facilities and routes that provide connections into Downtown is a work in progress. There are examples of corridors that already provide bicycle friendly connections into Downtown. For example, Livingston Street provides on-street bike lanes into and through Downtown, beginning on the east at Maguire Boulevard near the Fashion Square Mall, and continuing west to Parramore Avenue, with only a small gap in the bike lanes at the Centroplex area. An example of emerging north-south connectivity is the completion in 2005 of the first phase of the Dinky Line Trail across Lake Formosa between Princeton Street and South Lake Formosa Drive. This multi-use trail is proposed to be extended into Downtown and will ultimately connect with the existing Gertrude's Walk facility as part of the Orlando Urban Trail.

North-south connectivity to the College Park neighborhood is provided via the existing bike lanes on Edgewater Drive. However, the road network continuity at SR 50 leaves a gap for bicyclists. Parramore Avenue, located about 450 feet to the west of Edgewater Drive, also has bike lanes. However, the offset between Edgewater Drive and Parramore Avenue requires bicyclists to either use sidewalks or make a difficult weaving movement across two lanes of traffic to access a left turn lane to continue traveling either north or south. Southbound bicyclists have the option of turning left at SR 50 and then immediately right on Lake Dot Circle; however, northbound bicyclists cannot easily use this route because there is no signal at Lake Dot Circle and traffic volumes on SR 50 are typically heavy which results in a difficult left turn movement onto SR 50. The location of an existing building immediately south of the Edgewater Drive/SR 50 intersection may make it difficult to provide a direct connection across SR 50 for bicyclists. However, the Terry Avenue extension project is proposed to align with Edgewater Drive and would provide a continuation of the bicycle lanes south to Livingston Street.

While one of the primary northbound roadways, Rosalind Avenue/Magnolia Avenue has an on-street bike lane for much of its length, a complimentary facility in the southbound direction is lacking.

Several roadways within the study area have a large number of destinations located directly adjacent to them, but do not provide on-street bicycle facilities to accommodate those on bikes that wish to access the specific destinations. These roadways include SR 50, Orange Avenue, Gore Street, Orange Blossom Trail, Central Boulevard, and Summerlin Avenue. It should be noted that portions of Central Boulevard and Summerlin Avenue are shown on City maps as existing signed bike routes; however, there is currently no signage to indicate these routes. All existing signed bicycle routes should be reviewed for adequate signage, particularly where the route makes a turn.

The City recently made detection at many signalized intersections more bicycle friendly by adjusting the sensitivity of the loop detectors and installing signage and pavement markings to show cyclists where to position their bikes to actuate the signal. Since the initial installation, many of the painted pavement markings have faded considerably or completely worn off. It is recommended that the markings be reinstalled using a more durable material such as thermoplastic. In addition, the City should adjust signal detection and install the cyclist detector signs and markings at all signalized intersection along all signed and marked bicycle routes.

There are significant existing barriers to bicycle travel in two Downtown locations: Ivanhoe Boulevard at I-4, and the East-West Expressway, particularly in the vicinity of Orange Avenue. Because of the complex vehicular movements to access the freeways that occur in these areas, it is very difficult for bicyclists to negotiate their way safely through these areas. At Ivanhoe Boulevard, the primary concern relates to bicyclists traveling northbound on Magnolia Avenue in the right lane having to weave across a lane of traffic bound for eastbound I-4 and being in conflict with vehicles that are traveling at much higher rates of speed as they begin to accelerate to enter I-4. The East-West Expressway is also a barrier to bicyclists as there are a limited number of roadways that pass underneath the freeway, and they typically carry relatively heavy traffic volumes with little or no space allocated for bicycle travel. In fact, there are only two existing exclusive bicycle facilities that pass underneath this freeway, on Rosalind Avenue (northbound only) and Westmoreland Drive.

4.5 Recommended Downtown Bicycle Network

Types of Facilities

The recommended network of bicycle facilities needs to provide accommodation for a wide variety of users, from advanced level to novice cyclists, and adults to children. Some people prefer segregated facilities, such as multi-use trails and consider them to be more pleasant and safer to use. Many people cite the lack of off-street trails as a major barrier to increased cycling. Others prefer on-road facilities, such as bike lanes, bike routes, and roadway improvements for more complete access to destinations and because they are generally suitable for faster riding. In some cases, off-road facilities can have higher crash rates compared to on-road facilities if they create confusion at intersections or have inadequate designs, and because bicyclists must share trails with pedestrians, in-line skaters, playing children, and leashed or uncontrolled pets.

Multi-Use Trails

Typically, densely developed urban areas generally have few opportunities for multi-use trails. However, the City of Orlando has proposed the Orlando Urban Trail as a primary spine for bicycle movement into and through Downtown. It will become a central piece in a growing network of bicycle trails in the Orlando metro area. With connections to other facilities, this trail is planned to ultimately connect Winter Park to Kissimmee. Being located in a growing urban environment and providing connections to other regional trail facilities, the Orlando Urban Trail could highlight Downtown Orlando as a destination for urban tourism.

The existing Gertrude's Walk corridor.

As the trail corridor passes through the Central Business District utilizing the existing Gertrude's Walk corridor, it will have to cross numerous Downtown streets at-grade. It is imperative that these crossings be designed in a manner that makes the crossings visible to motorists, and as friendly and safe as possible for trail users. Potential crossing treatments include lighting, enhanced crosswalk markings, warning signage, medians, and trail-user activated signals or flashing warning beacons. While the Orlando Urban Trail will provide a convenient way to travel to Downtown, due to the number of at-grade crossings within Downtown, it will likely not be the preferred route for commuters within the urban core.

Existing bike lane in Downtown Orlando on Rosalind Avenue.

Bicycle Lanes

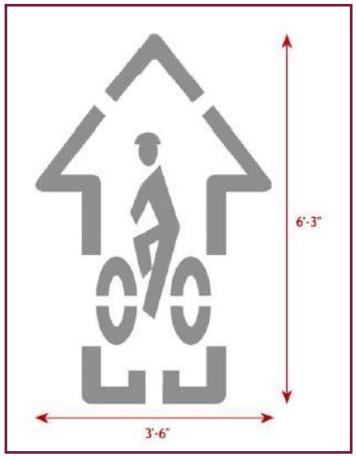
In urbanized areas, most bicycling opportunities are on-road. Bicycle lanes provide the safest form of travel for bicyclists in urban areas, because they allow separation from traffic lanes, and in clear view of traffic. When bicyclists ride on sidewalks, their travel is interrupted by numerous intersections and driveways – every one of which represents a conflict point. Sidewalks often hide bicyclists from motorist view, and permit wrong-way riding, which can cause crashes with vehicles turning right out of driveways or from side streets; drivers turning right from driveways or side streets typically only scan to the left before pulling out into traffic, and do not see bicyclists coming from the right.

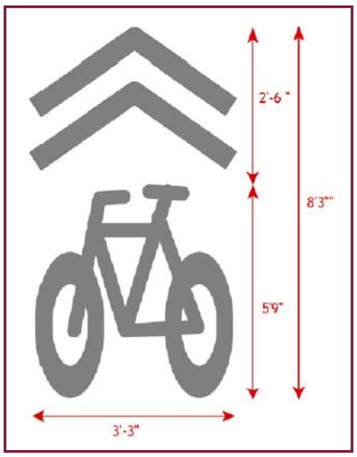
Bicycle lanes provide significant benefits, listed below, for the universe of roadway users:

- Increased border width to fixed objects;
- Increased turning radius into and out of intersections and driveways, particularly for trucks and transit vehicles; as a result, tighter corner radii can be used which narrows the intersection or driveway crossing distance for pedestrians;
- Improved sight distances when exiting driveways;
- Buffer to sidewalks and pedestrians, as well as to parked cars (increases the comfort of people exiting parked vehicles);
- A place for vehicles to pull into when emergency response vehicles pass;
- Traffic calming (narrower lanes can be adopted);
- Space for disabled vehicles, mail delivery and bus stops;
- Discharge water further from the travel lanes;
- Accommodate driver error;
- Reduce passing conflicts between motor vehicles and bicyclists and pedestrians; and
- Provide more intersection and safe stopping sight distance;

There are limited opportunities to stripe exclusive bicycle lanes in the Downtown area because of narrow roadway sections, where sidewalks, travel lanes, and on-street parking already compete for space within the available right-of-way. In order to accommodate bicycle lanes on many streets, tradeoffs between other uses must be made, such as eliminating a travel lane or on-street parking on at least one side of a street. However, because vehicle speeds in the urban core are lower than on most suburban streets, and can be controlled to some extent by regulating the progression speed of traffic at signalized intersections, bicycle lanes are not always necessary in Downtown areas. In urban areas with lower speeds, bicyclists can often maintain the same speeds as motor vehicles, giving them a legitimate reason to "take the lane". Taking the lane is also practical in urban settings when travel lanes are too narrow for a bicyclist and a motorist to share.

For roadways with curb and gutter, the minimum recommended width of a bicycle lane is 5 feet measured from the face of curb. It is desirable to maintain a smooth longitudinal joint between the pavement and the gutter pan. However, if the joint is not smooth, 4 feet of rideable pavement surface should be provided. If on-street parking is permitted, bicycle lanes should always be placed between the parking lane and the travel lane and have a minimum width of 5 feet, with the total distance from the left bicycle lane stripe to the curb face being a minimum of 13 feet. However in areas with substantial parking volume or high turnover, bicycle lane widths adjacent to parking are often increased to 6-





(Upper Left) "Bike in House" shared use arrow as used in San Francisco. Similar symbols have been used in Denver, CO, Gainesville, FL, and Chicago, IL.

(Upper Right) Recommended dimensions of the "Bike in House" shared use arrow.

(Center Left) "Bike and Chevron" marking as used in San Francisco. Similar symbols have been used in Chicago, IL and Paris, France.

(Center Right) Recommended dimensions of the "Bike and Chevron" pavement marking.

(Lower Left) Existing bikeway sign in Downtown Orlando.

(Lower Right) Example bike route signs on the South Dade Trail in Miami-Dade County.

7 feet, while the parking width is limited to as little as 6-7 feet. All things being equal, it is safer (for motorists exiting a car and bicyclists passing opening car doors) for the greater width to be in the bicycle lane.

Signed and Marked Bike Routes

When it is not feasible to include exclusive bike lanes, desirable bicycle routes can be signed with bicycle route markers and marked with pavement markings. The pavement markings would not only indicate that the roadway was a bike route, but would also show the proper bicycle riding position within the travel lane, typically to the outside of wide curb lanes of 14 or more feet, and towards the middle of the lane in narrower lanes or adjacent to a parking lane. To limit sign clutter, it is recommended to rely primarily on pavement markings for proposed bike routes on asphalt roadways; signage is limited, and is used mainly to indicate route turns. On brick streets, it may be necessary to use more signage if pavement markings cannot be used. Thermoplastic is preferred to paint for markings due to its durability.

Signage for bike routes is intended to provide reinforcement that the particularly roadway is a route used by bicyclists, as well as to provide directional and wayfinding information to bicyclists.

There are two potential bike route pavement markings for use in the Downtown area that have been used in other locations around the country: the "bike in house" shared use arrow and the "bike and chevron" marking. A study of the effectiveness of these marking conducted in San Francisco found that both types of markings had a positive effect on motorist and cyclist behavior, position, and safety. The use of each type of marking resulted in the following improvements:

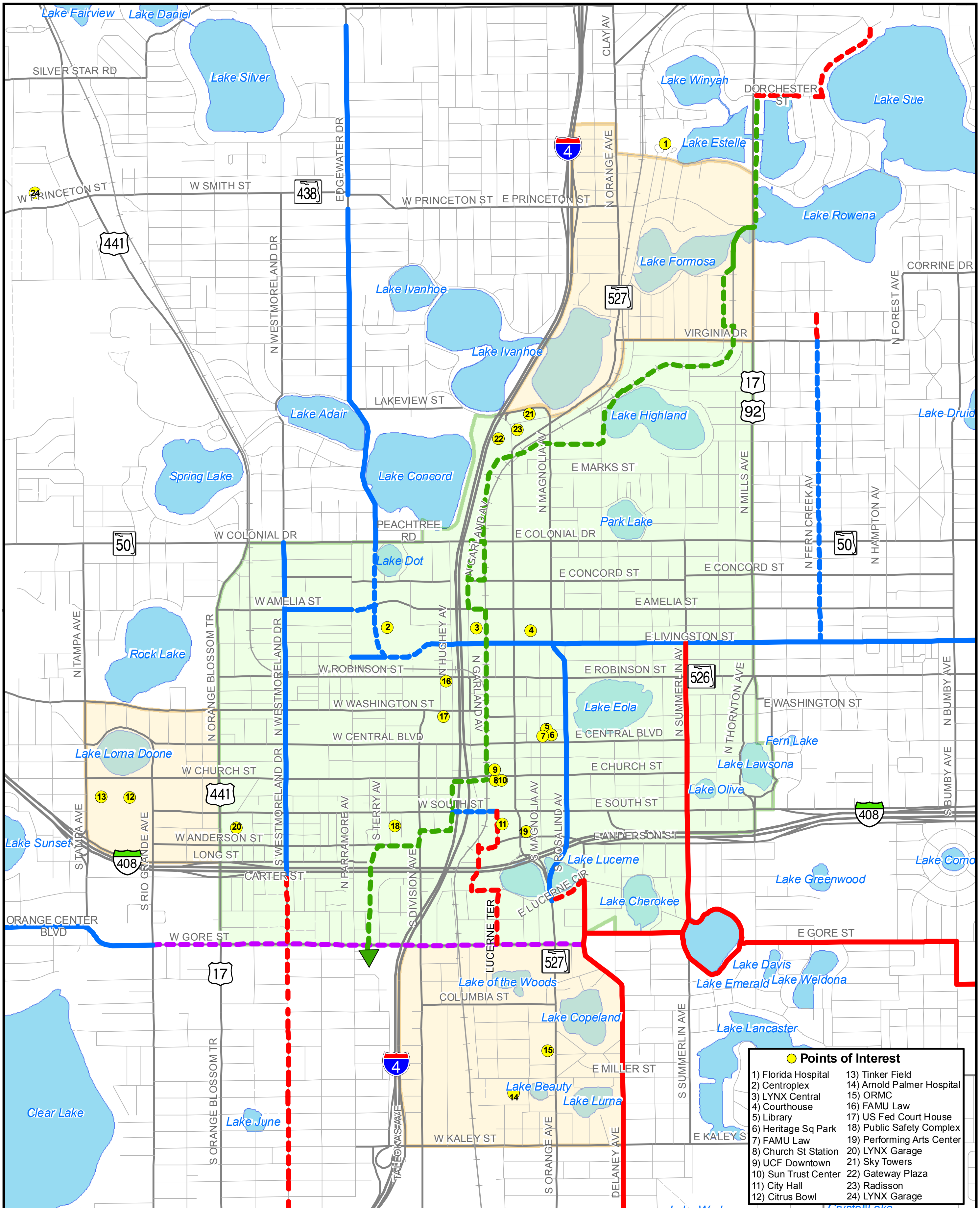
- an increase in distance that bicyclists rode from parked cars
- an increase in the distance between passing motorists and cyclists
- a reduction in sidewalk riding

The study also noted that the bike and chevron marking had a stronger impact on motorist positioning and in reducing wrong way riding compared to the bike in house. The bike and chevron symbol was also preferred by cyclists surveyed.

Primary Bicycle Corridors

Figure 4-4 presents the recommended primary bicycle corridors in the Downtown area. **Primary bicycle corridors provide the major routes for bicycle travel into and within Downtown Orlando**. The primary corridors are described as follows:

- The Orlando Urban Trail. This proposed trail corridor serves as the spine to the primary bicycle network, providing connections to Winter Park's Mead Garden at the north and ultimately to the Shingle Creek Trail at the south. The trail is proposed to encompass the Dinky Line Trail, Gertrude's Walk, and new sections of trail that will be built as part of interim or ultimate I-4/SR 408 interchange projects.
- Ferncreek Avenue, from Nebraska Street to Livingston Street. This roadway is wide enough to stripe bike lanes by removing unnecessary neighborhood street left turn lanes and on-street parking. This street may also be reconstructed with brick, in which case it should be configured with a concrete bike lane like those on Livingston Street.
- Summerlin Avenue, from Livingston Street to South Lake Davis Drive. This roadway will provide a signed north-south bicycle route connection between two primary east-west bicycle facilities and will serve the Thornton Park Shopping District.
- Rosalind Avenue/Magnolia Avenue, between Lucerne Circle and Livingston Street. This existing bicycle lane provides a major north-south route through the center of Downtown. It is recommended to extend the existing bicycle lanes north from SR 50 to Orange Avenue; however, there are potential space conflicts with vehicle and transit modes in these segments that may preclude the inclusion of bicycle lanes.
- Delaney Avenue/Lucerne Circle. This is an existing signed bicycle route that provides a primary north-south connection into the Downtown core from south of Downtown. The Lucerne Circle segment provides northbound cyclists a direct connection from Delaney Street to the Rosalind Avenue bike lane.



Existing and Proposed Bicycle Corridors

- Existing Bike Lanes
- Proposed Bike Lanes
- Existing Signed Bike Route
- Proposed Signed Bike Route
- Proposed Road Diet - Add Bike Lanes
- Existing Multi-use Trail
- Proposed Multi-use Trail
- Study Area
- Extended Transit Plan Area

Downtown Orlando Transportation Plan

Figure 4-4

Primary Bicycle Corridors

- Sylvia Lane/America Street/Lucerne Terrace, between South Street and Gore Street. This proposed signed and marked bicycle route will provide connectivity in both directions from Gore Street to the Downtown core, but is especially critical for southbound cyclists as it serves as the southbound route that compliments the Lucerne Circle to Rosalind Avenue northbound route. A potential extension and realignment of Lucerne Terrace would provide the same connection and if implemented should be, at minimum, established as a signed and marked bicycle route.

- Edgewater Drive, from north of Downtown to SR 50. This existing bicycle lane provides a connection into Downtown from the College Park neighborhood.

- Terry Avenue Extension, between SR 50 and Livingston Street. This proposed roadway extension should include bicycle lanes to provide a north-south connection between other facilities on the west side of Downtown.

- Westmoreland Drive, from south of Downtown to SR 50. Much of this corridor has existing bicycle lanes that provide a connection across the Downtown core on the west side of Downtown. South of Carter Street, Westmoreland is proposed to be a signed and marked bicycle route.

- Livingston Street, from east of Downtown to Parramore Avenue. This roadway has existing bike lanes with the exception of a small portion adjacent to the Centroplex, and provides one of the main east-west bicycle routes through Downtown. Bike lanes are proposed to be installed on the missing section by narrowing the existing travel lanes.

- Amelia Street, from the Terry Avenue Extension to Westmoreland Avenue. This roadway has existing bike lanes between Parramore Avenue and Westmoreland Avenue, and bike lanes are proposed to be added to the section between the Terry Avenue Extension and Parramore Avenue.

- South Street, from the Orlando Urban Trail and Hughey Avenue to Boone Avenue. An on-street bicycle lane is proposed on this section in the eastbound direction adjacent to the proposed eastbound contra-flow vehicle lane. This short section will help facilitate the primary southbound bicycle movement, complimentary to the northbound facilities on Rosalind Avenue.

- Gore Street/North Lake Davis Circle/South Lake Davis Circle/Cherokee Drive. East of Orange Avenue, this east-west corridor is an existing signed bicycle route. West of Orange Avenue, Gore Street is proposed to have bike lanes added through a "road diet" project in which the four-lane undivided roadway would be converted to a three-lane section (one travel lane in each direction with a center turn lane) and bike lanes.

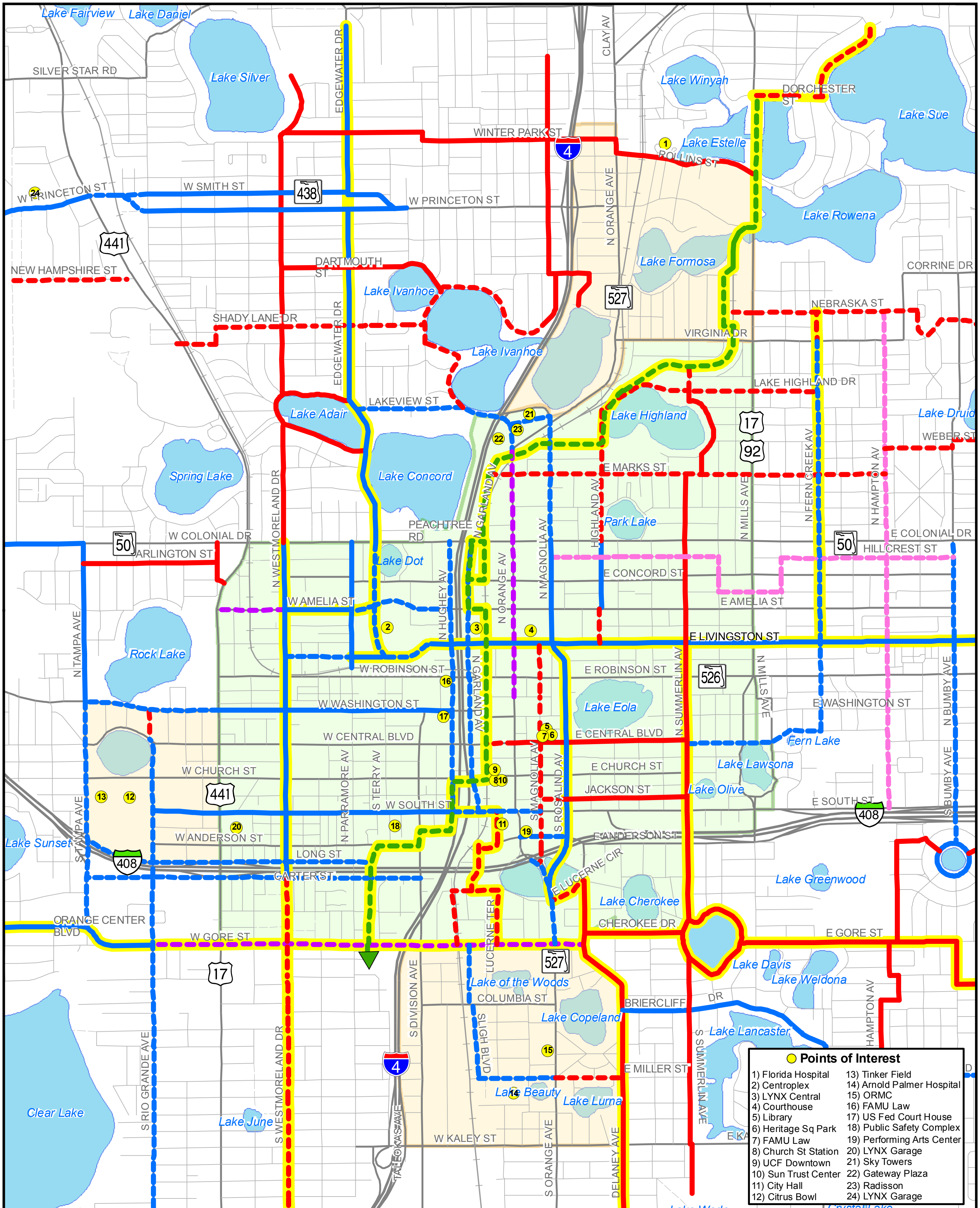
Other Downtown Bicycle Facilities

Figure 4-5 presents the complete bicycle facility plan for Downtown Orlando, inclusive of all existing and recommended bicycle facilities. In addition to the primary bicycle corridors mentioned previously, the following section describes other recommended bicycle facilities of note.

An example of a bicycle boulevard. Bicyclists are allowed to pass through this intersection, but vehicles must turn right.

A **"**bicycle boulevard**"** is proposed for Hillcrest Street, located one block south of SR 50. A bicycle boulevard is essentially a series of well connected local streets that give bicyclists preference over vehicular traffic. Bicycle boulevards will often have diverters for vehicular traffic at periodic intervals along the corridor which allows for less through vehicle traffic. At raised diverters, gaps are provided to allow bicyclists to continue through the intersection. Stop signs at intersecting streets are often rotated to favor the unimpeded through movement of bicycles. A bicycle boulevard is proposed for Hillcrest Street between Bumby Avenue and Magnolia Avenue primarily to provide easy access for bicyclists to the myriad of destinations along SR 50 – because the corridor is only one block south of SR 50, bicyclists will have access to the rear of buildings or from sidestreets. Heading westbound, there is a two block gap in the street corridor beginning at Mills Avenue – based on the existing residences and businesses, it is not feasible to allow a trail connection through this two block gap. As such, it is recommended that the bicycle boulevard detour south to Mount Vernon Street (a distance of two blocks) at Shine Avenue and connect back to Hillcrest Street via Hyer Avenue on the west side of Mills Avenue. Moving the corridor south to Mount Vernon Street also allows bicyclists the use of the existing traffic signal to travel across the busy, four-lane Mills Avenue. It is recommended to modify the detector setting to accommodate bicycles on the east and west approaches of this intersection, along with the corresponding signage and pavement markings. There are a number of locations along this proposed bicycle boulevard corridor that could have stop signs rotated to give priority to the through bicycle movement. In addition, some stop-controlled intersections could be converted to roundabouts or neighborhood traffic circles to allow bicyclists to pass through the intersection without having to stop. Although traffic diverters are often a component of bicycle boulevards, further study would be needed prior to determine appropriate locations for installation.

A bicycle boulevard is also recommended on Hampton Avenue. However, due to the nature of this roadway as an important north-south residential collector street for vehicles, it is unlikely that any diverters would ever be implemented on this corridor. The elements that should be implemented include signage and pavement markings, bicycle detectors on the north and south approaches of Hampton Avenue at SR 50, Livingston Street, and Robinson Street. In addition, some traffic control changes, such as rotating or eliminating stop signs for the north-south movement to benefit bicycle traffic, may be appropriate south of SR 50. The installation of roundabouts or neighborhood traffic circles in place of stop-controlled intersections such as at Marks Street or Amelia Street may also be considered.



- Existing Bike Lanes
- Proposed Bike Lanes
- Existing Signed Bike Route
- Proposed Signed Bike Route
- Proposed Bike Boulevard
- Primary Bike Corridor
- Proposed Road Diet - Add Bike Lanes
- Existing Multi-use Trail
- Proposed Multi-use Trail
- Study Area
- Extended Transit Plan Area

Downtown Orlando Transportation Plan

Figure 4-5

Bicycle Facility Plan

N

0 625 1,250 2,500 Feet

The model for brick streets with concrete bike lanes on Livingston Street and Briercliff Drive is recommended for the existing brick section of Central Boulevard between Summerlin Avenue and Brown Avenue. Bike lanes are recommended to continue along this corridor on the asphalt section between Brown Avenue and Ferncreek Avenue as well.

Bike lanes are desirable on Orange Avenue, beginning north of Garland Avenue at the beginning of the one-way section and proceeding to the Jefferson Street intersection at a minimum. This improvement would provide a complimentary southbound bicycle lane to the northbound facility on Rosalind Avenue/Magnolia Avenue. The inclusion of the bike lane can easily be accomplished through the removal of either a lane of on-street parking or one travel lane, which is feasible since this wide section of Orange Avenue has four travel lanes and on-street parking on both sides of the street. There is however, a potential conflict of available space within the right-of-way to accommodate bicycles, transit (having an exclusive transit lane), and vehicle traffic that may preclude the implementation of a bike lane on Orange Avenue.

A “road diet” is recommended on Amelia Avenue between Westmoreland Drive and Orange Blossom Trail to allow the inclusion of bike lanes on this section, and a continuation of the existing bike lanes between Parramore Avenue and Westmoreland Drive. The road diet would be similar to that proposed for Gore Street, by reducing the existing four-lane undivided roadway section to three lanes, thereby accommodating one through travel lane in each direction and a center left turn lane; the additional space gained by removing one travel lane is used to create a bike lane in each direction. This project would also provide a connection to the proposed link along Orange Blossom Trail (via a sidewalk trail) to Concord Street and Springdale Road (both proposed as signed bicycle routes), which links to the existing signed bicycle route on Arlington Street and the existing bike lanes on Tampa Avenue.

The section of Magnolia Avenue from Livingston Street to south of Anderson Street is proposed to be a signed and marked bicycle route. Because much of the corridor only has a single travel lane in the northbound direction adjacent to Lymmo, marking this travel lane as a bike route does not offer much from the perspective of Downtown bicycle mobility, since there is already a northbound bicycle lane two blocks to the east on Rosalind Avenue. What would benefit Downtown more from a bicycle mobility standpoint is one of the following options:

1. Change the primary direction of Magnolia Avenue’s single travel lane to southbound. This would allow a signed and marked bike route in the southbound direction as a compliment to the northbound bike lane on Rosalind Avenue, and would also proceed further south than the proposed Orange Avenue bike lane which is unlikely to go further south than Jefferson Street.

2. Prohibit all vehicular traffic on the segments of Magnolia Avenue that only have the single northbound travel lane today, and convert this to a two-directional exclusive bike boulevard.

Each of these concepts would need further study to determine their feasibility.

The shoulder on Washington Street, shown here between Westmoreland Drive and Parramore Avenue, is not striped correctly for bicycle traffic and disappears at major intersections.

Although Washington Street is shown as having bike lanes between Hughey Avenue and Orange Blossom Trail, the on-street facility is a narrow undesignated shoulder. Further, this shoulder disappears at the signalized intersections along Washington Street at Westmoreland Drive and Parramore Avenue to accommodate left turn lanes at these intersections. It is recommended to widen the existing shoulder to 5 feet by narrowing the adjacent travel lanes, formally designate the lanes as bike lanes through appropriate signage and markings, and to investigate the need for left turn lanes on the east and west approaches at Westmoreland Drive and Parramore Avenue. If the absence of the left turn lanes at these locations will not cause significant delay and queuing, it is recommended that they be removed in order to provide continuous bike lanes through the intersections. Another option for these intersections is to convert them from signal control to single lane roundabouts.

The proposed two-way conversion on South Street and Anderson Street result in proposed bike lanes adjacent to the single contra-flow travel lane. On South Street the bike lane runs eastbound between Hughey Avenue and Magnolia Avenue, and on Anderson Street, the bike lane runs westbound between Rosalind Avenue and Orange Avenue.

Bicycle and Transit Facilities

Due to limited right-of-way on many Downtown roadways, particularly those that are desirable for exclusive bus lanes, it may be necessary to create a shared bicycle and bus lane if an on-road bicycle facility is to be included. **Shared bicycle and bus lanes** can be designed in one of two general ways:

1. With a narrower width (10 to 12 feet). In this case, no raised barrier should be placed between the shared bike/bus lane and the adjacent travel lane to allow an overtaking bus or bicyclist to move into the adjacent travel lane to pass.

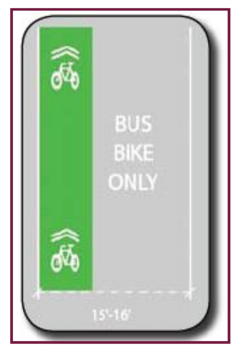
2. With a wider width (15 to 16 feet). In this case, the shared lane will be wide enough to allow passing without the bus or bike having to move into the adjacent lane. If needed, this lane could be barrier separated, although it will be important to consider bicycle access to adjacent land uses and streets. For example, a bicyclist riding in a shared bike/bus lane on the far right side of a roadway may wish to turn left at a roadway in which case they should move into the right-most lane that will direct them to their destination.

Bicyclists and buses can coexist well as long as the bus drivers act professionally and the bicyclists operate as vehicles. Each must overtake the other with adequate lateral clearance, and avoiding getting on the wrong side of the other.

A separate bike lane can be included to the left of an exclusive bus lane that is located on the far right side of the roadway if there is adequate right-of-way. Having the bicycle lane to the left of the bus lane places the cyclist in the correct location at bus stops which must be directly adjacent to the curb.

There is the potential that some exclusive transit lanes in Downtown Orlando may operate contraflow to the direction of vehicle traffic. At signalized intersections, if buses are traveling straight through an intersection, no special transit phases would be necessary. In this case, bicycles could still be permitted to use a shared bike/bus lane because a traditional signal display would be used at intersections. However, if a special transit phase (and special transit signal display such as those used for Lymmo) were used, a special cyclist signal would also be needed to tell cyclists when it was safe to proceed through the intersection. Any exclusive bus lanes that are planned to be two-directional, with buses in that section being regulated in time to eliminate head-on conflicts (a possibility on Orange Avenue between Amelia Street and Livingston Street) could not operate as shared lane facilities for bicyclists.

It should be noted that rail-based transit such as streetcar should not have a shared lane with bicycles due to the hazard of bicycle wheels crossing rails at low angles. Exclusive bicycle lanes can be accommodated on streets with streetcar. However, there must be adequate provisions for bicyclists to travel past the streetcar station areas; they cannot pass between the streetcar track and the curb, as the streetcar track must be located directly adjacent to the curb at the stations. Maneuvering the bicycle lane to the left of the streetcar track at the stations would require the bicyclist to cross the track at very low angles, increasing the potential for bicyclist crashes. The City of Portland, Oregon has addressed this concern regarding bicycle lanes at the streetcar stations by ramping the bicycle lane up to the sidewalk



(Top) A shared bike and bus lane in Philadelphia (Photo: John Allen).

(Center) A bike lane to the left of an exclusive bus lane in Madison, Wisconsin (Photo: John Allen).

(Bottom) The City of Denver plans to use shared bike/bus lanes (15-16 feet wide) on two downtown roadways having high transit frequencies (48 buses per hour). Bicycles will use a colorized bike lane to the left of the bus lane. The bicycling community and transit operators in Denver were both in agreement as to their preference of locating the bike lane to the left of the transit lane (Source: Downtown Multimodal Access Plan, Denver, CO, Dec. 2005).

level and directing cyclists behind the station platform and shelter. The bicycle lane then ramps back down to street level once past the streetcar station. Although this configuration avoids a conflict between bicycles and the streetcar tracks, it creates another potential conflict between bicyclists and pedestrians between the sidewalk and the station platform.

4.6 Evaluation & Feasibility of a Yellow Bike Program

In 1995, City of Orlando staff researched the City of Portland's Yellow Bike Project to determine its applicability to the City of Orlando. This section summarizes the information regarding Portland's program at that time, as well as similar programs in other cities.

City of Portland's Program

The Portland Yellow Bike Project consists of approximately 350 bicycles that are painted bright yellow and dispersed throughout Portland. The bicycles are free to all users with a sign that instructs the user to return the bicycle to a major street intersection and cautions the user to "use at your own risk". Thomas O'Keefe, the co-founder of the Yellow Bike Project, noted that the bicycle program has also been initiated in several cities including Seattle, Vancouver, Boulder, and Huntington Beach.

Liability is a concern. Although there have been no law suits to date, Mr. O'Keefe explained that liability is an issue and that it is virtually impossible to insure this type of program. Instead, they have chosen to administer it through a very small non-profit organization. The non-profit organization has virtually no budget, and in the event of a lawsuit would dissolve. In previous discussions with the Executive Director of the Downtown Orlando TMA, it was determined that the TMA's insurance company will be unable to administer the program.

Since 1995, Portland's Yellow Bike Project has evolved into "Create a Commuter" and other programs at the Community Cycling Center. The Community Cycling Center's Create a Commuter (CAC) program provides low-income adults with fully-outfitted commuter bicycles and five hours of training on safe bicycle commuting. Federally funded initially through the Job Access Initiative, CAC is the first program of its kind in the nation. This program provides a flexible option to meet the transportation needs of low-income adults.

Programs in Other Cities

Details from similar programs in other cities are provided as follows:

Boulder, CO – Spokes For Folks

- This is the longest-running free bike program in the U.S.
- The program began in 1995 with 50 old, discarded junker bicycles.
- The program celebrated 5 years in 2000 with a 130 bike fleet.
- Spokes for Folks was modeled after Portland's Yellow Bike program.
- The program's bikes are painted bright lime green with a basket on the front and a sign which reads: "Spokes for Folks, Free Community Bikes."
- The "Spokes" bike fleet is put out for free use by anyone who needs to make a short trip around town.
- The bikes are built and maintained by local high school students, who get paid for their work and build skills and camaraderie with the experience.
- Much of the program's success can be attributed to these student mechanics' efforts.
- Most of the program's $20,000 cost of maintaining the bikes came from private donations (in 2000) rather from City funds.
- The program is a test of community spirit which Boulder has passed by the fact that the majority of the bikes are returned each year for winter storage, and more are added each year. People in Boulder accept the program and are supportive.

Munich, Germany – Dial-a-bike

- Fluorescent orange bikes are scattered around the City with phone numbers printed on the sides, and a self-locking mechanism on the rear wheel.
- When users dial a particular number from their mobile phone and through GPS and text messaging, they are informed of the location of the nearest "Dial-a-bike" bicycle. When the user gets to the bike, they punch in a code number on an LCD panel on the rear of the bike and the locking mechanism unlatches. Users can cruise around Munich at their leisure for whatever number of minutes they paid for. When they are done, they just leave the bike wherever they happen to be. It will lock itself and await the next customer.

Rental bikes available in Lyon, France in a program similar to the Munich Dial-a-Bike program.

- This program uses a mobile phone technology not sufficiently available in the U.S. at this time.

Orange County, Florida – Blue Bikes

The Dasani Blue Bikes community bicycle program, supported by Trek and the Rails-to-Trail Conservancy, encourages Orange County residents to be active by providing free use of 20 brand-new Trek Cruiser bicycles to explore the West Orange Trail and Little Econ Greenway Trail. The Dasani Blue Bikes are housed in specially designed storage lockers; at the Little Econ Greenway, the lockers are located at the Orange County Parks and Recreation office on the east end of Blanchard Park. People can use the bikes for free, between 9 AM and 7 PM daily, by registering for a one-day Dasani Blue Bikes card at the Parks and Recreation office. Cyclists simply pass their card through the reader at a Blue Bikes locker (which records their identity from the card) to remove a bike and return it at the end of their ride.

Feasibility for Downtown Orlando

A yellow bike program, modeled after Portland's program, could be feasible in Downtown Orlando. A small non-profit agency that is interested in promoting bicycling should be identified to administer the program. There are several non-profit bicycle oriented agencies that could be approached as potential sponsors. A community bike program would attract media attention and increase membership and volunteers for a sponsoring agency.

If a community bicycle program were implemented in the City of Orlando, the City's role would likely be an indirect one. The City of Portland does not play an active role in overseeing the project, because of liability issues. The City of Portland provides warehouse space for bicycles that have been donated to the Yellow Bike Program but that have not been serviced for distribution. If a community bicycle program is implemented, it is anticipated that the City of Orlando's role would be similar to the City of Portland's.

A program similar to Orange County's Blue Bikes program could be implemented in Downtown Orlando as an alternative to the yellow bike program model. A blue bikes program would enable residents and employees of Downtown to have access to a bike for transportation or recreational purposes, while eliminating much of the potential risk for theft of bicycles. A drawback is that bicycles would be less accessible, having to be stored and accessed via a central location. An ideal location from which to administer this type of program would be at the LYNX Central Station, and preferably at a Downtown Bike Station.

4.7 Evaluation of Pedicabs in Downtown Orlando

Pedicabs in Downtown on Orange Avenue.

Pedicabs (bicycle powered cabs, typically seating 2-4 passengers) have become quite prevalent in Downtown Orlando, typically catering to nighttime activity. Pedicabs help to reduce the number of cars in a

Downtown area, along with air pollution and congestion, encourage a pedestrian friendly atmosphere, and help people with health problems or in hot or wet weather to get from their car to their destination. However, pedicabs are typically not regulated and as a result there are often too many companies vying for the same customers, creating a tense situation. It is also difficult to enforce traffic laws for pedicabs – they need to be defined as a vehicle and subject to all traffic laws, such as moving out of the way of emergency vehicles. Insurance is typically tough for pedicab companies to acquire. There is only one insurance company with a history of providing insurance to pedicab companies – McKay Insurance, from Knoxville, Iowa.

Table 4-4 provides a summary of the experience of other cities with regard to pedicabs.

Table 4-4
Pedicab Information for Other Cities

City	Description
New York	Still debating regulations, want to keep out renegade drivers with no license or insurance and 1-2 cabs
Santa Barbara	As of 2002, drivers apply for a city permit, providing a valid Drivers License and insurance. The city conducts background checks and reserves the right to revoke license at any time.
Las Vegas	In 2004 banned all pedicabs from "the Strip" where most pedestrian activity exists. Bowed to pressure from limo and taxi drivers claiming there were too many accidents and safety issues.
Philadelphia	The City uses pedicabs to replace some maintenance trucks and carts
Orange County, California	Pedicabs used to shuttle travelers from terminal to parking lot
Denver	Used in Lower Downtown district – not allowed to use certain business streets
San Diego	Requires Drivers License, proof of insurance and background checks
Phoenix	Requires Drivers License, proof of insurance and background checks; local police feel pedicabs provide an important service for physically challenged, elderly, and those unaccustomed to the heat – reduces calls to emergency services
Dallas	Prohibited from busy streets with posted speed limits of 30 MPH +; require drivers license, proof of insurance, and business permit. They have been banned from around American Airlines Arena – the most lucrative for pedicabs.
London	DHL Express Mail uses to make upwards of 200 package deliveries/day
Netherlands	Pedicabs serve park and ride lots to shuttle people into the city center
Antwerp	Substitute for delivery vans to reduce number of motorized trips on roads

The following recommendations are offered to address pedicabs in Downtown Orlando:

- Require driver license, proof of insurance, and business permit/license to protect the public and the City.
- Define cabs as a vehicle – as such, they are not allowed on sidewalks and must obey all traffic laws and have adequate lighting for nighttime operation.
- Pedicabs will not be allowed to charge fares – “Tips Only” should be printed on the side of every cab.
- Random safety checks should be made of the pedicabs and to ensure possession of correct documentation – this could be done by vehicles for hire section of the Orlando Police Department.
- Mandate the completion of a bicycle safety class (such as the League of American Bicyclists Road I) for all drivers prior to permitting them to operate a pedicab.

4.8 Gaps and Deficiencies in the Downtown Pedestrian Network

Based on the data collected for the survey of streets and sidewalks in Downtown Orlando, an analysis was done on the gaps in the existing pedestrian network. For the purposes of this analysis, a gap in the network was considered any roadway segment surveyed that did not have 100 percent sidewalk coverage on both sides of the street at the time the data was collected. Of the 336 roadway segments surveyed, it was found that only approximately 11 percent have incomplete sidewalks. To fill in the missing sidewalk sections on both sides of the street on all roadway segments surveyed, a total of 4.6 miles of new sidewalk would need to be constructed. A complete list of all roadway segments with sidewalk gaps, as well as the estimated length of missing sidewalk is presented in **Table 4-5.**

Prioritizing the Elimination of Gaps

The gaps in the pedestrian network identified in **Table 4-5** should be prioritized for completion based on the following four priority levels:

1. Eliminate gaps along designated primary pedestrian streets.
2. Eliminate gaps along designated secondary pedestrian streets.
3. Eliminate gaps on any roadway segments not designated as primary or secondary pedestrian streets that are within one-quarter mile of existing or proposed transit circulator routes.
4. All other sidewalk gaps.

Table 4-5

Existing Gaps in Downtown Orlando Sidewalk Network

PRIORITY LEVEL	STREET_NAME	FROM	TO	PLOS SCORE	PLOS GRADE	LENGTH (ft)	# LANES	% SIDEWALK COVERAGE		SIDE-WALK WIDTH (ft)	MISSING SIDEWALK LENGTH (ft)
								N/E	S/W		
1	Robinson	Parramore	Chatham	3.64	D	990	2	50	50	5	990
1	S. Parramore Av	Carter St	Conley St	3.25	C	649	2	100	70	5	195
1	W. Church St	S. Westmoreland Dr	S. Parramore Av	1.91	B	1,317	2	90	80	11	395
2	S. Terry Av	W. Anderson St	W. South St	3.37	C	595	2	10	10	0	1,071
2	W. South St	S. Parramore Av	S. Division Av	3.33	C	1,306	2	70	70	4	784
2	Garland Av	W. Jefferson St	Washington St	3.23	C	332	3	0	10	5	299
2	W. Amelia St.	N. Westmoreland Drive	Parramore Avenue	3.20	C	1,321	4	90	90	6	264
2	S. Terry Av	W. Central Blvd	W. Church St	2.65	C	662	2	30	80	5	596
2	S. Terry Av	W. Church St	W. South St	2.60	C	647	2	90	90	5	129
2	W. South St	S. Westmoreland Dr	S. Parramore Av	2.59	C	1,336	2	70	70	4	802
2	W. Washington	Chatham	Hughey St	2.29	B	987	2	10	100	5	888
2	N. Terry Av.	Washington St.	Central Ave.	2.20	B	665	2	90	90	6	133
2	N. Westmoreland Dr.	W. Amelia St.	W. Livingston St.	2.04	B	679	2	90	90	5	136
3	Randall St	S. Westmoreland Dr	S. Lee Av	3.43	C	670	2	10	10	0	1,206
3	Ossie St.	Parramore Av.	Terry Av.	3.38	C	651	2	10	10	0	1,172
3	Jefferson St.	Off of Chatham Av.		3.36	C	478	2	10	10	0	860
3	Colyer St	S. Westmoreland Dr	S. Lee Av	3.35	C	662	1	10	10	0	1,192
3	Jernigan Av	W. South St	Long St	3.27	C	935	2	10	10	0	1,683
3	Grove Park Dr.	N. Terry Av.	N. Division Av.	3.07	C	688	2	20	20	8	1,101
3	W. Livingston St.	N. Westmoreland Drive	Parramore Avenue	2.92	C	1,290	2	80	100	6	258
3	W. Jackson St	S. Division Av	S. Hughey Av	2.91	C	644	1	80	10	4	708
3	Franklin Ln	Ernestine St	America St	2.80	C	579	2	50	30	5	695
3	McQuigg Av.	W. Washington St.	W. Robinson St.	2.79	C	647	2	100	20	5	518
3	Pharr Av	W. Anderson St	Hicks Av	2.77	C	493	2	10	100	5	444
3	Chapman Ct	Dead End	W. South St	2.70	C	473	2	100	20	5	378
3	Bentley St.	N. Westmoreland Drive	Parramore Avenue	2.65	C	1,280	2	100	10	5	1,152
3	Mcfall Av	W. South St	W. Anderson St	2.54	C	621	2	10	100	5	559
3	Hicks Ave	Pharr Av	W. South St	2.47	B	411	2	100	10	5	370
3	Garden Av.	N. Washington St.	W. Robinson St.	2.35	B	636	2	100	50	5	318
3	W. Concord St.	N. Westmoreland Drive	Parramore Avenue	2.35	B	1,310	2	90	90	5	262
3	Polk St.	N. Westmoreland Drive	N. Lee Av.	2.30	B	412	2	70	100	5	124
3	W. Jefferson St.	Hills Place	Parramore Avenue	2.24	B	1,055	2	70	80	5	528
3	W. Jackson St	S. Parramore Av	S. Division Av	2.20	B	1,262	2	80	80	5	505

Table 4-5 continues on the next page.

Table 4-5 **(continued)**
Existing Gaps in Downtown Orlando Sidewalk Network

PRIORITY LEVEL	STREET_NAME	FROM	TO	PLOS SCORE	PLOS GRADE	LENGTH (ft)	# LANES	% SIDEWALK COVERAGE		SIDE-WALK WIDTH (ft)	MISSING SIDE-WALK LENGTH (ft)
								N/E	S/W		
3	W. Jackson St	S. Parramore Av	S. Division Av	2.20	B	1,262	2	80	80	5	505
3	Chatham Av.	Robinson St.	Washington St.	1.68	B	655	2	90	100	5	66
4	Hills St.	Hills Place	N. Lee Av.	3.36	C	401	1	10	10	0	722
4	Quill Av	Carter St	Conley St	2.79	C	643	2	60	10	5	836
4	Conley St	S. Westmoreland Dr	Eresken Av	2.76	C	1,563	2	10	100	5	1,407
4	Murphy St	Avondale Av	Dead End	2.21	B	334	2	10	100	6	301
4	Mcfall Av	Conley st	W. Gore St	2.08	B	667	2	100	50	5	334
Total Sidewalk Gap Length (miles)											4.6

Table 4-5 includes the priority level of each sidewalk gap identified. The PLOS score of each segment is also included. Segments at each priority level have been sorted by PLOS score; those with the worst (highest) PLOS scores at each priority level should be given higher priority for filling gaps in the sidewalk network.

4.9 Walking Audits

A series of "walking audits" through four distinct areas of Downtown provided stakeholders and City staff (a.k.a. "Street Doctors") a chance to informally walk and talk about what is working and not working within the study area from the pedestrian's viewpoint. Each audit began with an explanation of the five elements that every street and place needs to succeed, including security, convenience, efficiency, comfort, and welcome. The "Doctors" then walked a set route through each area, stopping often to discuss elements of the street, "diagnose" problems, and talk about potential solutions. A complete summary of the walking audits is included in **Appendix 4-C**

During a series of walking audits, the "Street Doctors" discussed problems and potential solutions within the Downtown urban walking environment.

5 Keys to Success of Place

As discussed before each of the walking audits, **there are five primary elements that every street and place needs to succeed**. These five elements are defined below in terms of pedestrian and bicycle accommodation within the built roadway environment:

1. **Security**. A roadway's environment should give people a feeling of safety that they can walk or ride down the street without fear or anxiety and without putting themselves in danger.

2. **Convenience**. The roadway environment should provide accommodation to all potential users that allow them to easily accomplish their purposes and meet their needs, such as allowing a person to easily walk or bicycle to a specific destination.

3. **Efficiency**. The roadway environment should be effective in helping people accomplish a purpose without having to spend any additional effort; direct and complete sidewalks are an example.

4. **Comfort**. People should feel at ease and content when walking or bicycling within a specific roadway environment, such as walking on wide, shaded sidewalks that are set back from the roadway away from vehicle traffic.

5. **Welcome**. A roadway environment should be inviting to people, and encourage walking or bicycling.

Assessment of Existing Environment

By walking through much of the study area during the walking audits, the Team was able to observe and assess the existing urban environment and identify a number of pedestrian and bicycle issues and needs in several areas.

CPTED

Crime Prevention Through Environmental Design (CPTED) is based on the premise that the proper design and effective use of the built environment can lead to a reduction in both the fear of and incidence of crime, as well as an improved quality of life. Some common CPTED characteristics include providing clear boundaries of controlled space (both public and private space) and designing for natural surveillance (i.e., "eyes on the street") through appropriate sightlines, landscaping, lighting, minimizing hiding places, providing windows that view public spaces (transparency), and encouraging legitimate uses, such as increased pedestrians on sidewalks and cyclists on paths.

Criminals are least likely to act when there is a high risk of their actions being observed.

During the walking audit, both good and poor examples were observed with respect to CPTED principals, as follows:

- Many buildings observed do not have sufficient transparency on the ground floors, and therefore do not provide "eyes on the street". In addition, some buildings have hiding places directly adjacent to the sidewalk.
- Eyes on the trail is an issue on the existing section of Gertrude's Walk north of Central Boulevard due to a high wall on one side and a high line of shrubs on the other. The height of the shrubs should be limited to 30 inches for better visibility of path.
- A good example of bushes that are trimmed to an appropriate height is found on Washington Street east of Parramore Avenue at the Callahan Neighborhood Center. This allows natural surveillance of both the playing fields and sidewalk.
- A lack of transparency due to high fencing has resulted in documented crime problems at a house on Terry Avenue.
- One of the questions on the Active Living by Design Street Survey asked participants to rate how safe they felt on each street segment on a scale from A to F, with A being the safest and F being the most unsafe. **Figure 4-6** presents the results, stratified into two categories; segments in green were generally viewed as safe (rated 1 to 3, or A to C), while segments in red were generally viewed as unsafe (rated 4 to 6, or D to F). As shown, the majority of streets east of I-4 were rated as safe, while a significant number of street west of I-4, particularly those south of Central Boulevard, were rated as unsafe.

(top) Building with poor transparency and a hiding place adjacent to the sidewalk.

(second from top) Properly trimmed shrubs at the Callahan Neighborhood Center allows natural surveillance.

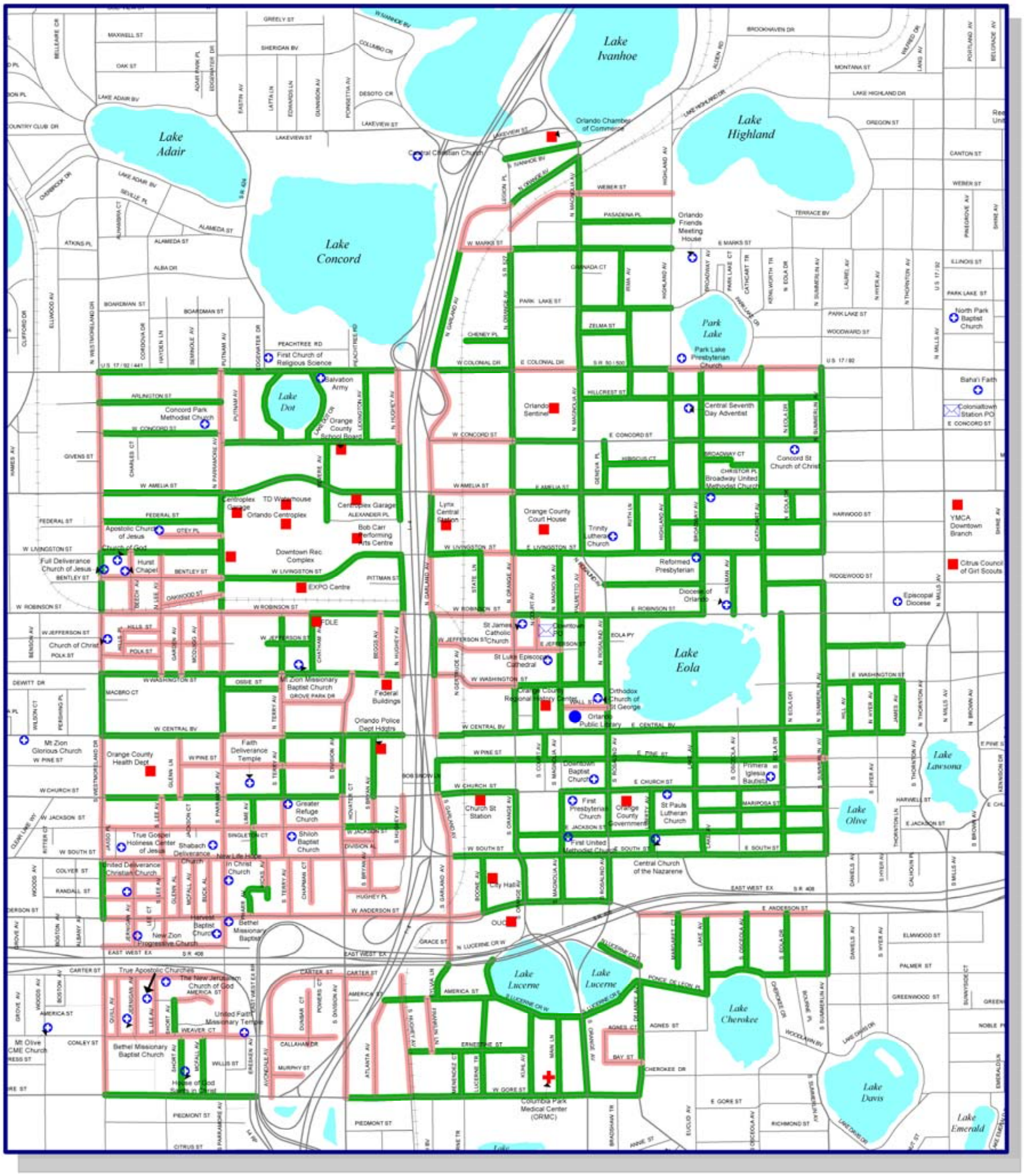
(second from bottom) Crime occurs here due to a lack of transparency.

(bottom) Existing visual barrier on Gertrude's Walk due to high shrubs.

Streetscape Elements

Each object that occupies space in a street, defines the boundaries of zones within a street, or is made use of within the street can be considered an element. A variety of streetscape elements, including

Figure 4-6
Downtown Sense of Safety



Downtown Sense of Safety

NORTH

- Point of Interest
- Hospital
- Library
- Religious Institution
- Post Office

Rated 1 to 3

Rated 4 to 6

City of Orlando, Economic Development Department, City Planning Division, May 2005

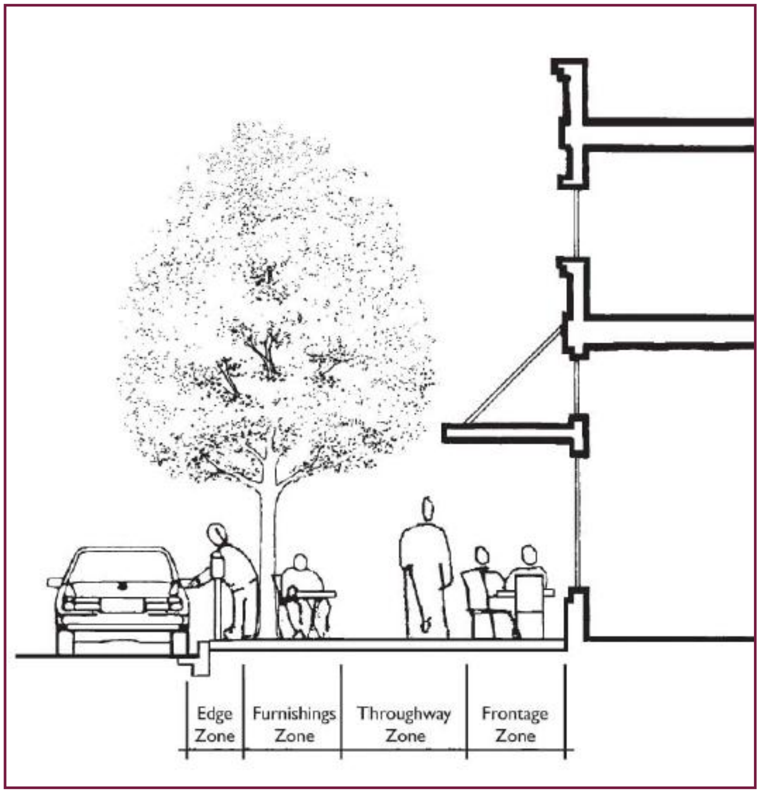
paved surfaces, plantings and accessories (trees and tree-related equipment), and amenities (furniture, fixtures, and other equipment), can enliven a street and help to facilitate social interaction among people thereby transforming the street into a place.

In general, the pedestrian environment is defined by different roadside zones, as follows:

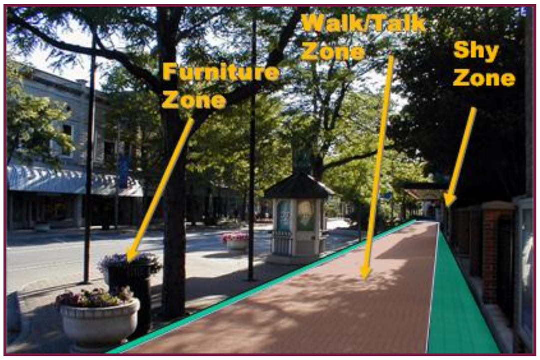
- **Shy Zone (also known as the Frontage Zone)**. People need to shy from walls, fences and shrubs a minimum of 2 feet. Some items, such as planters, can be placed in shy zones, as well as some private furnishings, such as cafe tables and seating, portable signage, and merchandise displays. If bike lanes or on-street parking is omitted from the street, shy zones exist to both the building and the street side of the walkway. Awnings, canopies, and overhangs should cover this area and extend into the walk/talk zone to protect pedestrians from heat and rain.

- **Walk/Talk Zones (also known as the Throughway Zone)** can have widths of 5-40 feet, with 8-10 feet being most common. This area is intended for pedestrian travel only and should be entirely clear from obstacles and have a smooth walking surface. In some entertainment zones the walk/talk space may be more restricted. On great shopping streets they are often more generous in width.

- **Furniture or Furnishing Zones** are typically 4-12 feet wide (sometimes wider). This area may also include an **Edge Zone**, which is the buffer between the traveled way and the furniture zone at the curb, which provides clearance space for vehicle doors, mirrors, or vehicle overhangs associated with angled parking. The Furniture Zone must be of sufficient width for all types of street furniture to fit with comfort, including street trees, planters or planting strips, utility poles, signal poles, signal and electrical cabinets, fire hydrants, bicycle racks, benches, trash receptacles, transit stops/shelters, and other street furniture. Having great street amenities in the furniture zone will help to make pedestrian walkways interesting and comfortable.



Roadside zones (Source: Community Design + Architecture).



(top) Example of sidewalk zones (Source: Dan Burden).

(second from top) Orange Avenue defines its roadside zones through color and texture.

(second from bottom) The existing trash cans on Orange Avenue could be improved simply by having them thoroughly cleaned on a regular basis.

(bottom) Pine Street has good shade, awnings, and eyes on the street; it is a good model for streetscape on other roadways.

Streetscapes within Downtown vary considerably from very attractive streets with wide sidewalks, shade via trees and awnings, and sidewalk cafes, to streets that have very barren roadsides with little or no pedestrian amenities. Observations relative to the various streetscape elements in Downtown include:

- Trash receptacles are an important element of a streetscape, and are needed throughout Downtown. The frequency of receptacles was noted to be good on Orange Avenue, but inadequate in other locations, such as Magnolia Avenue north of Colonial Drive and within the Parramore/Callahan area.

- One strategy for improving a streetscape is to take the ugliest thing on the block, such as trash receptacles, and make them the most attractive.

- A primary element missing from the streetscape in the Parramore area is seating, which was omitted or removed, presumably, to prevent loitering. As a result, people were observed sitting on concrete curbs, newspaper boxes, etc.

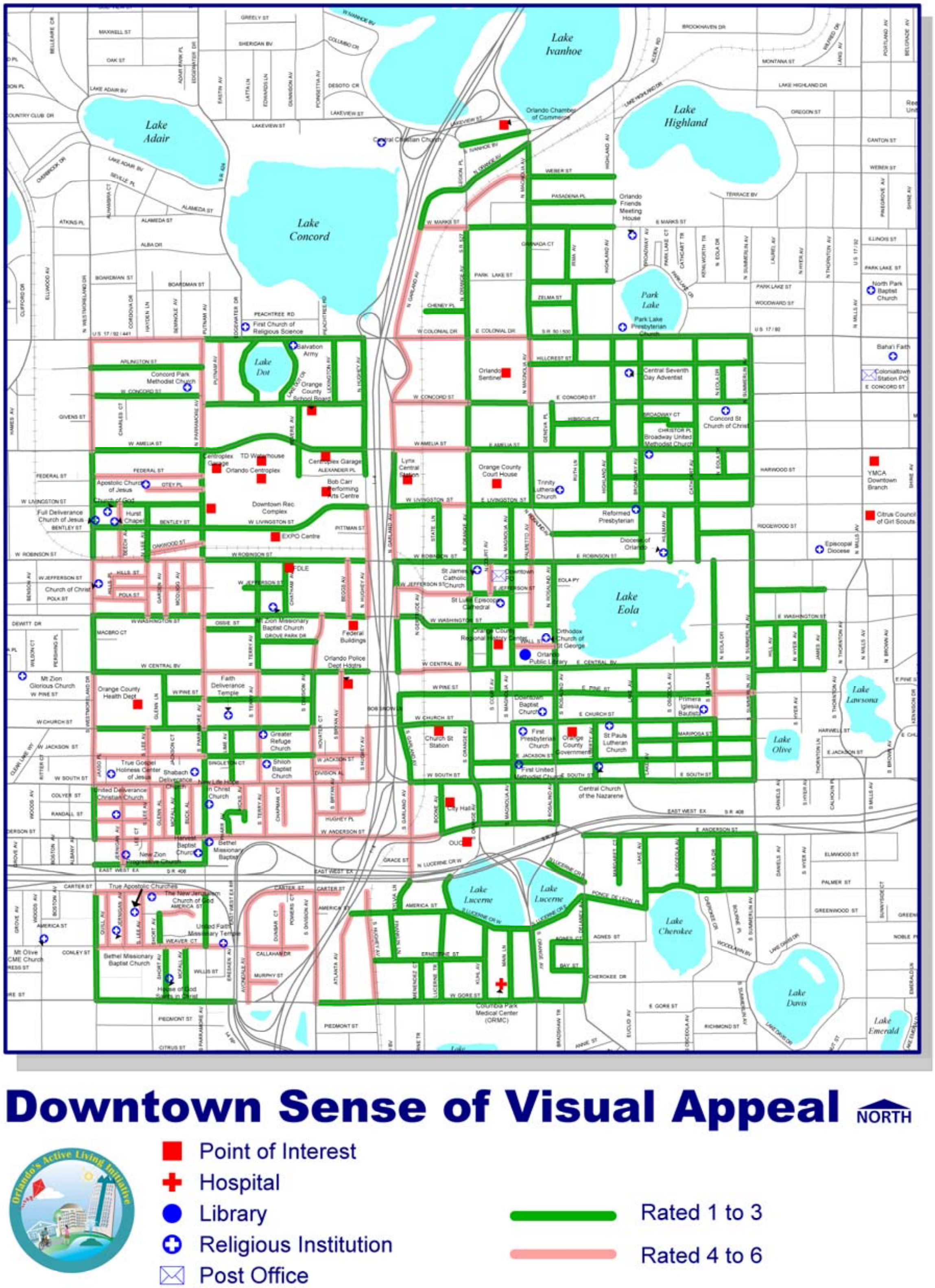
- An Active Living by Design Street Survey question asked participants to rate the level of visual appeal on each street segment on a scale from A to F, with A being the best it could ever be and F being the worst it could ever be. **Figure 4-7** presents the results, stratified into two categories; segments in green were generally viewed as visually appealing (rated 1 to 3, or A to C), while segments in red were generally viewed as visually unappealing (rated 4 to 6, or D to F). As shown, the results are very similar to those for the evaluation of Sense of Safety, with the majority of streets east of I-4 rated as visually appealing, while many streets west of I-4, particularly those south of Central Boulevard, were rated as visually unappealing.

Comfort Characteristics

As discussed previously, comfort is one of the five keys to success of place. Many of a street's physical characteristics contribute towards a pedestrian's comfort level, including shade, sidewalk width, widths of buffers between the sidewalk and the street, and the absence of obstructions within the walking

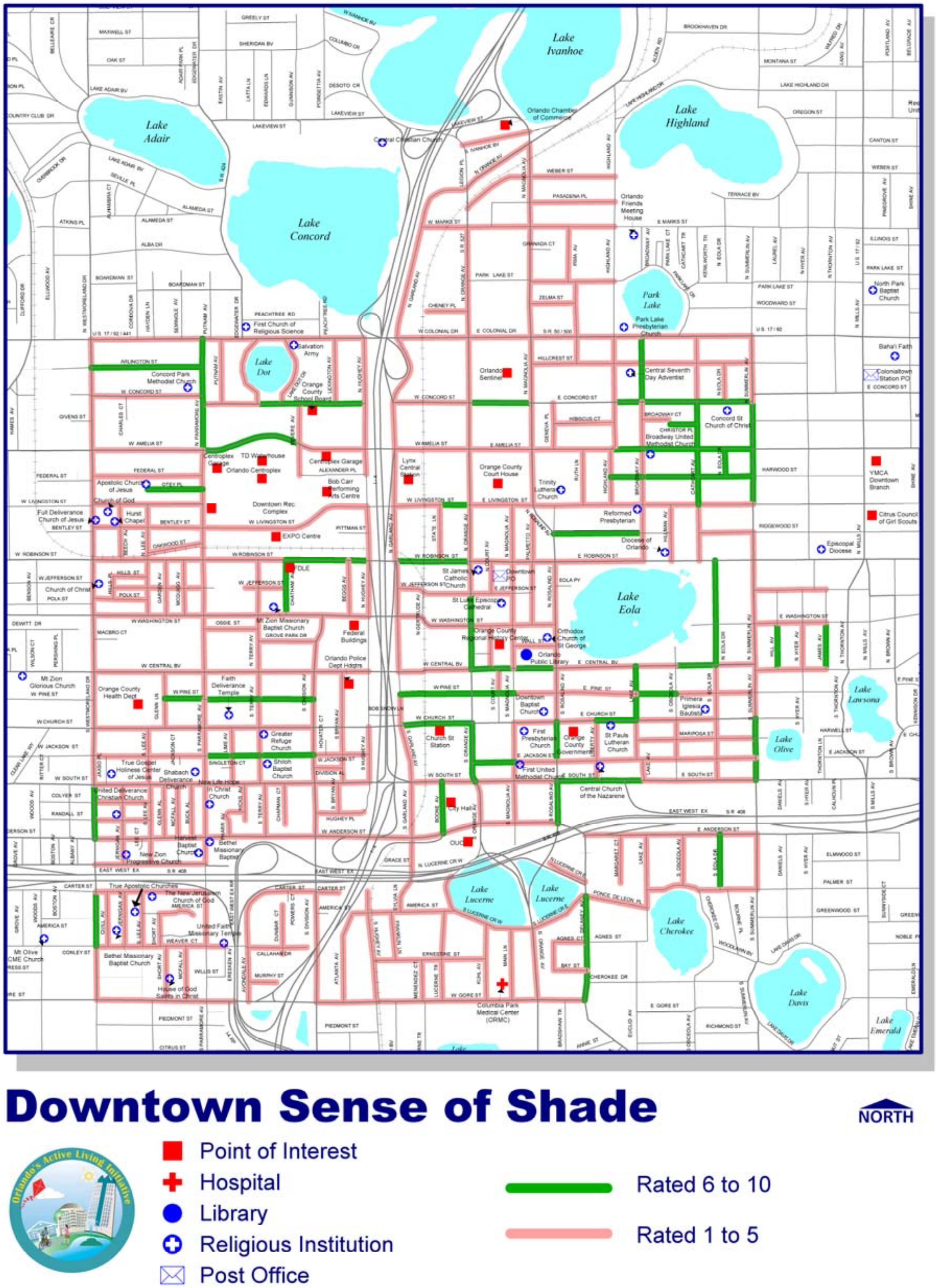
Figure 4-7

Downtown Sense of Visual Appeal



City of Orlando, Economic Development Department, City Planning Division, May 2005

Figure 4-8
Downtown Sense of Shade



City of Orlando, Economic Development Department, City Planning Division, May 2005

area. Because of Central Florida's very warm climate and frequent rain showers and thunderstorms, shade and protection from rain are two very important street characteristics that are critical to providing a truly walkable Downtown.

A third Active Living by Design Street Survey question asked participants to rate the sense of shade on each street segment based on the estimated amount of shaded sidewalk (as a percent of the segment) due to trees and/or awnings at noon. **Figure 4-8** presents the results, stratified into two categories; segments in green were generally viewed as shady (rated 6 to 10, or having 60 percent or more shade), while segments in red were generally viewed as not shady (rated 1 to 5, or having shade of 50 percent or less). As shown, the City has lots of room for improvement relative to shade, as the vast majority of segments rated low relative to sense of shade.

Sidewalk widths vary tremendously in Downtown, from neighborhood streets with 5-foot sidewalks to primary pedestrian corridors with sidewalks of nearly 20 feet in width, including walk/talk zones of more than 10 feet or more. However, many sidewalks today are too narrow for the volume of pedestrian activity experienced. Five-foot sidewalks typically can only accommodate two people walking side by side; wider sidewalks are needed on corridors with significant pedestrian volumes. In order to keep corridors comfortable for pedestrians, many sidewalks will need to be widened.

Buffers between sidewalks and the roadway are very important in terms of pedestrian comfort. Buffers can include planting strips, furniture zones on the sidewalk, bicycle lanes, and on-street parking. Street trees within the buffer significantly enhances pedestrian comfort, particularly when closely spaced. Pedestrians are the least comfortable walking on roadways with the sidewalks located at the back of curb and no buffer to vehicle traffic. Downtown Orlando has many examples of streets with exemplary buffers, as well as those with no buffers.

ADA Compliance

In most locations in Downtown, there is good compliance with the requirements for access to facilities by those with disabilities per the Americans with Disabilities Act (ADA). However, there are still intersections that do not have curb ramps. It was also noted during the walking audits that

Two unattractive streetscape examples with poor pedestrian facilities in Downtown today, (top) on Rosalind Avenue north of Pine Street and (center) Anderson Street at I-4.

(top) A street that was rated as having good shade is Concord Street between Orange Avenue and Magnolia Avenue. Note the wide green buffer between the street and sidewalk.

(center) Division Avenue north of Church Street has very wide 19-foot sidewalks, including a 12-foot walk/talk zone.

(bottom) Magnolia Avenue at Colonial Drive has 6-foot sidewalks with no buffer to the street, as well as several obstructions in the middle of the sidewalk.

Gore Street has sidewalks directly adjacent to the travel lanes with no buffer.

uneven pavers can be an issue for the visually impaired; without proper maintenance, there are numerous areas with pavers that could become dangerous. Another problem is that some sidewalks were observed with missing sections or connections for direct street crossing. In addition, there were some locations where curb ramps did not align properly with marked crosswalks. Intersections that have been specifically mentioned as problem areas for the visually impaired include the Central Boulevard intersections at Rosalind Avenue and Magnolia Avenue.

Pedestrian Treatments at Intersections

To create a successful pedestrian environment, particular care must be taken at intersections to ensure that pedestrians can cross the street easily and safely. Downtown intersections should not favor motorists or pedestrians, but give equal accommodation and support to both. One of the primary ways to simplify intersections for both pedestrians and motorists is to build them as compactly as possible, without unnecessary lanes and with features such as slip lanes, medians, and bulbouts to reduce the street crossing exposure time for pedestrians. In Downtown, there are a number of both good and poor examples of pedestrian treatments at intersections. Observations include the following:

(top) The intersection of Orange Avenue at Concord Street has no curb ramps on any of the corners.

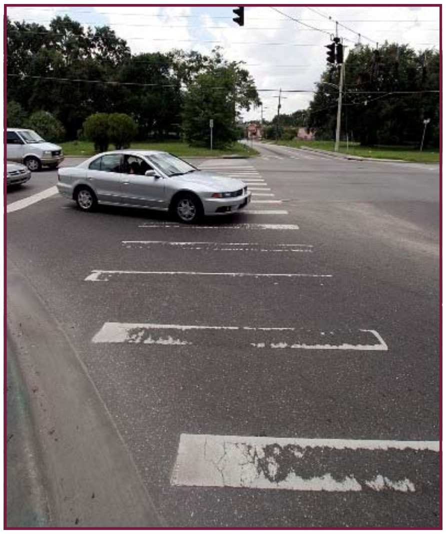
(center The sidewalk on the south side of Anderson Street east of Orange Avenue does not provide a sidewalk connection to cross the street or curb ramps on the right-in right-out island.

(bottom) A curb ramp at the Orange Avenue/Colonial Drive intersection puts those with disabilities directly into the path of vehicle traffic, rather than in the marked crosswalk.

- Most signalized intersections in Downtown should have pedestrian signal timings on automatic recall. There are a number of intersections where this is the case. However, there are also a significant number of intersections where pedestrians are still required to push a button to activate a pedestrian walk phase. One intersection observed during the walking audits (Livingston Street at Garland Avenue) had pedestrian push buttons that were not functioning. Other intersections, such as Colonial Drive at Garland Avenue and at Hughey Avenue, do not provide crosswalks or pedestrian signal heads for pedestrians wishing to cross Colonial Drive. In addition, pedestrian signal phases should be overlapped with exclusive transit phases (Lymmo) where no conflicts occur; this is the case at many intersections, including Robinson Street at Magnolia Avenue, and could reduce delay for pedestrians and possibly for vehicles by providing for a shorter side street phase (shorter because the pedestrian walk phase ends earlier due to the overlap).

- Many intersections are unnecessarily wide and require pedestrians to cross long distances. For example, Hillcrest Street is a two-lane road where it intersects Magnolia Avenue, but measures 58 feet from curb to curb along the pedestrian crossing path; the intersection is also missing curb ramps.

- A stark contrast in intersection design can be seen on Anderson Street in just a



(top left) Poor pedestrian accommodation at the Anderson St./Division Ave. intersection.

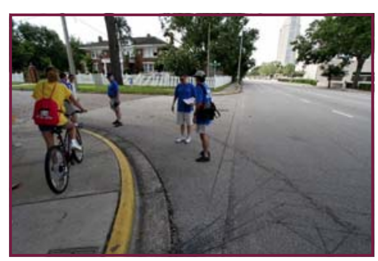
(top right) In contrast, good pedestrian accommodation at Anderson St./Parramore Ave. intersection.

few blocks when comparing the intersections at Division Avenue and Parramore Avenue. At Division Street, the southwest corner has a huge radius that requires pedestrians to walk 30 feet from the curb just to get to the edge of the outside travel lane (an average of nearly 9 seconds of walk time). The intersection also does not have any pedestrian signals, and due to Anderson Street being one-way eastbound, a westbound pedestrian can't even see the vehicle signal to know when it's safe to cross the street. In contrast, the Anderson/Parramore intersection has a very compact design with well marked crosswalks, tight corner radii, and pedestrian signals.

Crosswalks are set too far back from the intersections in many locations, such as (top) the Parramore Ave./ Jackson St. intersection, and (bottom) the Colonial Dr./Garland Ave. inter-section.

❖ Crosswalks at many intersections are set too far back from the intersection. An example is the Garland Avenue/Colonial Drive intersection, which has a very wide northeast corner radius which results in the crosswalk being set very far back from the intersection. This design encourages high speed right turns and prevents motorists from seeing crossing pedestrians until midway through their turn. Another example can be found at Parramore Avenue and Jackson Street.

❖ The Summerlin Avenue/Washington Street intersection is an ideal place to install "Yield to Pedestrian in Crosswalk" paddle signs (mounted on flex-stakes) in the roadway on the centerline to help increase the yielding behavior of motorists. These signs could be used throughout Downtown at midblock crosswalks or other prominent crossing locations to help induce better yielding behavior among motorists.



Wide intersection with long crossing distance at Hillcrest St. and Magnolia Ave.

(top left) Good example of narrow parking garage driveway at Orange Ave./Jackson St., and

(bottom left) very wide, poor example at Church St. garage on South St.

(top right) Example pedestrian paddle sign (Photo: Dan Burden).

(lower right) Existing paseo between Orange Avenue and Court Avenue.

- Downtown has very good and very poor examples of parking garage driveways. A good example is located on Orange Avenue at Jackson Street, which is well designed with good contrast and an appropriate 9.5-foot width. A very poor example is the Church Street garage on South Street in which pedestrians are forced to cross a very wide area with multiple lanes inbound and outbound, where motorists are encouraged to make high speed turns, and the sidewalk cross slope is severe.

Use of Alleys and Intrablock Connectors

There are few examples of alleys and intrablock connectors today in Downtown. The existing paseo (i.e., commercial connector) between Orange Avenue and Court Avenue just north of Wall Street was done reasonably well. While it provides adequate lighting, it could use a better deck, flower boxes, and most importantly, a screened view of the parking at the end of the paseo.

Condition of Sidewalk Pavement

The majority of sidewalks in Downtown have pavement that is in good condition. However, as with most urban areas, there are locations where sidewalks are cracked or broken, missing sections, or have upheaval due to tree roots and therefore represent potential tripping hazards.

Potential Projects

During the course of the walking audits, there were a number of *potential* projects discussed. These projects ranged from intersection improvements to bicycle lanes to potential new on-street parking locations. The projects discussed are presented in **Table 4-6**.

Table 4-6
Potential Projects (From Walking Audits)

Roadway	Intersection or Segment	Project	Comment
Anderson St	at Division Ave	Add Ped Signals	
Anderson St	Orange Ave to Rosalind Ave	Bicycle Lane	Narrow existing lanes; Check with proposed plans for two-way conversion
Division Ave	N. of Anderson St	Bicycle Lanes	Restripe wide lanes to allow for bike lanes
Livingston St	adjacent to Centroplex	Bicycle Lanes	Street section can accommodate 4 x 10-foot lanes, 4-foot bike lanes, and 4-foot pedestrian refuge island
Amelia St	S. side at RR Tracks adjacent to Lynx Central Station	Complete Sidewalk	
Anderson St	S. side, E. of Orange Ave	Complete Sidewalk	
Marks St	N. side, W. of Orange Ave	Complete Sidewalk	
St. George St (aka Wall St)	at Rosalind Ave	Curb Bulbouts	
Orange Ave	at Concord St	Curb Bulbouts & Curb Ramps	
Summerlin Ave	at Washington St	Double Width of Existing Ped Crossing Ladder Stripes & Add Edge Stripe	For better crosswalk visibility
Parramore Ave	at Jackson St	Extend Eastern Crosswalk Markings 12 feet back towards Intersection	Eastern crosswalk is set too far back from intersection
Delaney Ave	at SR 408 off ramp	Extend Median Nose Beyond Crosswalk	
Parramore Ave	at Washington St	Extend Western Crosswalk Markings back towards Intersection	Western crosswalk is set too far back from intersection
Summerlin Ave	at Washington St	Install "Yield to Pedestrians in Crosswalk" paddles	Install on roadway centerline to enhance motorist yielding
Anderson St	at Terry Ave	Potential "Cinderella" Parking	For special events (i.e., Citrus Bowl)
Rosalind Ave	N. of South St	Potential "Cinderella" Parking	Could increase peak hour vehicle capacity
South St	Summerlin Ave to Osceola Ave	Potential "Cinderella" Parking	
Amelia St	Magnolia Ave to Garland Ave	Potential Back-In Angle Parking	Requires reduction in lanes; may conflict with event traffic flow
Church St	W. of Eola St	Potential Back-In Angle Parking	Conflicts with primary transit corridor
Church St	Magnolia Ave to Rosalind Ave	Potential Back-In Angle Parking	Create shared EB left/through lane; conflicts with primary transit corridor
Concord St	W. of Orange Ave	Potential Back-In Angle Parking	
Concord St	W. of Hughey Ave	Potential Back-In Angle Parking	Retain left turn lanes at parking entrances only
Jackson St	Magnolia Ave to Rosalind Ave	Potential Back-In Angle Parking	Eliminate WB exclusive right turn lane at Magnolia Ave
Orange Ave	at Concord St	Potential Back-In Angle Parking	Requires reduction in lanes; may conflict with primary transit corridor
Pine St	Orange Ave to Rosalind Ave	Potential Back-In Angle Parking	Would require maintaining as one-way

(Continued on Next Page)

Table 4-6 **(Continued)**
Potential Projects (From Walking Audits)

Roadway	Intersection or Segment	Project	Comment
St. George St (aka Wall St)	Magnolia Ave to Rosalind Ave	Potential Back-In Angle Parking	
State Ln	S. of Livingston St	Potential Back-In Angle Parking	
Summerlin Ave	N. of Central Blvd	Potential Back-In Angle Parking	A few spaces may be possible if 4 feet taken from furniture zone to get a total of 37 feet curb to curb
Anderson St	at Rosalind Ave	Reduce Intersection Width or Turning Radii	SE corner; there are multiple receiving lanes for vehicles with large turning radius
Anderson St	at I-4 off ramp	Reduce Intersection Width or Turning Radii	
Anderson St	at Division Ave	Reduce Intersection Width or Turning Radii	
Colonial Dr	at Garland Ave	Reduce Intersection Width or Turning Radii	NE corner crosswalk set too far back
Magnolia Ave	at Hillcrest St	Reduce Intersection Width or Turning Radii	
Orange Ave	at Weber St	Reduce Intersection Width or Turning Radii	
South St	at Rosalind Ave	Reduce Intersection Width or Turning Radii	NE corner
Orange Ave	at Garland Ave/Legion Pl	Roundabout	
Summerlin Ave	at Central Blvd	Roundabout	
Summerlin Ave	at Livingston St	Roundabout	
Orange Ave	at Livingston St	SB right turn improvements	To discourage SB right turning vehicles from entering exclusive bus lanes
Anderson St	S. side, W. of Orange Ave	Sidewalk Connectors and Curb Ramps	Include pedestrian signals
Anderson St	at Orange Ave (south leg)	Signed & Marked Crosswalk	Include pedestrian signals
Colonial Dr	at Hughey Ave	Signed & Marked Crosswalk	
Livingston St	at Lynx Central Station, W. of RR Tracks	Signed & Marked Crosswalk	Midblock crosswalk

4.10 General Recommendations to Improve Bicycling & Walking

In order to make walking and bicycling more attractive modes in Downtown Orlando, streets and places must possess the qualities of the five keys to success (security, convenience, efficiency, comfort, and welcome), as described previously. To accomplish this, a number of general recommendations are provided, as follows, which are recommended to be incorporated into the City's Land Development Code. More specific discussion on many of these recommendations including treatments and design details are also provided in this section.

1. Develop a bicycle-friendly system of trails, bike lanes, shared routes, connectors, and links that serve the full spectrum of bicyclists, from the most youthful to the most senior.

2. Provide clear bike route information to bicyclists by installing adequate signs and pavement markings along bikeways and by publishing bikeway system maps. Specific signage is preferred, with numbered routes and signs that will guide cyclists to key locations such as "downtown" or public venues.

3. Each time arterial and collector streets are resurfaced they will be re-striped to add bike lanes, parking, or other buffers between pedestrians and motorists, where there is sufficient width. The new standard lane width in Downtown will be 10 feet to help accommodate space for bicycles. Rather than providing exceptions to allow for 10-foot lanes, exceptions will be given only to provide lanes wider than 10 feet, such as for roadways with significant volumes of truck traffic (i.e., primary truck and delivery routes).

4. When any road work repairs are done within the study area such as utilities, the road and sidewalks shall be restored to their original quality, with particular attention to surface smoothness and restriping suitable for bicycling. Pedestrian and bicycle modes will be adequately accommodated within work zones.

5. Provide continuous walkways on both sides of all streets in Downtown with a preferred minimum separation of 6 to 7 feet from the roadway. Walkways should be a minimum of 5 feet in width (or provide a clear walking zone of at least 5 feet) , with walkways in primary pedestrian corridors being significantly wider. Streetscaping and landscaping elements should be used to make the pedestrian environment aesthetically pleasing and enjoyable.

6. Design more compact and efficient intersections, and modify signal detector sensitivity for bicycles.

7. All pedestrian facilities are geometrically designed to accommodate people with disabilities. Evaluate all signalized intersections to determine where accessible pedestrian signal (APS) features such as audible tones, verbal messages, or vibrating surfaces are most needed.

8. Design and install new midblock crossings to make it easier to get to common destinations.

9. Provide adequate lighting at all intersections, street corners, pedestrian corridors, midblock crossing locations,

(top) Trail users are expected to yield to motorists in crossings where motorists out-number trail users, and vice versa. Use of a wide median here keeps crossing conflicts down to one direction at a time.

(second from top) Tactile materials can be placed 125-150 feet out from intersections to alert riders of upcoming conflicts. Color, inset pavers, or stamped concrete are useful materials.

(second from bottom) Trail users are separated into single file by direction in advance of a crossing through use of an approach median. Low shrubs in medians keep motorists off the trail, yet allow access to emergency response and large maintenance trucks.

(bottom) On higher volume crossings, where trail users are expected to stop or yield, it is helpful to provide leaning rails, stop lines, appropriate warning signage, make use of tight corner radii to slow motorists, and maintain sight lines of at least 6 seconds in all directions (longer if crossings are wide).

and underpasses to provide for the safety and clear visibility of pedestrians at night.

10. Enhance connectivity. Better distribution of traffic through the Downtown grid will reduce overall volume of vehicles at several troublesome intersections. Use of roundabouts at several key intersections will improve flow and help keep speeds low.

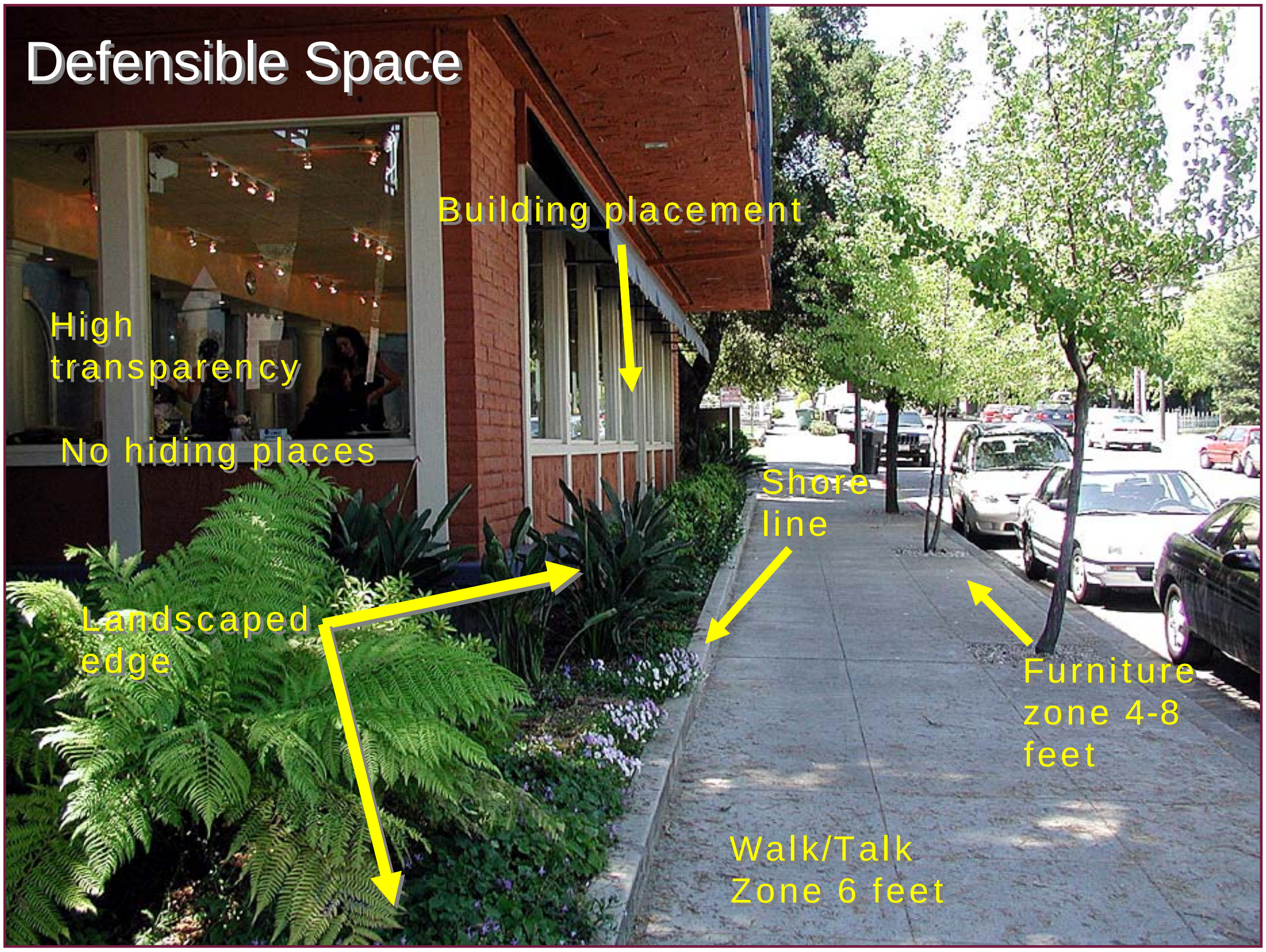
11. Build all blocks, corridors and streets to create a strong sense of security, with many ground uses and upper stories watching over pedestrians and bicyclists. Security, or lack of security, is what attracts or repels pedestrians from the street.

12. Multi-use trail crossings should minimize number of conflicts, conflict speeds, and complexity of conflicts. This is achieved through care in locating crossings, creating the right crossing angle, geometrics, medians, sight lines, lighting, and operations.

13. All future re-bricking of collector streets are to follow the Livingston Street/Briercliff Street model and include concrete bike lanes. All future residential street bricking projects will allow for a smooth surface for the outer third of each lane. Existing brick streets designated as bicycle routes will be evaluated for smoothness in the outer third of each lane; appropriate maintenance to ensure smoothness will be completed.

Trail Crossing Design Details

Trail crossings at roadways will be a key consideration for the Orlando Urban Trail, particularly within the CBD. In some cases, signalization may be warranted at crossings. Common design details for trail crossings are shown in the column to the right.



Defensible Space

Pedestrians know to stay away from places where they are not being watched over. Create defensible space with good buildings, plazas, alleys, and passages. A performance measure is many diverse people walking, sitting, and enjoying space all hours of the day and evening. Specific recommendations include the following:

1. At least 60 percent of street level rooms are glass
2. Zoning and development provides mixed use residential
3. Stores and residential stock watch over alleys and paseos
4. Many “eyes” on parks, plazas, and other public space
5. At least one activity center on each block that remains active many hours per day
6. Underpasses, such as those along the I-4 corridor should include under-lighting and pedestrian scale lighting, and should be patrolled often by bicycle police officers

Downtown Pedestrian Crossings

Example crossings at pedestrian malls (Source: Dan Burden).

Retail stores and Downtown vitality are driven heavily by the ability of pedestrians to freely cross streets multiple times, just as they do in a mall. Crossing islands and midblock crossings can add to streetscapes and enhance placemaking. Use of green, bollards, pedestrian scale lighting, colorized pavers, texture and other materials help keep speeds under control.

Motorists are invited through pedestrian mall areas with great caution. People using pedestrian malls have many competing thoughts on their minds. Group behavior, focus on entertainment, retail, and other issues dominate their thinking. For this reason a number of steps are taken to keep motorist compliance and behavior under control, including the following:

- ❖ Keep crossings narrow (2 lanes are best).
- ❖ Bring motorists to a stop for crossings.
- ❖ When signals are used, create short cycles so that pedestrian queues do not build to high levels.
- ❖ Circulate many or most motorists around mall areas, rather than through malls.
- ❖ Consider hours of high use where motorists are not permitted to cross through the center.
- ❖ Use curb extensions and excellent lighting.
- ❖ Make effective use of green and other landscaping materials.

Example midblock pedestrian crossings in downtown areas (Source: Dan Burden).

Intersections

Intersections are places of managed conflict. Efficiently designed intersections keep numbers of lanes and lane widths under control and costs of roadway systems affordable. Conflict reducing designs include: low speed entries and turns, separation of conflicts in time and place, positive guidance, and operations clarity. Many tools are needed at each intersection. However, in too many cases essential tools are missing, and in other cases these tools are not well designed, placed, or constructed. In further cases maintenance is lacking. Well designed, complete intersections pass the following performance measures:

- ❖ Incorporate the needs of all modes of travel.
- ❖ Efficiently move all forms of traffic through all approaches (crossing islands are found on all legs of all multilane road approaches).

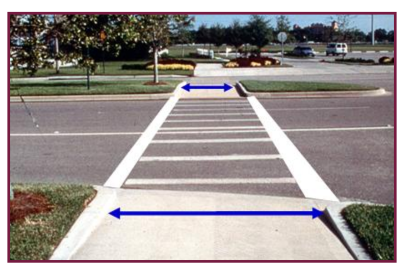
- ❖ They are efficient. They reduce the need for added lanes used to store vehicles for long signal cycles.
- ❖ Pedestrian friendly intersections attract pedestrians to marked crossings. Poorly designed intersections are easily recognized, as they force many people to cross away from intersections at midblock locations.
- ❖ They are free of driveways and other nearby intersections that complicate movements and compromise safety.
- ❖ They are flexible. Downtown signals move great numbers of cars and pedestrians during peak hours, then use different cycle lengths and timings to manage high numbers of pedestrians with efficient crossings in off-peak hours.
- ❖ They control speeds. Especially in downtowns, signal cycles keep motorists from driving faster than is desirable for healthy downtowns or shopping districts (signal progression is often set in the 20-25 mph range).
- ❖ Turning speeds are low. Safe turns are made at speeds of 5-10 mph for right hand turns, and 15-20 mph for left hand turns.

These two highly efficient and well-designed intersections in Washington, D.C. handle large numbers of vehicles and pedestrians. For the most part traffic speeds are slow and steady. Note the care of design and placement of proper curb radii, lane demarcations, lane widths, crosswalk locations and width, signal placements and speed control measures. (Source: Dan Burden).

Intersections are kept compact through a combination of appropriately narrow lanes, appropriate curb radii, and curb extensions. Effective use of curb extensions, especially when on-street parking is used, is a common way to assure safe and easy access to streets, minimize pedestrian crossing distances, and maximize the efficiency of signal cycles and intersection performance.

Crosswalk Markings

Well marked crossings are essential to good walking environments. Crossings are needed on all legs of signalized intersections (with a few exceptions). Leaving crossings off of a leg of an intersection forces pedestrians to cross three legs and endure 18 conflicts versus only 6 conflicts for crossing a single leg. Omitting a crossing leg also increases crossing times and distances, and increases the desire to cross away from intersections. Ladder style markings are preferred by visually impaired people, since the ladder rails (shore lines) help guide them across streets. Ramps and median openings should be as wide



Example of ladder style crosswalk markings, with median opening the same width as the crosswalk (Photo: Dan Burden).

Inset Markings. Crosswalk markings may also be inset into the pavement, with the markings carefully spaced to allow motorist wheels to pass around the markings. With inset markings, the asphalt or concrete is milled and the thermoplastic is placed below grade. This style of placement can allow markings to remain strong and visible for years (Photo: Dan Burden).

as markings. Crossings need to be as close to the intersection as practicable (generally 2-10 feet). If ramps are set back to match the flush curb then overly wide markings (12-20 feet) help draw motorists' attention to crossings.

Crosswalks should be highly visible all times of the year. When thermoplastic is used it is helpful to add extra glass bead content (increasing coefficient of friction as well as night visibility). Twelve foot minimum widths are preferred.

Well marked crossings provide these essential services:

- Alert motorists to pedestrian conflict areas
- Increase motorists yielding to pedestrians
- Enhance motorists recognition of intersections
- Assist people with visual impairment in their crossings
- Attract pedestrians to the best crossing places with the most appropriate sight distances

Pedestrian Signals

All signalized intersections require well maintained pedestrian signal heads on all legs. When signal heads are omitted, pedestrians do not know when they are permitted to cross. Signals in downtowns should not require pedestrian activation. All urban signals should build pedestrians into all cycles giving them sufficient time to cross. Only in those areas where pedestrians rarely cross should pedestrians be required to activate systems via a push button. The pedestrian clearance phase to signals should be set for walking rates of 3.5 feet per second (MUTCD). The walk phase duration for crossings should be no less than 4 seconds, with 7 seconds a more common time.

Pedestrian Countdown Signals. Pedestrian countdown signals are placed at many crossings, particularly on multi-lane roadways. Countdown signals end much of the confusion that standard signal heads create ("I only had four seconds to cross the street before the hand started to flash at me"), and give a clear idea of actual time left to complete the crossing (Photo: Dan Burden).

An accessible pedestrian signal (APS) is a device that communicates information about pedestrian timing in nonvisual formats such as audible tones, verbal messages, and/or vibrating surfaces (MUTCD, Section 4A.01). APS can provide information to pedestrians about the existence and location of the pushbutton, the onset of the walk interval, the direction of the crosswalk and location of the destination curb, the clearance interval, intersection geometry, and street names. APS should be considered within the Downtown area for new signals, signal improvements, or retrofits. Factors for considering installation of APS include potential demand for APS, request for APS features, traffic volumes during periods when pedestrians might be present including periods of low traffic volumes or high

Proper radii. (Left) This set of one-way streets at Rosalind Avenue and South Street illustrates good and bad decisions on turn radii. All corners where turns are illegal should be as close to 90 degrees as possible (5 foot radii). Where right-on-red is appropriate turning radii of 15-25 feet are acceptable. Note that the lower right corner uses an 85 foot radius. This keeps pedestrians in the street an extra 6 seconds, and places them at high risk as motorists are encouraged to turn at high speeds into their path (Photo: Dan Burden).

Colorized materials, inset parking. (Left) Right-side curb ramps are the most important to preserve access for large vehicles to enter. This inset parking design minimizes pedestrian crossings to no more than 22 feet (less than 8 seconds). Street furniture is deeply set on the curb extension, allowing oversize vehicles (fire engines, sanitation trucks) to enter even with large overhangs (Photo: Dan Burden).

Downtown corners. (Left) Lane widths are kept to 10 feet and corner radii support large vehicles to complete turns using appropriate radii. Large trucks would not turn right-on-red if the first two lanes are occupied, but cars may do so when the first lane is clear (Photo: Dan Burden).

Curb extensions, inset parking and ADA ramps. (Left) Another benefit of a matched set of curb extensions is the significantly reduced crossing times of pedestrians and protected access onto side streets (motorists cannot park too close to corners). Curb extensions also allow for two ramps to be provided per corner. When only one ramp is used on a corner with too wide of a radius, serious safety complications can occur, such as pointing disabled persons towards the middle of the intersection and not towards their destination (Photo: Dan Burden).

right-turn-on-red volumes, the complexity of signal phasing, and the complexity of the intersection geometry. When APS functions are used, they can be enhanced through the use of leading pedestrian intervals at signalized intersections, which provide the pedestrian walk phase 3-5 seconds prior to the green phase for vehicles.

Stop Lines (Stop Bars)

Stop lines are most often placed 4-6 feet back from marked crosswalks. Lines placed 10-30 feet back from crosswalk markings are an important option. More distant placement has been shown to reduce the number of motorists

Motorists often encroach on crosswalks at signalized intersections when the stop bars are placed too close to the crosswalk.

(top) Beverly Hills, CA, Rodeo Dr. (Before). Taken in 1996, this photo features an earlier, skinnier, median. Used effectively, the thin median added a splash of color and an ever so slight pause for informal pedestrian crossings (Source: Dan Burden).

(center) Beverly Hills, CA, Rodeo Dr. (After). In August 2004, Rodeo Dr. completed cosmetic surgery resulting in landscaping "nip and tucks" (curb extensions), lane diets (reduced from 10 foot to 9 foot visual lanes), wider medians, inset parking, and new sidewalk definition (Source: Dan Burden).

(bottom) Chicago, IL, Michigan Ave. Islands are raised and tapered to changes in grade, then richly planted to hide far side lanes of asphalt. Chicago maintains its competitive marketing and aesthetic edge over all other Midwestern towns with a focus on the planting of 1 million trees, and hundreds of miles of medians inside the urban boundaries (Source: Dan Burden).

pulling forward into crosswalks. Minor changes in stop bar placement (those of approximately 6-10 feet) will not affect signal clearance intervals. Pavement loop detectors should never extend beyond stop bars, as this only serves to reinforce bad motorist behavior by rewarding those that stop beyond the marked stop bars. Any potential changes in stop bar location should be evaluated with respect to potential intersection sight distance impacts.

Pedestrian Interaction with Transit

To help foster a successful interaction between the pedestrian environment and transit stations, the following recommendations are provided:

1. Influence interaction decisions during a streetscape or transit project's design phase
2. If there is a pre-existing transit stop, incorporate it into the streetscape project's "furniture zone"
3. Integrate the transit stop into the existing hardscape
4. Create bulbouts that are large enough to accommodate standing pedestrians (i.e., a "ped island") in between on-street parking spots or at intersection corners.

Downtown Medians

Although medians are not as common in downtowns compared to other urban and suburban locations, some of North America's premiere shopping streets have medians. A few of the most popular are shown at the left. Advantages include added use of color and streetscape, reduction in the amount of asphalt seen on multi-lane main streets, ability to add tree canopies, and lighting.

Downtown Lane Widths

Speed is dictated by comfort. High speed (40 mph and higher) boulevards are inappropriate for downtown urban areas. Crash rates go up at higher speeds, while motorist desire to yield to pedestrians drops significantly. A number of urban area multi-lane roadways are now being built with 11-foot and 10-foot travel lanes. Storage lane widths are either 10 feet, or as little as 9 feet. By creating narrower lanes it is possible to get some speed reductions, increase safety due to lower speeds, save on construction and right-of-way costs, reduce drainage and runoff problems, and address ease of getting across streets. Narrower lanes also lead to more compact intersections, making signal cycles more efficient. More compact intersections can lead to improved traffic capacity, especially in high pedestrian areas. Narrower lanes may also help to accommodate other modes through the provision of bike lanes, exclusive transit lanes, or wider sidewalks. The following are recommended lane width details for Downtown Orlando:

Narrow 9-foot lanes in Charleston, SC (Photo: Dan Burden).

- All measurements are measured from face of curb to the center of the each line, or from center of line to center of line.
- The standard lane width within Downtown will be 10 feet. Exceptions for wider lanes may be made on roadways that serve as primary freight routes or otherwise have high truck volumes (typically more than 10 percent trucks).
- Narrow lanes are not always acceptable to funding agencies, so data needs to be collected on comparable roadways, and on each model roadway where narrower lanes are used successfully.
- Keep storage lanes to minimum widths (10 or even 9 feet easily accommodate all types of vehicles).
- Do not add extra space for shy zones to medians. Instead, if required, use a different color material for the gutter pan (coral or bright white are acceptable), then use dark asphalt to keep actual lanes down to 10 feet. Using visual “tightening” of roadway lanes may be acceptable to agencies and have speed reduction impacts.
- Use broad white stripes to designate turn lanes, bike lanes. An 8-10 inch stripe for these lane lines helps accentuate visual narrowing of roadways, and can help hold down traffic speeds.

Street Trees and Urban Roadways

Urban street trees cost about $250-400 to plant and nurture through the first three years of life. The U.S. Department of Agriculture, as well as forestry and main street reports, emphasize that this investment is sound. Each urban street tree returns $56,000 in direct benefits to the city during its life, and only costs $18 per annum to maintain (in 1996 dollars). But there are far more advantages to greening up urban streets, including the following:

- People linger longer in a cooling or green main street, and are more likely to exchange money for services, products, and goods. It has been documented that people under a main street canopy spend 12 percent more for the same product (this gives a main street its green edge against big box retail).
- Summer temperatures can be 8-12 degrees cooler at street levels. As such, pavement life is extended from 30-60 percent longer (less extreme heating and cooling, which reduces expansion and shrinking of asphalt).
- Trees capture 30 percent of rainwater and transpire it back into the atmosphere (cooling the temperatures as it

Examples of street trees in downtowns, including Vancouver, B.C. (bottom left) and Charlotte, NC (bottom right) (All photos: Dan Burden).

does). Water hitting the ground and making it to root systems may comprise another 30 percent of rainwater. Thus as little as 30-50 percent of storm water may make it to the drains. Therefore, trees reduce storm water runoff, thus reducing stream and aquifer pollution. This role of trees around a paved environment can help when storm drains are already near peak capacity, thus reducing flooding.

❖ Street trees capture and convert harmful auto gases into useful oxygen nine times more efficiently than do trees planted elsewhere. By keeping street temperatures more moderate, the effects of harmful gases are reduced. It is believed that cities having large percentages of streets covered with green can reduce asthma and other emissions effects on its residents.

Urban street plans should call for making all streets and public corridors green and complete. As a general rule, street trees should be planted on all town center streets, parking lots, and trails to create and declare access and welcome as public space. A series of corridor-like rooms will emerge through careful plantings. Even young trees planted in lines, with relatively close and consistent spacing, begin to define the street space. As trees approach maturity, they will make the street into gracious outdoor rooms.

A combination of planter strips, medians, and ample width tree wells allow street trees to evolve quickly into attractions of neatness that help screen or mask a recovering downtown center's early starkness as it transitions from a suburban to an urban place.

Street trees should be planted to create a colonnade effect. A canopy of branches and leaves are needed to walk under. The street will effectively be subdivided into zones or rooms. Street trees are noted to have a traffic calming effect. Proper spacing of street trees gives motorists a sense of enclosure, protection (as opposed to being in a field), and allows a closeness and vertical wall to gauge their speed. When trees are set back, motorists do not sense their speed impacts well.

Trees have to be planted closely to maximize this effect. A tree spacing of 15-30 feet is recommended. Although there is a prevailing myth that trees do not like to be spaced closer than 50 feet apart, this is just a myth. Trees like companions at all times, and especially during storms. Trees lose their visual effectiveness and can fail at the job of spatial definition when they are planted more than 30 feet apart (Jacobs and Arnold).

Street design (typical sections) demands that adequate space and growing conditions be provided to nurture healthy trees.

Median Trees

Proper placement of median trees is an important feature of multiple lane roads and other roads with widths of 40 or more feet. Median trees in urban environments are no less safe than medians without trees (2003 Caltrans Study by Reid Ewing, P.E.). Some traffic calming effects can be anticipated with urban boulevards (multiple lane roadways). When trees of a caliper considered non-frangible (6 inches or more) are placed in medians it is best to have at least an 8-foot median, with trees set back from edges 4 feet. These trees are often set back 100 feet from intersections (based on speed). Trees not expected to have calipers of 6 inches or greater can be placed closer to median edges.

Tree Wells

Tree wells, curb extensions, and inset parking are used widely throughout North America and Europe. Use of tree wells to separate parking has a number of advantages:

- ❖ Sidewalk widths are improved when wells can be placed in parking areas.
- ❖ When greened, curb extensions and tree wells screen parked cars and give a narrower street appearance.
- ❖ Some streets show a noted traffic calming effect from a reduction of the amount of asphalt seen when driving.
- ❖ Street planted trees can have a noted cooling effect in hot climates.

As a general rule, when trees are planted in parking areas they separate either two or three cars. Some European treatments (Holland) will plant a tree between each parked car. Standard tree wells can be used, and as with tree wells with sidewalks, it is important to establish these wells with good access to moisture and oxygen. In some cases cobbled parking areas are used to allow extra air and moisture to reach root systems. Many notable tree parking wells have 20-40 year tree stands.

Urban street trees (Photo: Dan Burden).

ADA Access (Universal Design)

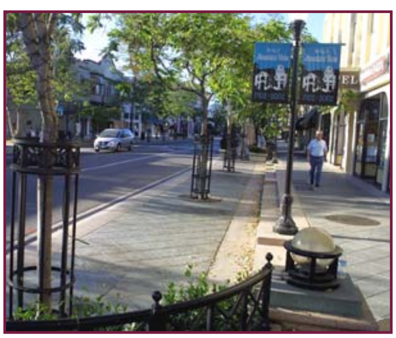
All people of all abilities need and appreciate designs that work for everyone (Universal Design). Sidewalks, crossings, entire blocks and corridors, parking lots, parks, waterfronts, and trails are to be designed or retrofit for full access.

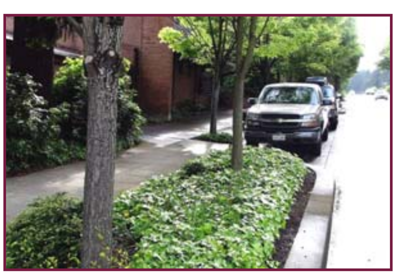
Example trees in roadway median (Photo: Dan Burden).

Well designed blocks include adequate widths for turning and maneuvering wheelchairs, landscaping and other guidance to help all people remain oriented toward crossings (two ramps per corner are best) and utilities and other features that present no barriers.

Rules for successful ADA supportive intersections are simple. Design, build, and maintain as follows:

1. Keep corner radii to appropriate levels, never so wide to induce speed.
2. Maximize use of curb extensions to inset parking, and allow for planter boxes and other furniture to help orient and guide people.
3. Curb extensions also protect the corner from illegal parking, reduce crossing distances and time, and provide awareness of when a person enters and exits a street or other place of danger or safety.
4. Use color, texture, and tactile features to help orient and guide.
5. Maximize curb ramp entry and exit widths. Use minimum widths only when necessary.





Examples of on-street parking with tree wells (Photos: Dan Burden).

As a general rule pedestrians are able to enter and exit streets most efficiently when two ramps are provided on each corner. For a modest increase in cost, benefits are profound. Dual ramps are especially important to all people who are using wheelchairs or blind. Ramps will need to be built into all crossings in time. Highest priority should be to transit, medical care facilities, and where special populations are most commonly found. There are no requirements for two ramps per corner, though they are much preferred. As corner radii increase, ramps line up too far back from intersections. Thus, unless curb extensions are used, corner radii of 30 feet or more may call for a single ramp, allowing crosswalks to be closer to intersections. **Avoid using single ramps for cost saving reasons**. In some cases, a single ramp forces pedestrians into oncoming traffic. Curb extensions, pork chop islands and other measures help get appropriate numbers of ramps and ramp orientations within code compliance.

(top) Two curb ramps per corner provide the best accommodation for all pedestrians (Photo: Dan Burden).

(center) Due to insufficient space, this design forces pedestrians with disabilities against traffic. Two ramps on this corner would eliminate the problem (Photo: Dan Burden).

(bottom) Tactile warning strips are used correctly at the existing Lymmo station median at the Magnolia/Central intersection; note, however that the tactile strips do not align with the existing far side curb ramp.

Intrablock Connectors

Alley or intrablock connectors are used to achieve basic connectivity and service properties with deliveries and other needs at the same time. Some alleys are converted to walking space, complete with gardens, open light, rock gardens, and more. Others are kept as service alleys for hand carts. Well designed alleys invite right use and plenty of activity. The following are recommendations for intrablock connectors:

1. Alleys are maintained with absolute cleanliness.
2. Alleys underground utilities and inset boxes and dumpsters into well designed interior spaces.
3. Alleys develop a theme, such as an art gallery, a musicians hall of fame, or neon lighting.
4. Alleys are well lit at night, and may include theme lighting, store fronts or doors, café windows, and other ways to watch over the alley.
5. Alleys become attractive places for planters, hanging baskets, quality lamp fixtures, wooden pavers, or other key features making them a unique attraction.
6. Alleys are scrubbed and cleaned to meet the best outdoor café standards, and may include a café private/public partnership.
7. Some alleys are climate controlled, using glass canopies and welcoming shade in the summer.
8. Alleys connect the most important parking lots or other town center land uses.

A clean, well watched-over intrablock connector (Photo: Dan Burden).

4.11 Pedestrian Street Designation

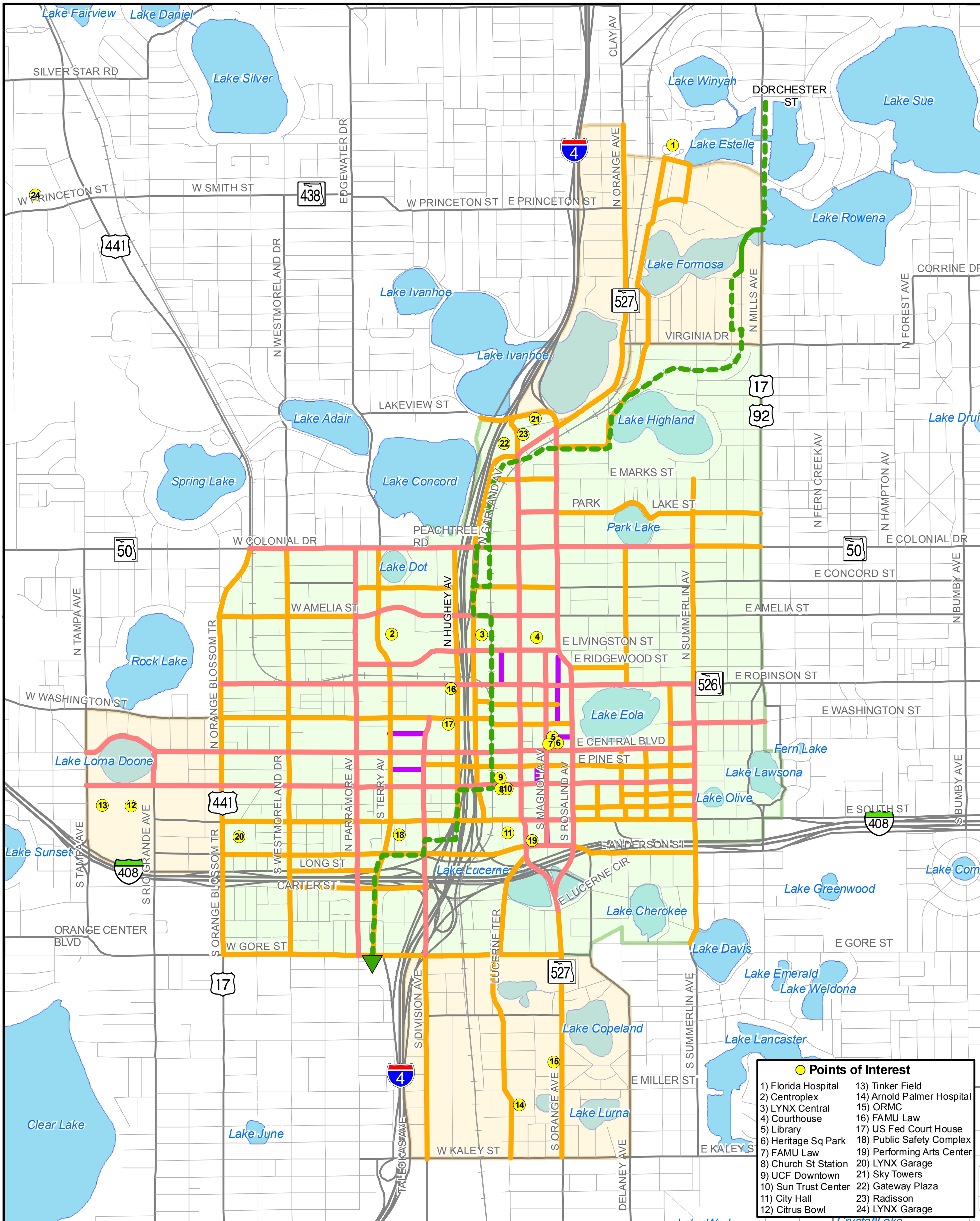
It is recommended that pedestrian streets be divided into two primary categories: primary pedestrian streets and secondary pedestrian streets. **Primary pedestrian streets have been designated to receive strong pedestrian emphasis** either because they carry (or will carry in the future) heavy pedestrian volumes, because they link important places or activity centers, or because they play an important visual or aesthetic role. **Secondary pedestrian streets also serve as important pedestrian corridors** within the Downtown area, but are less important in terms of anticipated pedestrian volumes and visual and functional design structure of the streetscape. Streets within Downtown designated within each category are shown in **Figure 4-9**. A list of street segments designated with the primary and secondary pedestrian street categories is included in **Tables 4-7** and **4-8,** respectively . Specific streetscape recommendations are beyond the scope of this project, but it is recommended that streetscape specifications and guidelines be coordinated through the City and specifically, the Downtown Development Board.

Primary Pedestrian Streets

It is recommended that the roadside environment on primary pedestrian streets have the following general characteristics:

- ❖ Minimum total sidewalk width of 15 feet, inclusive of shy zone, walk/talk zone, and furniture zone; however, wider sidewalks are encouraged
- ❖ Attractive, integrated street furniture
- ❖ Attractive buildings with awnings or overhangs to protect pedestrians from rain and to provide additional shade.
- ❖ Minimal number of driveways; driveways should be low speed and minimal widths
- ❖ Great use of trees and ground cover
- ❖ Low speed, well behaving traffic

It should be a goal of the City to establish one or more of the primary pedestrian streets as “great streets”. Today only one in twenty cities have a “great street” sidewalk. Although many great streets are coming back, great streets like Pennsylvania Avenue in Washington, D.C., Michigan Avenue in Chicago, Illinois, or State Street in Santa Barbara, California have gone through dramatic remakes following years of neglect. In general, great streets require 50 percent of the physical space to be devoted to the pedestrian (on-street parking is counted as part of the pedestrian realm since it provides a buffer to vehicle traffic). While 50 percent pedestrian space is a lofty goal for many Downtown Orlando streets, it is possible to accomplish this goal. For primary pedestrian streets not able to meet a 50 percent pedestrian space goal, 30 percent has been set as a secondary goal. Note that the elements that work together to create a great street are organic. Streets are diverse and full of wonderful surprises. Some blocks fall into a theme, but there is constant change. The greatest model of all is that of Las Ramblas, in Barcelona, Spain. Each street establishes its own personality and character. There are no hard formulas, but all great streets are measured by being full of people most hours of the day, and solid rents for retail shops. It is the street to which all others are measured.



Pedestrian Street Network

- Primary Pedestrian
- Secondary Pedestrian
- Alleyways
- Existing Multi-use Trail
- Proposed Multi-use Trail
- Study Area
- Extended Transit Plan Area

Downtown Orlando Transportation Plan

Figure 4-9

Pedestrian Street Network

N

0 625 1,250 2,500 Feet

Table 4-7

Downtown Pedestrian Street Designation - Primary Pedestrian Streets

Street	From	To
Primary Pedestrian Street		
Amelia St	Parramore Ave	Magnolia Ave
Anderson St	Orange Ave	Rosalind Ave
Central Blvd	Tampa Ave	Summerlin Ave
Church St	Tampa Ave	Summerlin Ave
Colonial Dr	Orange Blossom Tr	Summerlin Ave
Division Ave	Washington St	Gore St
Livingston St	Parramore Ave	Magnolia Ave
Magnolia Ave	Livingston St	Anderson St
Magnolia Ave	Orange Ave	Livingston St
Orange Ave	Magnolia Dr	Lucerne Cir
Park Lake St	Orange Ave	Magnolia Ave
Parramore Ave	Colonial Dr	Gore St
Rio Grande Ave	Central Blvd	Church St
Robinson St	Orange Blossom Tr	Summerlin Ave
Rosalind Ave	Livingston St	Orange Ave
South St	Orange Ave	Rosalind Ave
Summerlin Ave	Robinson St	South St
Washington St	Eola Dr	Mills Ave

Table 4-8

Downtown Pedestrian Street Designation - Secondary Pedestrian Streets

Street	From	To
Secondary Pedestrian Street		
Alden Rd	Rollins St	Magnolia Ave
Amelia St	Orange Blossom Tr	Parramore Ave
Anderson St	Orange Blossom Tr	Orange Ave
Anderson St	Rosalind Ave	Summerlin Ave
Boone Ave	South St	Anderson St
Broadway Ave	Colonial Dr	Robinson St
Camden Rd	Rollins St	Princeton St
Carter St	Westmoreland Dr	Division Ave
Colonial Dr	Summerlin Ave	Mills Ave
Concord St	Parramore Ave	Hughey Ave
Concord St	Garland Ave	Magnolia Ave

Table 4-8 continues on the next page.

Table 4-8 (cont.)

Downtown Pedestrian Street Designation - Secondary Pedestrian Streets

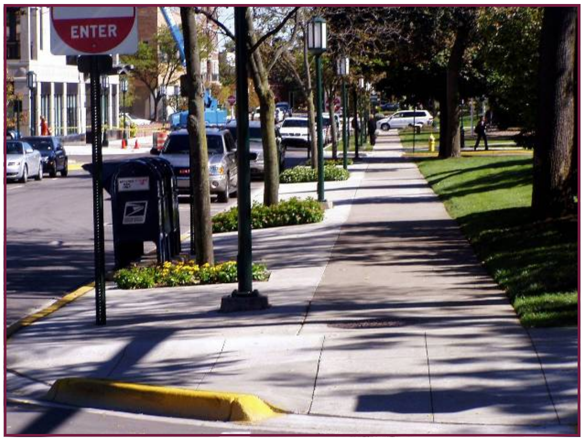
Street	From	To
Secondary Pedestrian Street		
Division Ave	Gore St	Kaley St
Eola Dr	Robinson St	South St
Garland Ave	Orange Ave	South St
Gore St	Orange Blossom Tr	Orange Ave
Hughey Ave	Colonial Dr	South St
Ivanhoe Blvd	Lakeview St	Orange Ave
Jackson St	Rosalind Ave	Summerlin Ave
Jefferson St	Garland Ave	Palmetto Ave
Lake Ave	Central Blvd	South St
Legion Pl	Ivanhoe Blvd	Orange Ave
Liberty Ave	Church St	South St
Long St	Westmoreland Dr	Terry Ave
Lucerne Terr	Anderson St	Kaley St
Mariposa St	Lake Ave	Summerlin Ave
Marks St	Garland Ave	Magnolia Ave
Orange Ave	Spruce St	Magnolia Ave
Orange Ave	Lucerne Cir	Miller St
Orange Blossom Tr	Colonial Dr	Gore St
Osceola Ave	Central Blvd	South St
Park Lake St	Magnolia Ave	Mills Ave
Pine St	Division Ave	Summerlin Ave
Princeton St	Alden Rd	Camden Rd
Ridgewood St	Rosalind Ave	Broadway Ave
Rollins St	Alden Rd	Camden Rd
South St	Orange Blossom Tr	Orange Ave
South St	Rosalind Ave	Summerlin Ave
Summerlin Ave	Marks St	Robinson St
Summerlin Ave	South St	Cherokee Dr
Terry Ave	Colonial Dr	Gore St
Washington St	Orange Blossom Tr	Rosalind Ave
Westmoreland Dr	Colonial Dr	Gore St

Example primary pedestrian street (Photo: Dan Burden).

Secondary Pedestrian Streets

It is recommended that the roadside environment on secondary pedestrian streets have the following general characteristics:

- ❖ Minimum total sidewalk width of 11 feet, inclusive of shy zone, walk/talk zone, and furniture zone or planting strip; however, wider sidewalks are encouraged
- ❖ Planter strip or furniture zone should have a minimum width of 4 feet
- ❖ Buildings built to street or include modest landscape setback
- ❖ Minimal number of driveways; driveways should be low speed and minimal widths



Example secondary pedestrian street (Photo: Dan Burden).

These clear overhangs in Vancouver, B.C. provide shelter for pedestrians against rain while allowing light through (Photo: Dan Burden)..

- Good use of trees with sidewalks having plenty of shade
- Traffic behaves well with speeds at or below 20 mph; if speeds are higher, sidewalk is buffered by on-street parking and/or bike lane
- Good street lighting

Examples of building transparency (Photos: Dan Burden).

4.12 Transparency Requirements

The City desires to update its Land Development Regulations to encourage "eyes on the street" and foster the notion of defensible space. To accomplish this, the following recommendation is offered with regard to building transparency requirements (section 62.600):

> *All street-facing, park-facing, and plaza-facing structures shall have windows covering a minimum of 40% and a maximum of 80% of the ground floor of each storefront's linear frontage. Blank walls shall not occupy over 50% of a street-facing frontage and shall not exceed 20 linear feet without being interrupted by a window or entry. Mirrored glass, obscured glass, and glass block cannot be used in meeting this requirement. Display windows may be used to meet this requirement, but must be transparent and shall not be painted or obscured by opaque panels. Display windows should be lit at night.*

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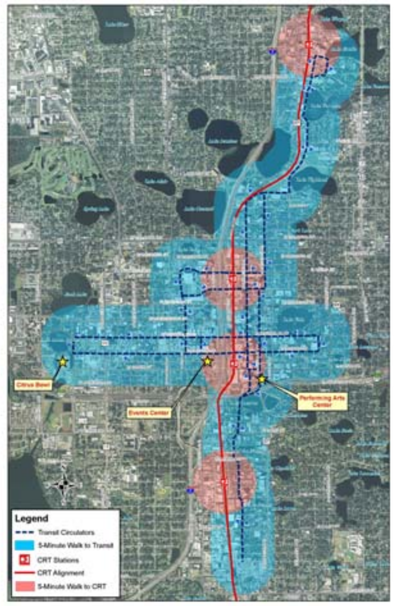
Section 5

Transit Plan

Transit System Plan

The Downtown Plan includes four new potential circulator routes that connect with the four planned Commuter Rail stations. The circulator service would run at 5-10 minute headways and connect major destinations and attractions with Commuter Rail, connect remote parking garages to the Downtown Core, and provide convenient circulation throughout the Downtown. The system would use modern low-floor circulator vehicles that are quiet, efficient and distinctive in appearance.

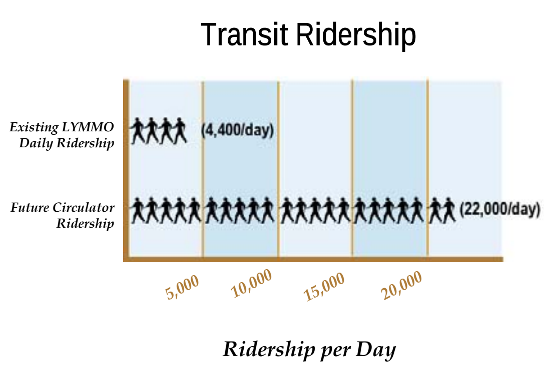


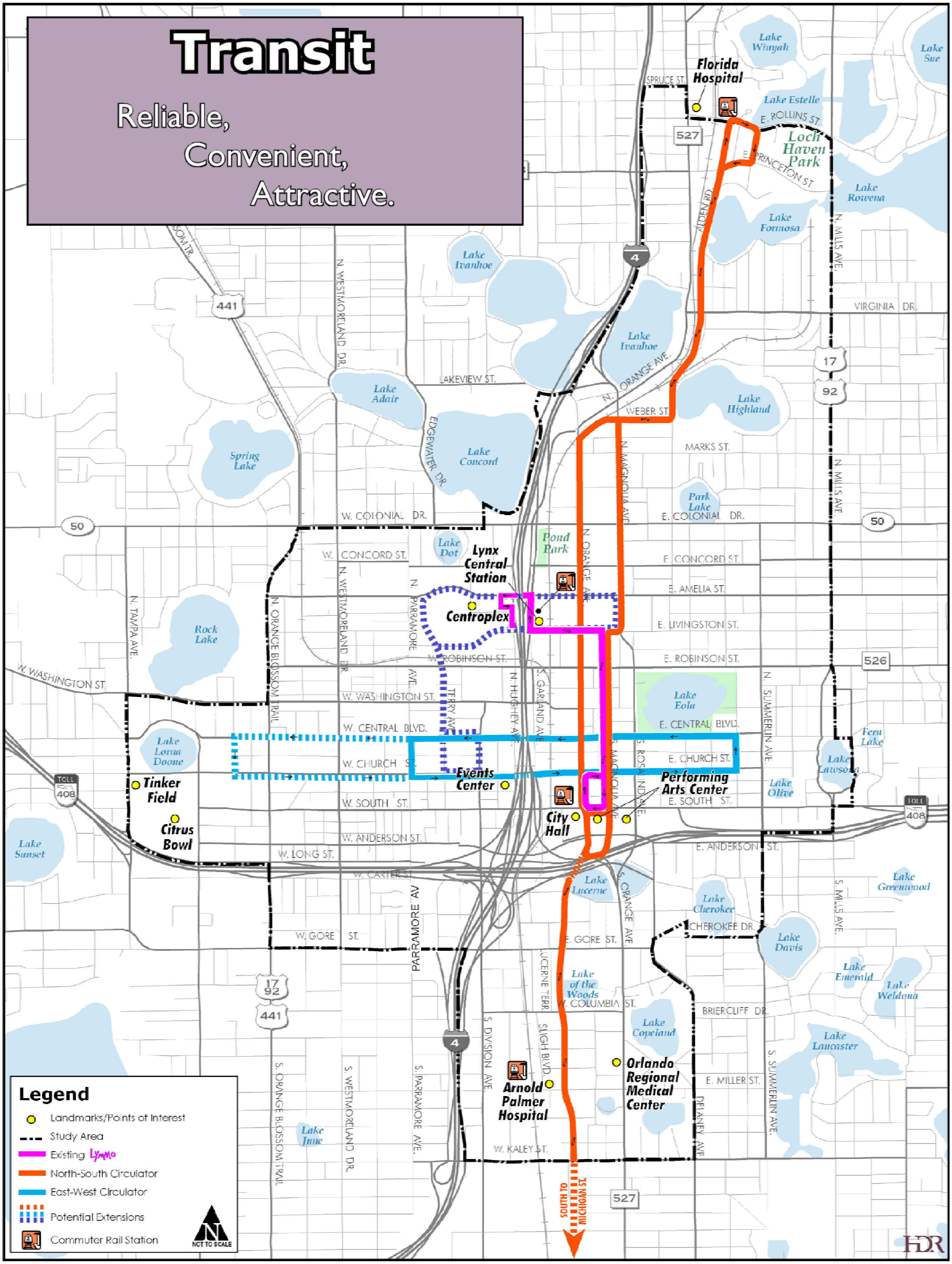
The proposed transit circulator system integrates seamlessly with regional rail and bus transit. About 80% of the Downtown study area will be less than a 5-minute walk from transit. Travel by transit within the Downtown will be faster and less costly than driving and parking for most key destinations.

An East-West Circulator running westbound on Central Boulevard (concept shown) and eastbound on Church Street would connect Thornton Park to Parramore and the Citrus Bowl with service to many shopping, employment, residential and recreational destinations, including the Events Complex. The circulator would run in mixed traffic with frequent stops and direct access to the regional Commuter Rail system.

One concept for the North-South Circulator connects from Florida Hospital to ORHS running northbound on Orange Avenue and southbound on Magnolia Avenue in a separate transit-only lane (concept shown). Emergency vehicles can also use this lane to rapidly respond to emergencies during congested times of the day. North of Colonial Drive, Orange Avenue could be two-way when other network improvements are made to reduce traffic.

Example Circulator Vehicles




Transit
Reliable,
Convenient,
Attractive.
Florida Hospital
Lake Winyah
Lake Sue
Lake Estelle
SPRUCE ST.
E. ROLLINS ST.
Loch Haven Park
E. PRINCETON ST.
Lake Rowena
ALDEN RD.
Lake Formosa
N. MILLS AVE.
Lake Ivanhoe
VIRGINIA DR.
N. WESTMORELAND DR.
LAKEVIEW ST.
Lake Adair
N. ORANGE AVE.
WEBER ST.
Lake Highland
Spring Lake
EDGEWATER DR.
Lake Concord
MARKS ST.
N. MAGNOLIA AVE.
Park Lake
W. COLONIAL DR.
E. COLONIAL DR.
Lake Dot
Lynx Central Station
Pond Park
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
Centroplex
E. LIVINGSTON ST.
N. TAMPA AVE.
Rock Lake
N. ORANGE BLOSSOM TRAIL
N. PARRAMORE AVE.
W. ROBINSON ST.
E. ROBINSON ST.
W. WASHINGTON ST.
TERRY AVE.
N. HUGHEY AVE.
S. GARLAND AVE.
Lake Eola
N. SUMMERLIN AVE.
W. CENTRAL BLVD.
E. CENTRAL BLVD.
Fern Lake
Lake Lorna Doone
W. CHURCH ST.
E. CHURCH ST.
S. ROSALIND AVE.
Lake Lawsona
Tinker Field
Events Center
Performing Arts Center
Lake Olive
W. SOUTH ST.
E. SOUTH ST.
Citrus Bowl
City Hall
W. ANDERSON ST.
E. ANDERSON ST.
Lake Sunset
W. LONG ST.
W. CARTER ST.
Lake Lucerne
S. ORANGE AVE.
Lake Cherokee
Lake Greenwood
CHEROKEE DR.
PARRAMORE AV
W. GORE ST.
E. GORE ST.
Lake Davis
S. MILLS AVE.
Lake of the Woods
Lake Emerald
Lake Weldona
W. COLUMBIA ST.
BRIERCLIFF DR.
LUCERNE TERR.
Lake Copeland
Lake Lancaster
S. DIVISION AVE.
SLIGH BLVD.
S. ORANGE BLOSSOM TRAIL
S. WESTMORELAND DR.
S. PARRAMORE AVE.
Arnold Palmer Hospital
Orlando Regional Medical Center
E. MILLER ST.
S. SUMMERLIN AVE.
DELANEY AVE.
Lake Jane
W. KALEY ST.
SOUTH TO MICHIGAN ST.
Legend
Landmarks/Points of Interest
Study Area
Existing Lymmo
North-South Circulator
East-West Circulator
Potential Extensions
Commuter Rail Station
NOT TO SCALE
441
4
17
92
50
527
526
408
TOLL
HDR

5.1 Existing Transit Service & Facilities

Existing Transit Service

The Central Florida Regional Transportation Authority (known as LYNX) currently (as of April 2006) operates 36 transit routes in the Downtown Orlando area. All but one route (#30) serve the LYNX Central Station (LCS). **Figure 5-1** illustrates the existing LYMMO Downtown Circulator service alignment. **Figure 5-2** illustrates the existing LYNX

Figure 5-1
Existing LYMMO Service Alignment

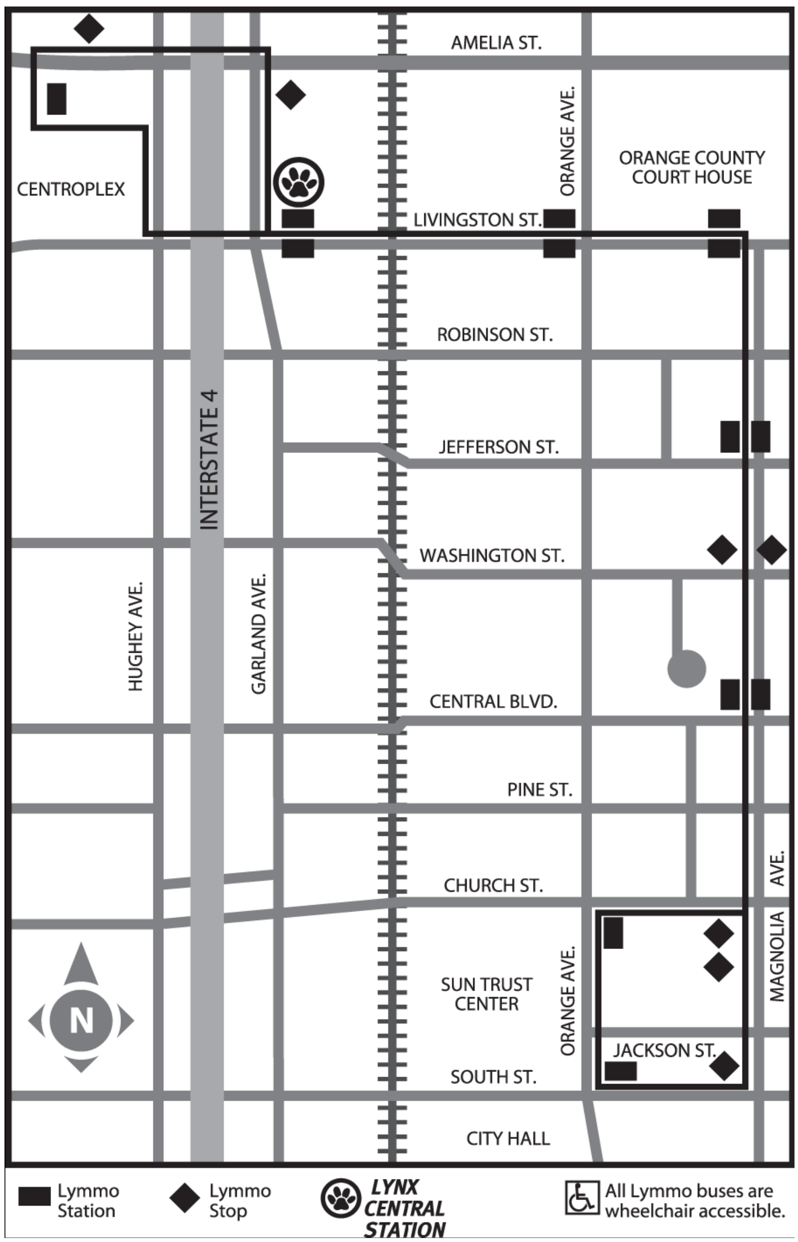
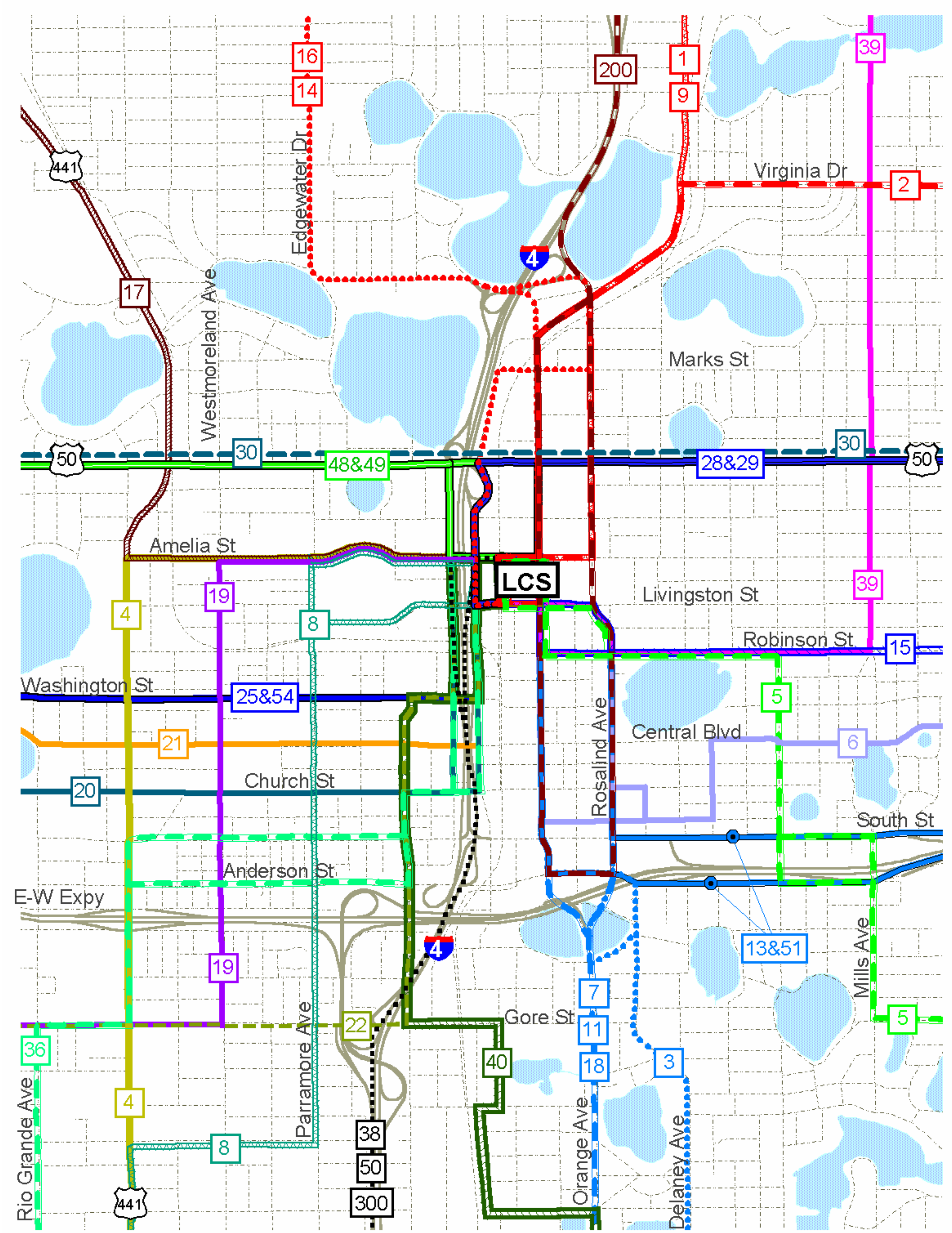


Figure 5-2

Existing LYNX Fixed Route Transit Service in Downtown Orlando



bus network within the downtown Orlando area. All existing transit service serving the core of Downtown terminates at the LCS. Transit service entering Downtown Orlando from the northwest, west and southwest access the LCS via Garland Avenue and Hughey Avenue. Service entering downtown from the north, east and south access the LCS via Rosalind Avenue, Magnolia Avenue and Orange Avenue.

Existing Service Characteristics

LYNX currently operates a total of 1,802 weekday bus trips in the Downtown area. Of the total bus trips, 888 are destined for the Downtown area (inbound), and 914 are trips departing the downtown area (outbound). Additionally, the LYMMO service operates 186 roundtrips on a typical weekday. Figure 5-3 identifies existing transit bus trip volumes by downtown roadway segment. Routes serving the Downtown core area are generally concentrated along the following streets/avenues: Orange Avenue, Magnolia Avenue, Rosalind Avenue, Garland Avenue and Hughey Avenue. Outside the core area, transit route alignments are generally spaced even distances apart, providing good service coverage (e.g., Washington Street, Central Boulevard, Church Street, South Street and Anderson Street).

Table 5-1 documents existing Downtown transit route operating characteristics. Transit service typically operates at 30 to 60 minute service frequencies (with a few routes operating 15 minute service frequencies). Transit service is typically operated seven days a week (28 of 36 routes) with service beginning generally between 4:00 AM and 5:00 AM and ending between 8:00 PM and 12:00 AM. Within the CRA boundary area, LYNX fixed route transit service boards approximately three thousand weekday riders (2,937 weekday boardings per 2006 LYNX COA Ridecheck Survey). Additionally, the Downtown LYMMO circulator service records approximately 4,400 weekday riders.

Existing Transit Facilities

LYNX Central Station (LCS)

Beginning in November 2004, transit service was moved from the previous Downtown Bus Station (DBS) to the LCS in Downtown Orlando located between Livingston and Amelia Streets and adjacent to Garland Street. The LCS features 24 sawtooth design bays for easy bus bay ingress/egress and a staffed customer service office providing route and schedule information, pass and ticket sales, lost and found and bicycle locker rental. The LCS adds many other new amenities like an 18,000 square foot terminal with an air-conditioned waiting area, direct access to the Downtown LYMMO route, and improved safety and security measures. The LCS has been designed to allow for additional routes and expansion and is located along the proposed commuter rail line.

Figure 5-3

Downtown Orlando Bus Trips by Street Segment

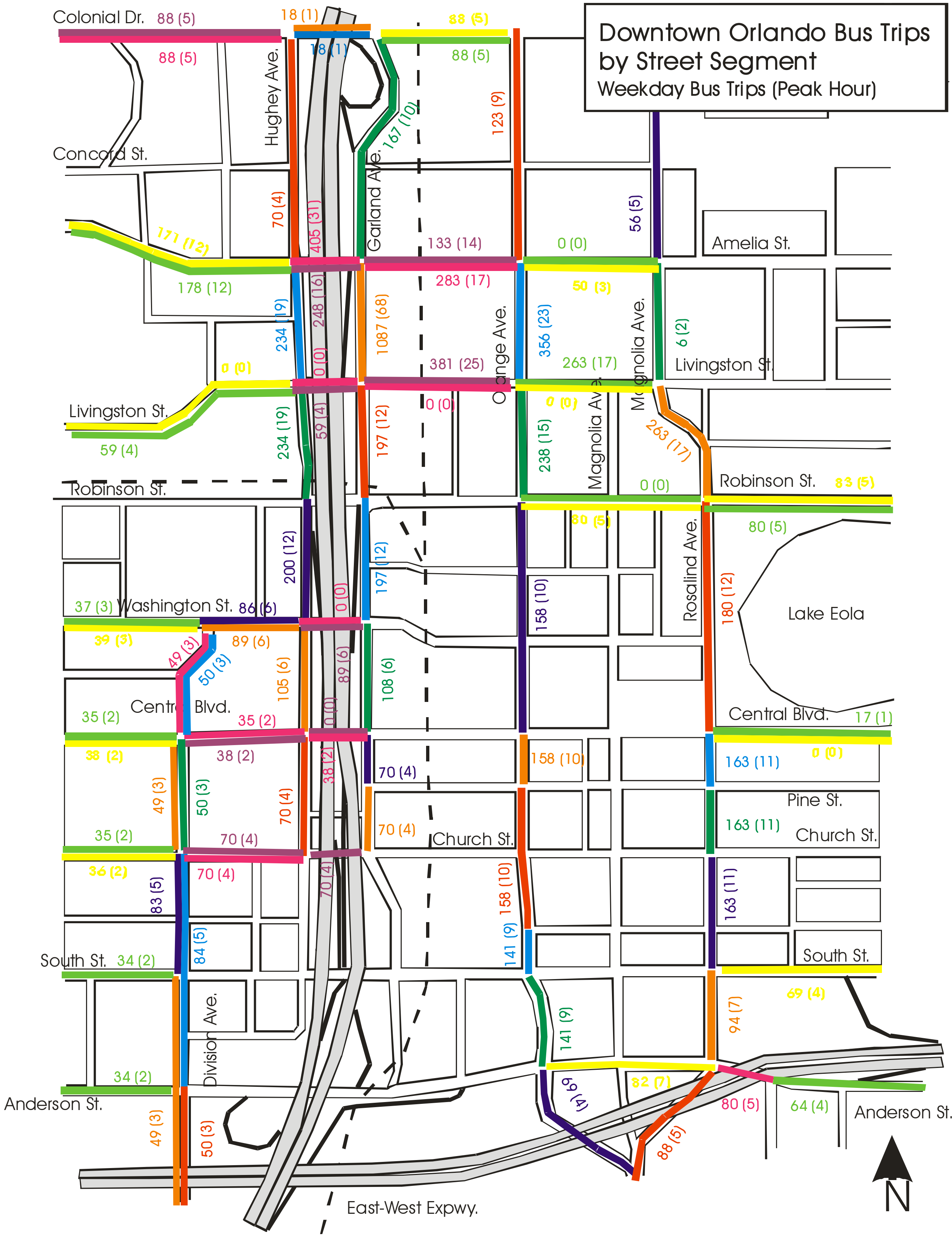


Table 5-1

Existing Downtown Bus Service Operating Characteristics

Rte. #	Route Name	Route Pattern	Service Frequencies (peak/midday/evening)			Span of Service Hours			One-Way Service Trips		
			Weekday	Saturday	Sunday	Weekday	Saturday	Sunday	Weekday	Saturday	Sunday
1	N Orange Ave/ Alt. Springs	LCS-Altamonte Mall	60/60/--	60/60/--	--/--/--	4:45 am-8:50 pm	4:45 am-8:50 pm	-	31	31	-
2	Colonialtown	LCS-Colonial Plaza	60/60/--	60/60/--	--/--/--	5:00 am-7:20 pm	5:00 am-7:20 pm	-	29	29	-
3	Lake Margaret	LCS-Dixie Belle Dr & Gaitlin Ave	60/60/--	60/60/--	--/--/--	4:43 am-9:05 pm	4:43 am-9:05 pm	-	32	32	-
4	S. US 441/ Kissimmee	LCS-Osceola Square Mall	30/30/60	30/30/60	30/30/60	4:15 am-2:05 am	4:39 am-11:35 pm	4:39 am- 10:05 pm	96	70	63
		LCS-Florida Mall (PM ONLY)	30/--/--	--/--/--	--/--/--						
		LCS-OBT & Hunters Creek Blvd (LATE EVE)	--/--/60	--/--/--	--/--/--						
5	Lake George/ Ft Gatlin	LCS-Dixie Belle Dr & Gaitlin Ave	60/60/--	60/60/--	--/--/--	5:30 am-7:50 pm	5:30 am-7:50 pm	-	28	28	-
6	Dixie Belle	LCS-Dixie Belle Dr & Gaitlin Ave	60/60/60	60/60/60	60/60/--	4:30 am-10:35 pm	4:30 am-10:35 pm	4:45 am- 8:35 pm	34	34	30
7	S. Orange Ave/Florida Mall	LCS-Florida Mall	60/60/60	60/60/--	60/60/--	4:30 am-12:35 am	4:30 am-10:35 pm	5:15 am- 8:35 pm	40	36	30
8	W. Oak Ridge Rd/ I-Drive	LCS-I-Drive & Westwood Blvd	15/30/60	15/30/60	15/30/60	4:45 am-3:05 am	4:45 am-1:05 am	4:45 am- 10:05 pm	111	78	68
9	N. Orange Ave/Rosemont	LCS-Rosemont Superstop	60/60/60	60/60/--	60/60/60	4:59 am-1:05 am	4:59 am-11:05 pm	4:59 am-9:05 pm	40	36	32
11	S Orange Ave/OIA	LCS-OIA	30/30/60	30/30/60	60/60/--	4:45 am-12:05 am	4:45 am-10:05 pm	5:28 am-8:05 pm	67	63	29
13	University of Central FL	LCS-UCF	30/30/30	30/30/30	60/60/--	4:45 am-1:05 am	4:45 am-11:05 pm	5:32 am-8:35 pm	69	65	29
14	Princeton St/Plymouth Apts	LCS-Plymouth Apts	60/60/60	60/60/60	60/60/--	6:00 am-7:20 pm	6:00 am-7:20 pm	6:15 am-6:35 pm	26	26	24
15	Curry Ford Rd/VCC East	LCS- VCC East	30/30/30	30/30/30	60/60/60	4:45 am-1:05 am	4:45 am-11:05 pm	5:15 am-9:05 pm	69	65	31
16	College Park/The Meadows	LCS-The Meadows	60/60/60	60/60/60	--/--/--	5:30 am-7:50 pm	5:30 am-7:50 pm	-	28	28	-
17	North US 441/Apopka	LCS-Park Ave & 5th St	30/30/60	30/30/60	60/60/60	4:43 am-1:35 am	4:45 am-11:05 pm	5:15 am-9:05 pm	72	66	30
18	S. Orange Ave/Kissimmee	LCS-Osceola Square Mall	60/60/60	60/60/60	--/--/--	4:40 am-11:05 pm	4:40 am-11:05 pm	-	34	34	-
19	Richmond Heights	LCS-Washington Shores Superstop	30/30/60	30/30/60	60/60/60	4:30 am-1:05 am	4:45 am-10:05 pm	5:15 am-9:05 pm	70	64	30
20	Malibu/Pine Hills	LCS-Park Promenade Plaza/Juvenile Center	30/30/60	30/30/60	60/60/60	4:45 am-2:05 am	4:45 am-11:05 pm	5:12 am-9:05 pm	71	65	31
21	Carver Shores/Tangelo Park	LCS-Mandarin Dr.	30/30/60	30/30/60	60/60/60	4:45 am-2:35 am	4:45 am-11:35 pm	4:53 am-10:05 pm	73	67	32
22	Richmond Estates	LCS-Washington Shores Superstop	30/30/--	30/30/--	--/--/--	4:35 am-7:50 pm	4:35 am-7:50 pm	-	60	60	-
25	Silver Star Rd	LCS-West Oaks Mall	30/30/60	30/30/60	60/60/--	4:45 am-1:35 am	4:45 am-10:35 pm	4:45 am-8:35 pm	48	45	24
28	East Colonial/Azalea Park	LCS-Grant St & Raper Dailry Rd	30/30/60	60/60/60	60/60/--	4:15 am-1:05 am	4:45 am-10:05 pm	4:45 am-8:05 pm	70	34	30
29	East Colonial/Goldenrod	LCS-Aloma Ave & Forsyth Rd	30/30/60	60/60/60	60/60/--	4:30 am-1:35 am	5:15 am-10:35 pm	5:15 am-8:35 pm	70	34	30
30	Colonial Drive Crosstown	West Oaks Mall- UCF	60/60/60	60/60/60	60/60/60	5:15 am-11:53 pm	5:15 am-11:53 pm	5:45 am-9:19 pm	36	36	30
36	Lake Richmond	LCS- Prince Hall/Bruton	30/30/60	30/30/60	60/60/--	5:00 am-12:40 am	5:00 am-9:40 pm	5:45 am-7:40 pm	68	62	28
38	Downtown Orlando/I-Drive	LCS-LCS (round trip)	15/--/--	15/--/--	60/60/--	6:00 am -9:20 am, 2:00 pm - 5:50 p.m.	6:00 am -9:20 am, 2:00 pm - 5:50 p.m.	6:15 am -9:05 am, 2:15 pm - 5:35 p.m.	23	23	11
39	US 17-92/ Sanford	LCS-Seminole Centre	30/30/60	30/30/60	60/60/60	4:30 am-11:35 pm	4:30 am-11:35 pm	4:45 am-9:35 pm	66	66	31
40	Americana Blvd/Universal	LCS-Universal Orlando Parking Garage	60/60/60	60/60/60	60/60/60	5:00 am-1:05 am	5:00 am-11:05 pm	5:15 am-9:05 pm	39	35	31
48	W Colonial/Park Promenade	LCS- Park Promenade Plaza	30/30/60	60/60/60	60/60/--	4:15 am-1:05 am	4:45 am-10:05 pm	4:45 am-8:05 pm	70	34	30
49	W Colonial Dr/Pine Hills Rd	LCS- Silver Hills Ctr	30/30/60	60/60/60	60/60/--	4:30 am-1:35 am	5:15 am-10:35 pm	5:15 am-8:35 pm	70	34	30
50	Dwtwn Orlando/Magic King.	LCS- Disney University	30/30/30	30/30/30	30/30/30	6:15 am-11:05 pm	6:15 am-11:05 pm	6:15 am-11:05 pm	62	62	62
51	Conway/OIA	LCS-OIA	30/30/60	30/30/60	60/60/60	5:00 am-11:05 pm	5:00 am-11:05 pm	5:15 am-9:05 pm	64	64	31
54	Old Winter Garden Rd	LCS- West Oaks Mall	60/60/--	60/60/--	--/--/--	5:30 am-7:35 pm	5:30 am-7:35 pm	-	28	28	-
31	LYMMO		4/5/10	10/10/10	10/10/10	6:00 am-10:00 pm (12:00 am on Fridays only)	10:00 am-12:00 am	10:00 am-10:00 pm	186 (198 on Fridays only)	85	65
200	Xpress Link	Saxon Blvd PNR & Magnolia Ave & Orange Ave	3 a.m. peak and 3 p.m. peak trips	--/--/--	--/--/--	6:00 am -8:05 am, 4:00 pm - 6:35 pm	-	-	3 trips / peak period	-	-
300	LYNX 3D- Hotel Plaza	LCS- Palm Pkwy & SR 535	1 a.m. peak and 1 p.m. peak trips	1 a.m. peak and 1 p.m. peak trips	1 a.m. peak and 1 p.m. peak trips	6:45 am -7:35 am, 4:45 pm - 5:50 pm	6:45 am -7:35 am, 4:45 pm - 5:50 pm	6:45 am -7:35 am, 4:45 pm - 5:50 pm	1 trip / peak period	1 trip / peak period	1 trip / peak period

LYMMO Alignment and Passenger Facilities

The LYMMO alignment operates low floor buses between the CentroPlex Garage and the Orlando City Hall, serving seven sheltered stop areas and 5 unsheltered stop areas. Additionally, the LYMMO service connects with all fixed route service serving the LCS (2 locations – north and south side). LYMMO stations include shelters, benches and information kiosks that indicate the location of all buses in the system and estimated arrival times of the next bus.

CentroPlex Garage / LYMMO Station

The CentroPlex Garage is utilized as the northern end-of-line for the LYMMO service. LYMMO buses approach the CentroPlex garage westbound along Amelia Street, travel southbound into and through this parking facility, and proceed eastbound on Alexander Place. All LYMMO buses are dispatched (and monitored) from this location according to service frequency by time period. LYMMO buses utilize this location to make schedule adjustments (dwell time) to ensure assigned service frequencies are maintained.

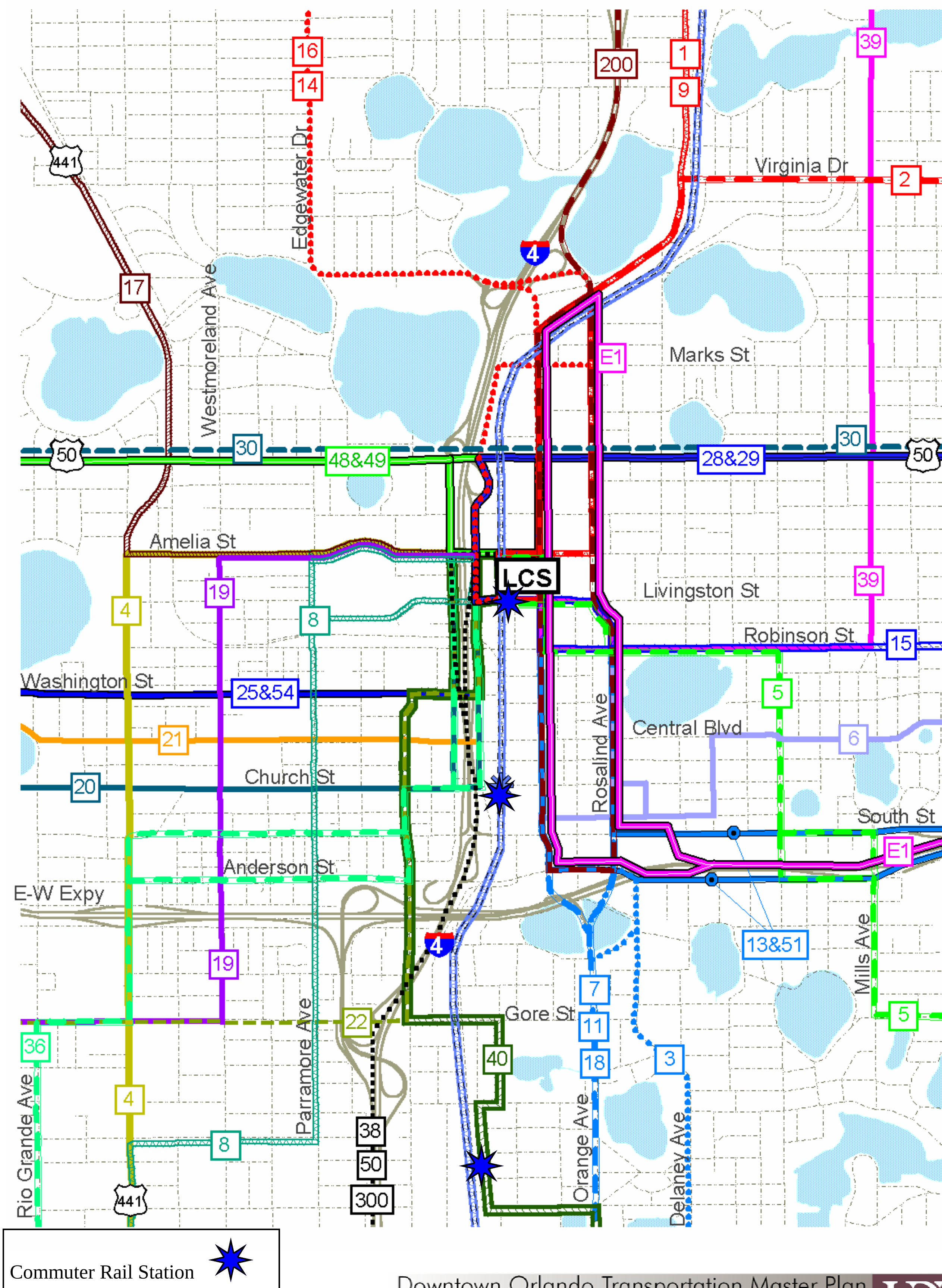
LYNX Central Station with adjacent LYMMO Station on Livingston Avenue.

5.2 Planned Transit Service & Facilities

Commuter Rail EA Plans

In December 2005, the Florida Department of Transportation (FDOT), the Central Florida Regional Transportation Authority (LYNX) and Volusia County Public Transit System (VOTRAN) completed the Environmental Assessment (EA) and Conceptual Engineering Phase of development for the Central Florida Commuter Rail Transit Project. This study phase identified Commuter Rail Transit as the Build Alternative to be operated between DeLand (Volusia County) and Poinciana Boulevard (Osceola County). Three phases of project development were identified, 1) Initial Operating Segment (IOS), a 31.0 mile line from Saxon Boulevard and the ORMC/Amtrak station just south of Downtown Orlando, 2) the Locally Preferred Alternative (LPA), a 53.5 mile line between Saxon Boulevard (Volusia County) and Poinciana Boulevard (Osceola County), and 3) the “Full” Build, a 60.8 mile commuter rail line between Deland and Poinciana Boulevard. All three Build Alternative phases would operate through Downtown Orlando along the CSXT line. Within the Downtown area commuter rail stations were identified at Florida Hospital, LYNX Central Station (LCS), Church Street and the existing Orlando Amtrak Station.

Figure 5-4
Commuter Rail EA – Downtown Orlando Bus Network



Commuter rail service is proposed to be operated on weekdays, approximately 260 days per year. The proposed service plan features 30-minute service during AM and PM peak periods and 120-minute service during the midday and early evening.

The background and feeder bus network for the commuter rail service identifies several bus route alignment and service level modifications to the existing service. However, very few route modifications were identified within the Downtown Orlando core area, as most bus service into Downtown terminates at the LCS, a proposed Commuter Rail Station. Figure 5-4 illustrates the proposed fixed route bus system within the Downtown area as identified in the Commuter Rail EA.

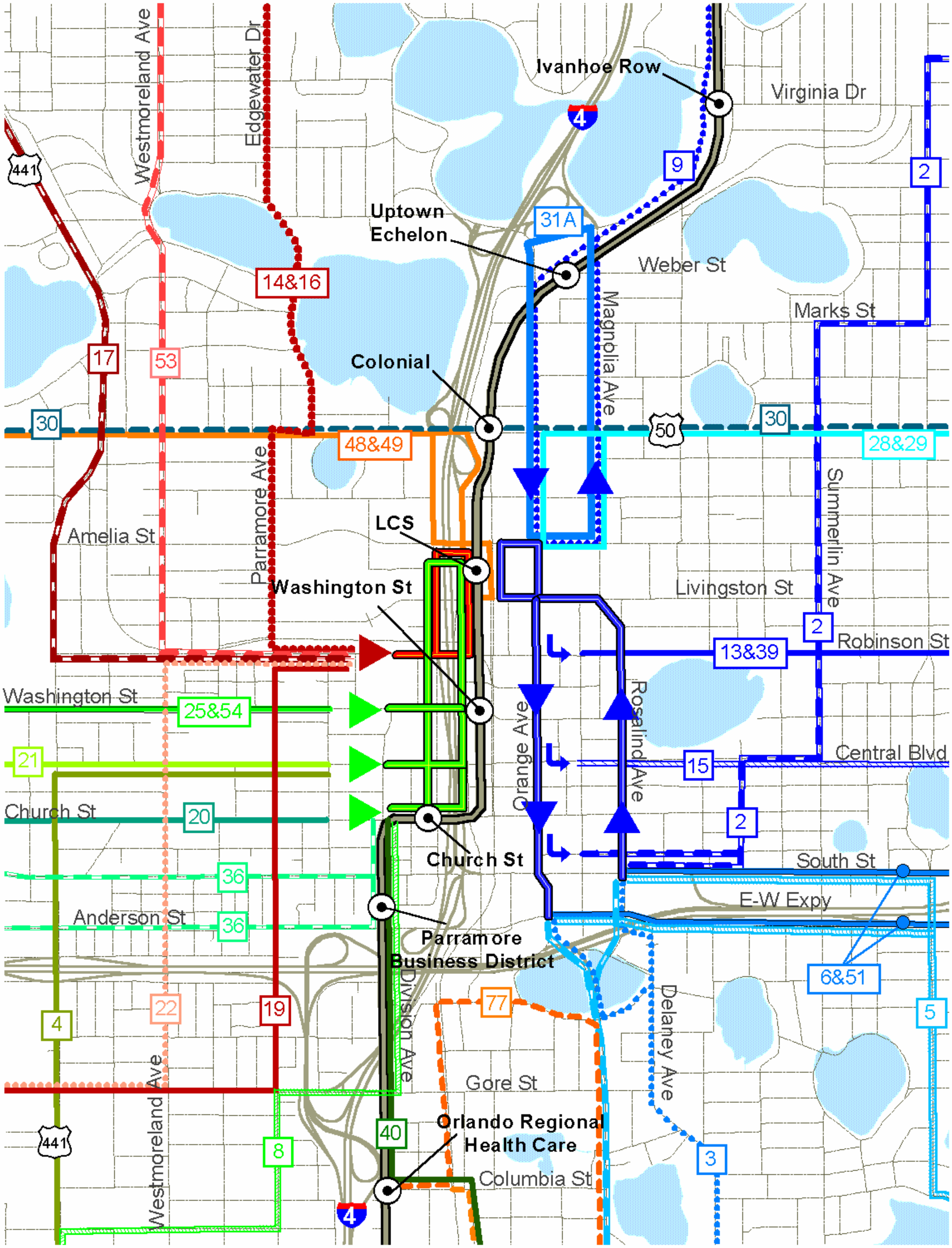
LRT SDEIS Plans

In Fall of 2003, the Florida Department of Transportation (FDOT), the Central Florida Regional Transportation Authority (LYNX) and Volusia County Public Transit System (VOTRAN) completed the Supplemental Draft Environmental Impact Statement (SDEIS) phase of development for the Central Florida Light Rail Transit System Project. This study phase identified Light Rail Transit (LRT) service as the Build Alternative to be operated between Altamonte Springs Mall (Seminole County) and Sea World (Orange County).

Light Rail Transit service is proposed to be operated seven days a week. Weekday service would operate 7.5-minute service frequencies during AM and PM peak periods and during midday hours, 15-minute service early evenings and 30-minute service during late evenings. Saturday and Sunday service would operate at 15-minute service during the day and early evenings, with 30-minute service in the late evenings. Twenty-seven (27) stations are proposed along the 22.58 mile alignment. Within the Downtown Orlando area, a total of eight stations are proposed at the following locations: Florida Hospital, Ivanhoe Row (Virginia Drive & Alden Road), Uptown (Orange Avenue & Garland Avenue), LYNX Central Station, Washington Street (at Garland Avenue), Church Street (under I-4), Parramore Business District (Anderson Street & Division Avenue) and Orlando Regional Healthcare (Columbia Street & Division Street).

The background and feeder bus network for the LRT service identifies several bus route alignment and service level modifications to the existing service. Within the downtown core area few route modifications were identified, as most bus service into Downtown terminates at the LCS, a proposed LRT Station. Figure 5-5 illustrates the proposed fixed route bus system within the Downtown area as identified in the LRT SDEIS.

Figure 5-5
LRT SDEIS – Downtown Orlando Bus Network



LYNX Comprehensive Operations Analysis (COA) Service Plans

A Comprehensive Operations Analysis (COA) was completed by LYNX in March 2006, and is intended to provide a blueprint for the growth of future transit services in Central Florida. This COA reflects a new approach to the delivery of transit services. The ultimate long-range "vision" of this COA consists of a "layered" approach of transit services that are defined to meet the travel demands of specific markets. The Long-Range Plan includes an increased number of transit centers and new park-and-ride lots. The following three service plan time periods have been identified by the COA:

- Near-Term (1 – 5 Year Plan)
- Short-Range (6 – 10 Year Plan)
- Long-Range (11 – 15 Year Plan)

Transit services design as part of the COA result in the restructuring and redistribution of transit resources, maximizing cost saving opportunities, redirecting transit resources to more productive routes and service areas, while providing appropriate levels of service to each transit/travel market.

Transit services included in the COA 15 Year Plan include;

- ***Commuter Rail.*** New commuter rail service is included from Saxon Boulevard in Volusia County to Poinciana Boulevard in Osceola County.
- ***Main Line Corridor Routes.*** The Long-Range Vision includes proposals for new routes along major arterial roadways that are proven transit markets (e.g., SR 436 and Colonial Drive). Frequent service is proposed along these corridors, with enhanced passenger amenities.
- ***Express Routes.*** An extensive network of regional routes is proposed as a means to provide fast and convenient point-to-point service to/from Downtown Orlando, Orlando International Airport, Canadian Court at International Drive, and Disney.
- ***Local & Neighborhood Routes.*** An extensive network of local routes is proposed to connect residential neighborhoods and commercial districts with the Regional Routes and Main Line Corridor Routes.
- ***Call-and-Ride Zones.*** The Long-Range Vision also includes new dial-a-ride services in select low density areas.

The COA assumes expansion of the Downtown Orlando Circulator System consistent with those route alignments identified as part of the Downtown Orlando Transportation Plan. COA service plan recommendations emphasize the placement of transit centers throughout the three county area, creating a system more representative of a hub and spoke design. This redesign of the LYNX system structure deemphasizes the current radial orientation of service to Downtown Orlando. **Figure 5-6** illustrates the proposed COA Long-Range bus route network for Downtown Orlando.

The result of the COA service plan recommendations is a larger overall transit system with minimal impacts on Downtown bus volumes. **Figure 5-7** identifies bus trip volumes by street segment for the COA Long-Range Service Plan.

Table 5-2 documents COA Long-Range Plan Downtown transit route operating characteristics. Transit service typically operates at 15 to 30 minute service frequencies (with a few routes operating 7.5 minute service frequencies). Transit service is operated seven days a week on all local routes and five days a week on 5 of 7 express routes. Service generally begins between 4:30 AM and 5:30 AM and ending between 8:00 PM and 1:00 AM.

Figure 5-6
LYNX COA Long-Range Plan Proposed Downtown Orlando Bus Network

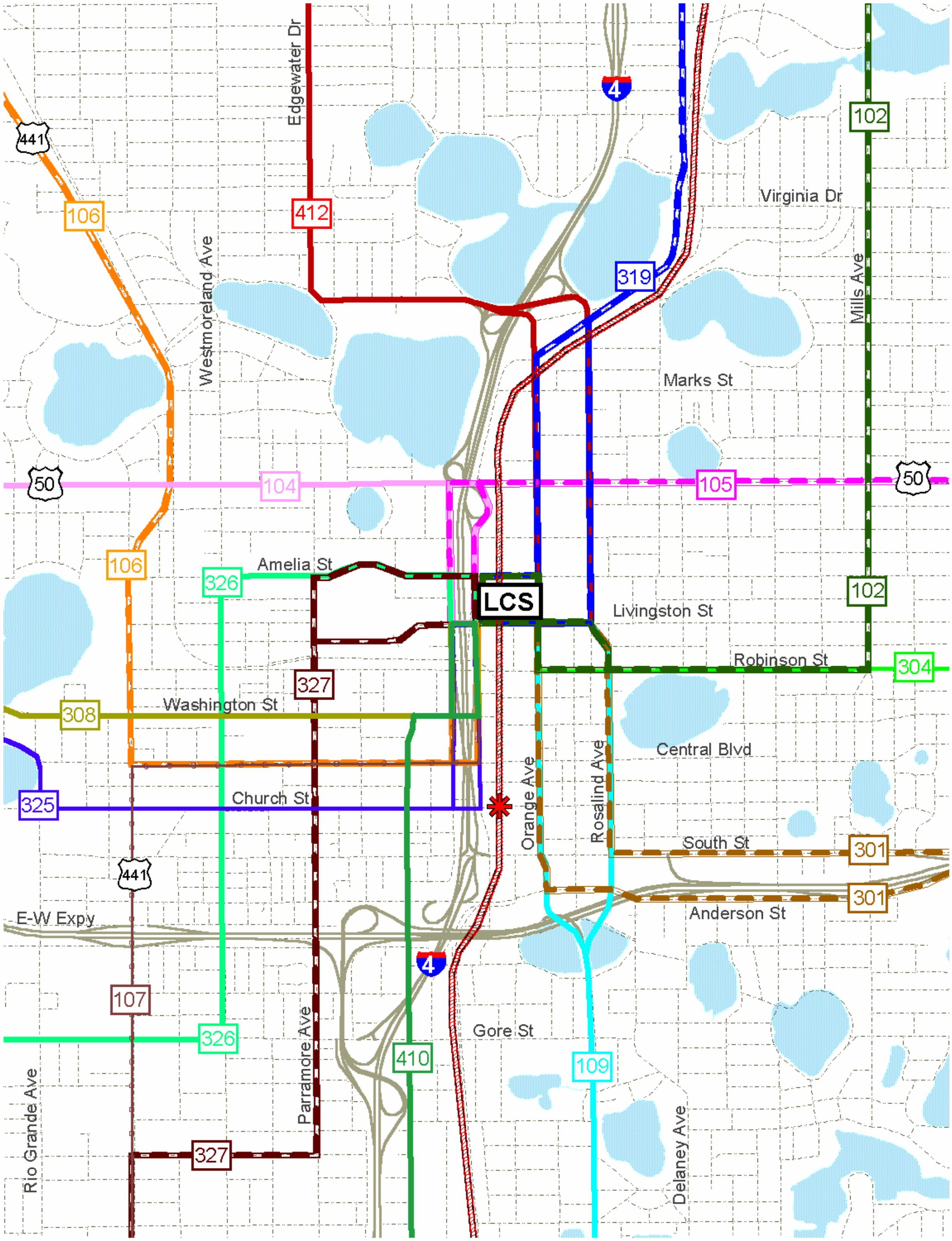


Figure 5-7

LYNX COA Long-Range Plan Downtown Orlando Bus Trips by Street Segment

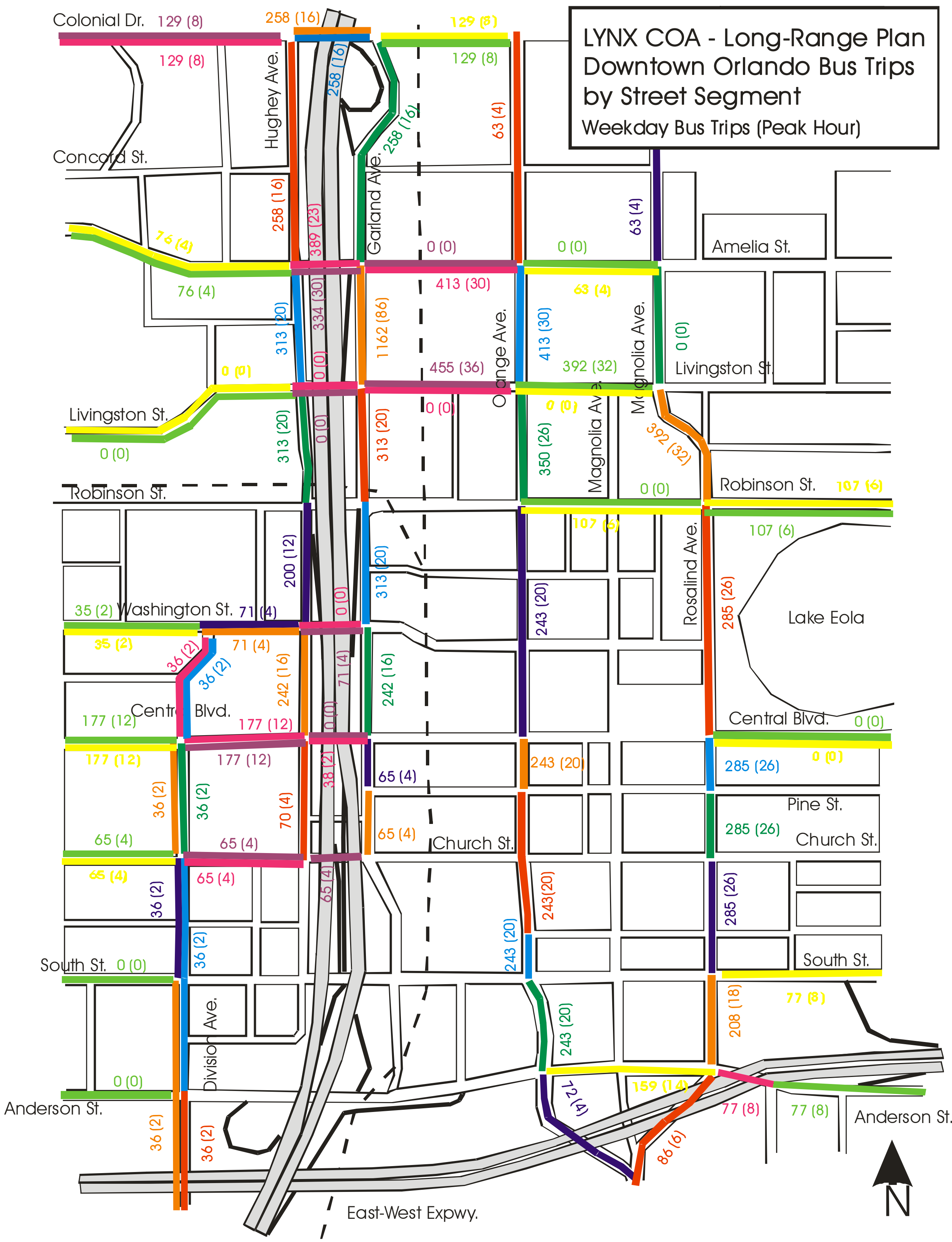


Table 5-2

LYNX COA Long-Range Plan Downtown Orlando Bus Trips by Street Segment

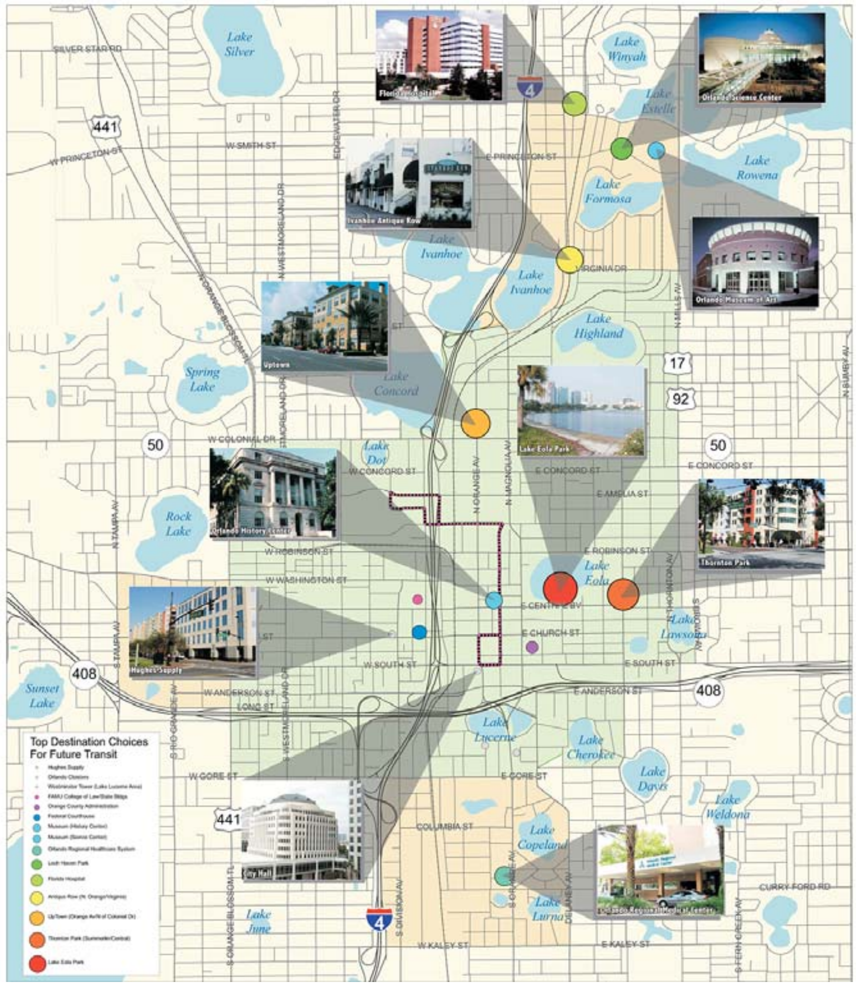
Route Category	Rte. #	Route Name	Route Pattern	Service Frequencies (peak/midday/evening)			Span of Service Hours			One-Way Service Trips		
				Weekday	Saturday	Sunday	Weekday	Saturday	Sunday	Weekday	Saturday	Sunday
Main-Line Routes	102	South US 17-92	LCS to Fern Park	15/15/30	15/15/30	30/30/30	4:30 am-1:00 am	4:30 am-12:00 am	5:00 am-11:00 pm	144	140	72
	104	West Colonial Dr.	West Oaks Mall to LCS	7.5/7.5/30	7.5/7.5/30	15/15/30	4:30 am-1:00 am	4:30 am-12:00 am	5:00 am-11:00 pm	258	248	132
	105	East Colonial Dr.	UCF to LCS	7.5/7.5/30	7.5/7.5/30	15/15/30	4:30 am-1:00 am	4:30 am-12:00 am	5:00 am-11:00 pm	258	248	132
	106	US 441 North	LCS to Apopka	15/15/30	15/15/30	30/30/30	4:30 am-1:00 am	4:30 am-12:00 am	5:00 am-11:00 pm	144	140	72
	107	US 441 South	LCS to Fl. Mall	7.5/15/30	15/15/30	15/15/30	4:30 am-1:00 am	4:30 am-12:00 am	5:00 am-11:00 pm	210	140	132
	109	S. Orange Ave.	LCS to Sand Lake C.Rail Station	15/15/30	15/15/30	15/15/30	4:30 am-1:00 am	4:30 am-12:00 am	5:00 am-11:00 pm	144	140	132
Express Routes	200	UCF/Waterford Lakes-CBD	UCF to Waterford Lakes pnr to Orlando CBD	30/120/--	--/--/--	--/--/--	5:30 am-6:45 pm	-	-	28	-	-
	201	Oviedo Mktplace-CBD	Oviedo Marketplace Mall pnr to Orlando CBD	30/120/--	--/--/--	--/--/--	5:30 am-6:45 pm	-	-	28	-	-
	202	Lake Nona-CBD	Lake Nona to Narcoosee pnr to Orlando CBD	30/120/--	--/--/--	--/--/--	5:30 am-6:45 pm	-	-	28	-	-
	203	Mt. Dora/Apopka-CBD	Mt. Dora pnr, Zellwood, Apopka pnr to Orlando	30/120/--	--/--/--	--/--/--	5:30 am-6:45 pm	-	-	28	-	-
	204	Clermont/Oakland-CBD	Clermont pnr to Oakland pnr to Orlando CBD	30/120/--	--/--/--	--/--/--	5:30 am-6:45 pm	-	-	28	-	-
	245	Orlando CBD-Can. Ct.	Orlando CBD (LCS) to Can. Ct. T.Ctr.	30/30/60	30/30/60	30/30/60	5:30 am-1:00 am	5:30 am-12:00 am	5:30 am-11:00 pm	68	66	64
	263	Orlando CBD-Disney	Orlando CBD (LCS) to Disney Transit Ctr.	30/30/60	30/30/60	60/60/60	5:30 am-1:00 am	5:30 am-12:00 am	5:30 am-11:00 pm	68	66	35
Local Routes	301	Lake Underhill	LCS to Waterford Lakes via VCC East	30/30/60	30/30/60	60/60/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	70	66	36
	304	Conway	Hoffner/436 to LCS via Colonial Plaza	30/30/60	30/30/60	60/60/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	70	66	36
	308	Old Winter Garden Rd.	LCS to West Oaks Mall	30/30/60	30/30/60	30/30/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	70	66	62
	310	Silver Star Road/ Downtown	West Oaks Mall to LCS via Silver Star/ Princeton	30/30/60	30/30/60	30/30/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	70	66	62
	319	Wymore Rd/Orange Ave.	Altamonte Mall to LCS	30/30/60	30/30/60	60/60/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-8:00 pm	70	66	30
	325	Wash. Shores/Ivey Lane	LCS to Ivey Lane via Wash. Shores	15/15/30	15/15/30	30/30/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	129	124	66
	326	Wash. Shores/VCC West	LCS to VCC West via Wash. Shores	30/30/30	30/30/30	30/30/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	82	78	66
	327	Rio Grande - Oak Ridge	LCS to Prime Outlets via Rio Grande/ Oak Ridge	30/30/60	30/30/60	30/30/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	70	66	62
Neighbor-hood Routes	410	Division/Millenia/Prime Outlets	LCS to Prime Outlets via Millenia Mall	30/30/30	30/30/60	30/30/60	4:30 am-1:00 am	4:30 am-12:00 am	5:30 am-11:00 pm	72	66	62
	412	Edgewater Dr.	LCS to Rosemont via Edgewater Dr.	30/30/60	60/60/60	60/60/--	5:30 am-8:00 pm	5:30 am-8:00 pm	5:30 am-6:00 pm	56	29	25

5.3 Land Use Compatibility

Downtown Land Uses

Existing and future land use were evaluated for the LYMMO expansion concept. As previously described, the City is undergoing tremendous growth with over 54 new development projects underway in planning, design and construction. In addition, the Downtown Future Land Use Map provides an indication of Activity Center growth, medium and high density mixed use development, high density office, and public/recreational/ institutional land use areas **(Figure 5-8).** This data was evaluated together with survey data collected from current residents who described the places and types of locations they would likely use transit to visit.

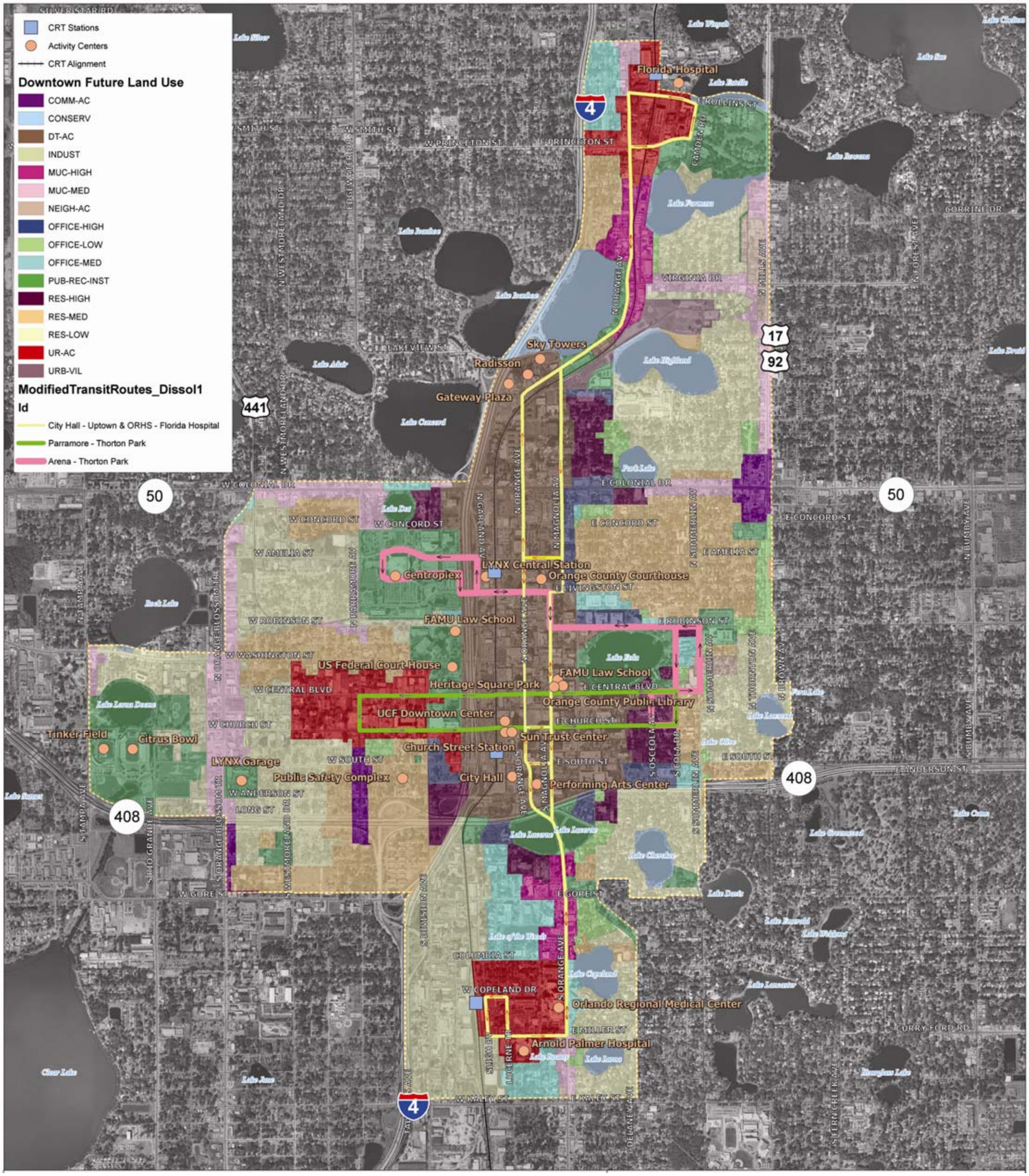
The places most frequently cited were places for recreation or entertainment (i.e. Lake Eola Park, Orlando Science Center) or places for shopping and dining (i.e. Thornton Park, Antique Row).

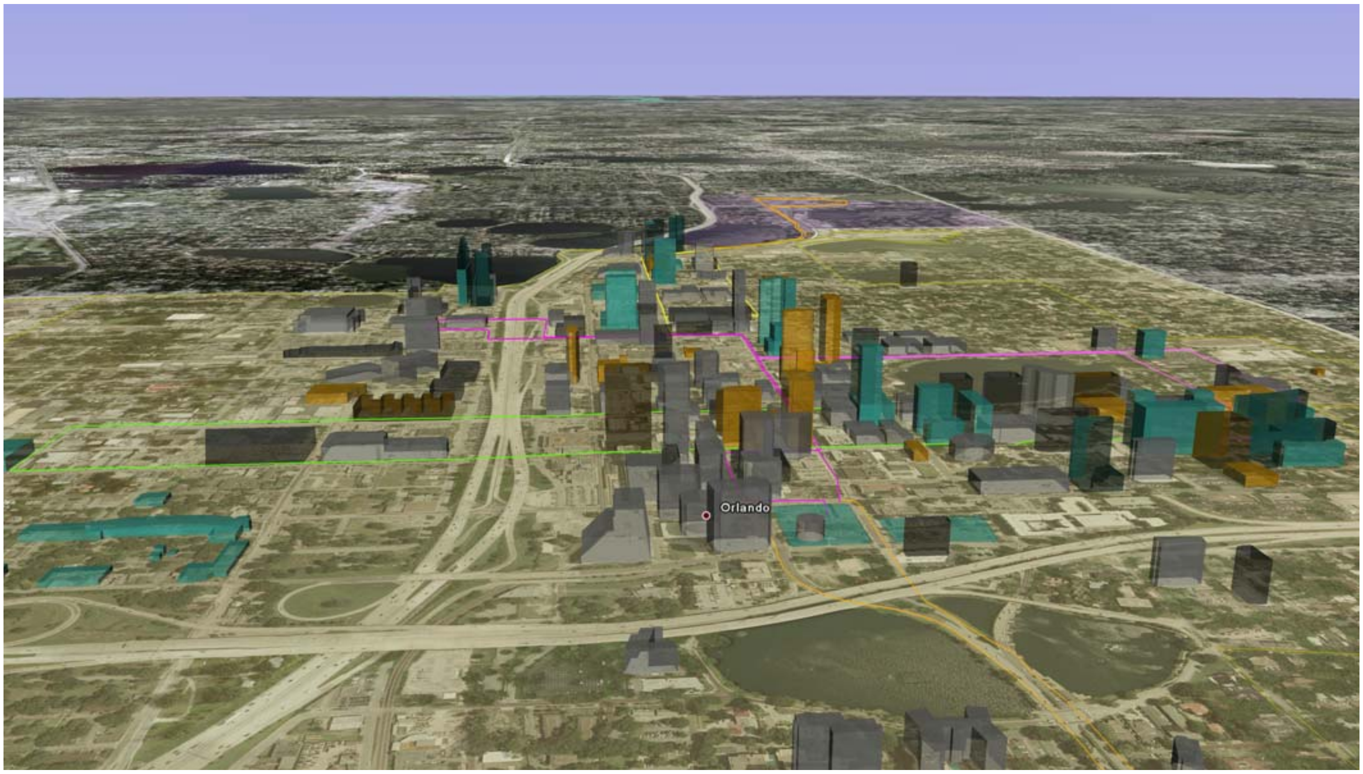


A survey of existing Downtown Study Area residents identified locations and the types of destinations residents would use a future transit system to visit if service were available. Importantly, these destinations reflect the types of places they would visit today based upon their understanding and familiarity with the current downtown. These types of places serve as future transit destinations for residents where they are replicated in future new development or redeveloping areas.

Development densities permitted within the future land use designations of the study area provide abundant opportunity for development to achieve density levels that will support a fixed route transit system. Low intensity residential associated with the Downtown neighborhoods were not considered intensive enough to support the future success of the initial system expansion concepts developed for the Downtown Transportation Plan.

Figure 5-8
Future Land Use Relationship to Transit Expansion Concepts

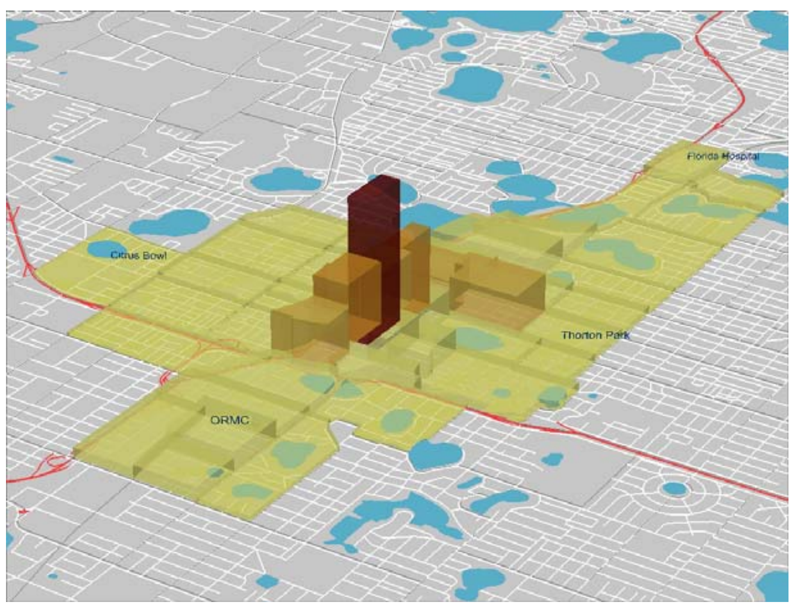




The future Downtown City skyline is represented by this Google Earth Pro scene with Existing (gray), Under Construction (orange), and Planned (green) developments shown. The scale of the projects and density represented in this future image clearly illustrates the potential for expanded transit service east-west and north-south.

5.4 Travel Demand

The OUATS 2025 travel demand model also provided as basis for estimating future sources of trip productions and trip attractions within the study area. The City's 2004 Micro-Traffic Zone allocation summary was used to update the OUATS regional travel demand model for the study area. The 2004 summary contained all known projects (at that time) plus provided future zone growth allocations to account for predicted growth areas through year 2025. The future year data within the model was matched to DRI development entitlement thresholds for areas within the DRI.



Daily trip density per traffic analysis zone from the 2025 OUATS travel demand model emphasizes locations generating the highest trips per acre within the study area.

5.5 Transit Technologies

Downtown Orlando is a unique urban area with land uses and development densities that generate significant travel demands throughout the day. While travel demands to and from this activity center are sizeable, a substantial number of trips begin and end within Downtown Orlando. Mobility within this activity center is critical to its success. A superior mobility system can only be obtained through a mix of pedestrian, bicycle, automobile, freight and transit circulation systems. Transit mobility can be achieved through circulator routes serving key trip generators. These circulators can be operated with several vehicle technologies.

This section of the report presents the results of a comparative assessment of transit circulator technologies. The purpose of this assessment is to aid the City of Orlando in the decision-making process of selecting feasible technologies for the Downtown Circulator System. The recommendations made herein are based upon the technology assessment.

The following steps were taken as part of the technology assessment:

- Identify factors to be considered when identifying potential transit technologies.
- Identify potential technologies.
- Define each technology, identify manufacturers and identify places where each technology has been applied.
- Develop and define criteria and requirements to be used in the evaluation of the technologies for this application.
- Evaluate each technology based on evaluation criteria and identify applicable technologies most responsive to downtowns mobility needs.

The technology assessment concludes with a summary of the results of the process.

Factors to Consider

Selection of a transit technology is critical to the success of the system. Typical factors considered in the evaluation and selection of the most appropriate transit technology include:

- Market Served:
    - Trip purpose (e.g., work)
    - Environment (e.g., land use mix)
    - Travel patterns (e.g., internal, external-internal, internal-external)
- Capacity:
    - Seated, standing, system expansion
- Operating Characteristics:
    - Speeds – low, variable, max speed
    - Acceleration / deceleration
    - Exclusive / shared right-of-way
    - Maneuverability – grades, curves
- Costs:
    - Capital – vehicles, infrastructure
    - Operating – labor, agreements, maintenance:
    - Environmental / Community
    - Noise / vibration
    - Air quality
    - Traffic impacts
    - Land use / community character
- Access:
    - Physical barriers to seamless access
    - Perceived barriers (psychological)
    - Time to access / egress the system
    - Supporting environmental systems (pedestrian, bicycle, auto and transit access)
    - Proximity to origins and destinations

Service requirements that may limit the range of applicable technologies at the planning stage include the following:

- Need to share right-of-way or cross at grade.
- Ridership capacities to be accommodated. The anticipated capacity needs over the life of the investment may narrow the range of applicable technologies.
- Guideway location (grade, elevated, underground).

- Limited R/W Width.

- Route length and complexity.

- Level Loading.

- Low Operation Cost (or higher off-peak frequency): Operating labor is the biggest component of transit operating costs. Automation can reduce operating costs because a driver is not required, and it can reduce the incremental cost of maintaining frequent service during off-peak periods. However, many automated systems continue to deploy operating personnel along the route to inspect fare compliance, provide security and attend to customer care. If automation is required, only guideways that are completely separated from traffic and pedestrians can be considered.

Potential Technologies

Below is a list of applicable transit technologies based on downtown environment and technology characteristics (technology physical and operating characteristics). Transit Technologies have been identified as the following types of bus and rail.

- Bus:
    - Circulator/Shuttle/Trolley Bus
    - Bus Rapid Transit
- Rail:
    - Light Rail
    - Streetcars & Trolleys
    - Automated Guideway Transit (AGT)
    - Personal Rapid Transit (PRT)
    - Monorail

Transit Technology Definitions

This transit technology assessment provides an overview of potential transit modes that may be applicable for operation in Downtown Orlando. For each technology, there is a general discussion about the technology and the operating characteristics. This inventory is by no means an exhaustive look at all the options. The technologies that are considered here all operate in revenue service in other cities and are thought to be the most appropriate options given the physical context of Downtown Orlando. Finally, the conclusion of this assessment discusses possible evaluation criteria that could be considered in the detailed analysis.

Transit Bus

The conventional bus is perhaps the most flexible of all transit technologies. It can be used for a variety of service models including line haul, local/limited stop, and circulation service. Buses typically operate in mixed traffic on a variety of roadway facilities including freeways/expressways, arterials, and high-occupancy vehicle (HOV) lanes. Some buses do operate in exclusive bus-only lanes. The vast majority of buses are powered by diesel engines. There are, however, many buses in service today that are powered by electric motors (obtain power from overhead catenary wires), alternative fuels such as compressed natural gas (CNG) which is currently used on the Downtown Orlando LYMMO Service, or liquefied natural gas (LNG), propane, hydrogen (for fuel cells) or biomass derived fuels and magnetic guidance. Conventional diesel-powered buses vary in length from approximately 30 to 40 feet, seat approximately 25 to 45 passengers, and are capable of freeway speeds. Typically, the cost of a conventional transit bus is in the range of $250K - $350K, over the road coaches in the range of $400K - $550K, and articulated buses in the range of $450K - $600K.

Electric Trolley Bus

Bus Rapid Transit Lanes

Bus Rapid Transit Vehicle

Electric Trolley Bus

Electric trolley buses are similar to either standard or articulated diesel powered buses, except that they are propelled by electric motors and obtain power from overhead catenary wires along the route. They are available as either standard trolleys approximately 40 feet in length or articulated trolleys approximately 60 feet in length. They are limited to approximately a 40-mph maximum speed. The trolley bus is steerable and needs no guideway, although the reach of its trolley poles limits its locus of movement before they become derailed. Trolley buses have excellent tractive power at low speeds making them very effective on steep grades. The electric propulsion option also allows these buses to operate inside of tunnels without a build up of exhaust fumes.

Monorail Vehicle - Seattle, WA

Monorail Vehicle

Bus Rapid Transit

While the word Bus Rapid Transit (BRT) is a relatively new term in the transportation lexicon, the concepts that define BRT have been around for many years. BRT is a technology that possesses characteristics of both bus

Bus Rapid Transit Vehicle

and rail. Typically, BRT vehicles are very similar to conventional buses in underlying design and performance. One characteristic that is borrowed from rail is the use of low-floor vehicles. This feature enables passengers to board and alight quickly thereby minimizing dwell times at stations. Perhaps the most radical change from a conventional bus is the marketing or branding of the BRT as a unique service. Characteristics that are common to many BRT systems are preferential or exclusive bus lanes, signal prioritization, aesthetic station treatments, improved fare collection, and intelligent transportation systems (ITS) that provide real time information to passengers. BRT routes currently operate in Boston, Massachusetts; Miami, Florida; Los Angeles, California, and Las Vegas, Nevada. The cost of a typical BRT vehicle is approximately $1.0 million.

Light Rail Vehicle - DART Dallas, TX

Light Rail Vehicle - Boston, MA

Light Rail Transit

Light rail transit (LRT) is a rail technology that operates in exclusive right-of-way or in city streets. An overhead electric wire provides electricity to a LRT vehicle’s (LRVs) electrical motor via an overhead catenary system. Light rail cars are manufactured in different sizes, but are generally comparable to heavy rail vehicles in length – 75 to 90 feet (23 to 27 meters), weight and cost. (The term "light rail" refers to fact that this transit mode is usually used for lower passenger demand application, not the vehicle weight). Articulated cars (hinged in the middle) are available for alignments that require tight turns, such as in Downtown streets.

Streetcar Vehicles—Tacoma

Light rail systems typically provide frequent, local service. LRT vehicles can operate as a single unit or as multi-car trains. Maximum train lengths depend on local constraints such as the length of loading platforms or the distance between street intersections (generally shorter distances in downtown environments). Generally, however, light rail trains are no more than 3-4 cars long. Electric power is usually supplied by overhead wires (catenary), a feature which allows pedestrians and vehicles to cross the tracks safely. The top speed of LRT is usually about 50-60 mph (80 to 95 kph). However, because light rail operations generally involve frequent stops and some traffic delays, average speeds (including stops) range between 10 and 22 mph (15 and 35 kph). Examples of Light Rail Transit include: RTD-Denver, TRAX-Salt Lake City and DART-Dallas.

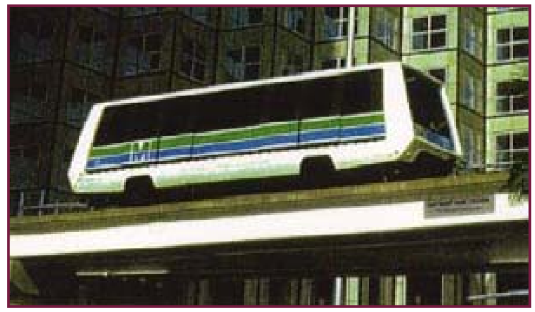
Historic Replica Streetcar Trolley Vehicle

Streetcar - Portland, OR

Streetcar\Trolley:

Streetcars, like LRT vehicles, operate on a fixed guideway and are powered by a single overhead trolley wire. Streetcar vehicles tend to be smaller and are designed for lower speeds (average 10 mph). Streetcars are often grouped together with the LRT technology. However, APTA describes the primary difference between the two modes as one of purpose. Streetcars are designed for local distribution. Typically, they operate in downtown Central Business Districts (CBD) and may stop at every block. While LRT systems in Portland and Denver, for example, perform this circulation function in the downtown, once outside the CBD these systems also provide line haul service to suburban communities. Finally, compared to LRVs, streetcars have lower capital and operations and maintenance costs. Examples of Streetcar systems include: Portland, Oregon; Tampa, Florida; Memphis Tennessee; Tacoma, Washington; San Francisco, California; and Kenosha, Wisconsin.

Automated Guideway Transit Vehicle



Automated Guideway Transit Vehicle - Metro-mover: Miami, FL

Automated Guideway Transit

Automated Guideway Transit (AGT) is a transportation technology, which is fully automated with driverless vehicles operated on fixed guideways with exclusive right-of-way. Self-propelled vehicles or trains use a two-rail guideway system with rubber tires on concrete or steel wheels on rail. Service may be on a fixed schedule or on demand. AGT is more commonly found in non-transit setting like airports or leisure settings. AGT vehicles range between 20 and 55 feet in length, operate singly or in combination with other vehicles, and can accommodate as many as 150 people (some systems accommodate higher capacities). Most AGT systems have capacities of between 5,000 and 15,000 passengers per hour. Examples of Automated Guideway Transit service include: the Miami MetroMover System, Jacksonville Skyway System, Detroit People Mover and the Vancouver, B.C. SkyTrain.

Personal Rapid Transit Vehicles

Personal Rapid Transit - West Virginia University

Personal Rapid Transit (PRT)

Personal Rapid Transit (PRT) systems are small typically low speed systems (25 mph or less) designed to provide personalized service, traveling to the desired stop without intermediate stops at other stations, and requiring an exclusive right-of-way. PRT is distinguished from other forms of AGT systems (such as SkyTrain) by two characteristics: vehicles are sized like taxicabs, and a non-stop ride from origin to destination is possible by having passable or off-line stations. The guideway is typically more expensive than those of conventional systems. The term "rapid" transit in PRT is given to enhance its image, but is technically not justified because this mode does not have the high performance that characterizes rapid transit. The capacity of PRT systems is approximately 5,000 passengers per hour per direction (pphpd) or less.

PRTs are defined as having:

- Fully-automated vehicles capable of operation without humans
- Vehicles operating on small, grade-separated guideway
- Small vehicles with a capacity of one to six people
- Direct, origin-to-destination service, without the necessity of transfers or stops at intervening stations
- Service available on demand, rather than on fixed schedules

Monorail

Monorail is a fixed guideway transit technology consisting of electrically propelled vehicles that are suspended from or straddle a guideway formed by a single beam, rail, or tube. Monorail trains generally consist of permanently coupled cars having suspension, propulsion, and control equipment in common. Electric power is generally picked up by carbon collectors on the bottom of the vehicle (top if suspended monorail) in contact with a bus bar mounted on the side of the guideway beam. Operations and maintenance costs vary according to the level of automation and the required capacity, and are usually higher than conventional grade-separated systems. If fully automated, they are similar in operation to Automated Guideway Transit (AGT) systems but are classified separately due to their unique guideway configuration. Headways as short as 60 seconds are possible. Examples of Monorail systems include: Disney World, Orlando, Florida and the Seattle Monorail (Downtown Seattle).

Table 5-3 identifies typical characteristics of the fixed guideway transit technologies identified above.

Table 5-3
Typical Characteristics of Bus and Fixed Guideway Transit Technologies

	Bus / BRT	Light Rail Transit (LRT)	Streetcar / Trolleys	Automated Guideway Transit	Personal Rapid Transit (PRT)	Monorail
Capital Cost per Mile	\$8 - 25 million	\$25 - \$60 million	\$2 - \$8 million (historic) \$25 - \$30 million (modern)	\$75 - \$100 million	Unknown	\$100 - \$150 million
O&M Cost	\$55 - \$70 per revenue hour	\$175 per revenue hour	\$175 per revenue hour	\$212 per revenue hour	Unknown	\$74 per revenue hour
Service Distance	1 - 30 miles	5 - 20 miles	5 miles or less	1 - 5 miles	1 - 5 miles	1 - 5 miles
Station Spacing	0.25 - 0.50 miles	0.25 - 2.0 miles	0.25 - 0.50 miles	0.25 - 0.50 miles	0.25 - 0.50 miles	0.25 - 0.50 miles
Speeds (Average/Maximum)	8 - 15 mph / 55 mph	20 - 25 mph / 70 mph	8 - 15 mph / 45 mph	8 - 15 mph / 30 mph	8 - 15 mph / 30 mph	30 mph / 70 mph
Service Frequency	15 - 30 min (peak) 30 – 60 min (off-peak)	5 - 10 min (peak) 10 – 20 min (off-peak)	10 - 15 min (peak) 30 – 60 min (off-peak)	1 -10 min (peak) 5 -20 min (off-peak)	1 -10 min (peak) 5 -20 min (off-peak)	5 -10 min (peak) 10 -20 min (off-peak)
Vehicle Capacity	30 - 75 seated (plus standees)	32 - 90 seated (plus standees)	16 -60 seated (plus standees)	30 - 100 seated	2 - 6 seated	30 seated
Sample Systems	LYNX Downtown LYMMO, Ottawa, Las Vegas, Los Angeles, Boston	RTD - Denver, TRAX - Salt Lake City, DART - Dallas	Portland, San Francisco	Miami Metrorail, Detroit People Mover, Jacksonville Skyway	Several demonstration projects under study, some small test tracks constructed	Seattle Monorail, Las Vegas Monorail, Walt Disney World Monorail

Technology Evaluation

This section describes the technical evaluation of each of the candidate technologies identified in the aforementioned paragraph (Bus, BRT, Light Rail, Streetcar, AGT, PRT and Monorail). These technologies were reviewed and evaluated for potential application for the Downtown Orlando area transit circulator system. Evaluation criteria for initial screening of technologies are listed below. Technologies advanced from the initial screening will be analyzed further under a future Alternatives Analysis.

Evaluation Criteria

Deciding on an appropriate transit technology involves the evaluation of a multiple factors. The following evaluation criteria have been identified for the initial screening of transit technologies:

- ***Expandability*** refers to the ability of the technology to be expanded with respect to performance and physical size. This criterion addresses a technology's flexibility to change when conditions change. When an area grows rapidly, what resources are required to add capacity? In addition, in areas requiring service, can new stations be added or can the existing line be extended without significant impacts on the environment or budget?
    - Expandability (critical criterion)
        - ◊ Low degree of flexibility for system expansion, high costs or high lost of initial investment associated with extensions,
        - ◊ Medium degree of flexibility for system expansion, moderate costs or moderate level of lost investment, and
        - ◊ High degree of flexibility for system expansion, low expansion costs with little or no lost investment.
- ***Speed*** refers to the ability of the technology to provide relatively quick and efficient service. Obviously in an urban setting, transit vehicles are not able to take advantage of their maximum speed. Technologies with fast acceleration and deceleration rates, however, are able to move passengers efficiently through the urban fabric. Another factor that influences speed is the configuration of the alignment. Alignments with tighter turns reduce the overall speed of the vehicle. Technologies with lower minimum turning radii are able to maintain greater speed into turns, thereby decreasing the overall travel time.
    - Speed (critical set of criteria)
        - ◊ Acceleration Rate (higher is better)
        - ◊ Deceleration Rate (higher is better)
        - ◊ Minimum turning radius (lower is better)
- ***Capacity*** refers to the number of passengers that can be carried on a transit service. In this context, capacity has several dimensions. First, the number of seated and standing passengers that each vehicle can carry is one dimension. Second, whether vehicles can be coupled together to increase overall capacity is another dimension. Finally, the third dimension is the technology's ability to operate at frequent service headways. More frequent service increases a technology's capacity. Within these dimensions, a theoretical capacity can be estimated for each technology and compared across the options.
    - Capacity: Carrying capabilities of the technology.
        - ◊ Passengers per unit (car)
        - ◊ Number of units (cars) per vehicle (train)
        - ◊ Passengers per hour per direction (PPHPD)
        - ◊ Minimum operational headway (travel interval between vehicles)

- ***Right-of-way*** refers to the amount of land that is required to operate the service. For example, LRT operating in an exclusive right-of-way would require the amount of land that is normally needed either for single or double track operation. For technologies using an elevated guideway, the right-of-way requirements would be significantly less. Generally, aerial structures in most cases require only the footprint of right-of-way needed to place the footer of the vertical support beams of the system.

    - Right-of-way (ROW): Space requirements of each technology.
        - ◊ Single lane ROW requirements (width in feet)
        - ◊ Double lane ROW requirements (width in feet)
        - ◊ Application (aerial, at-grade or sub-grade)
        - ◊ Type of ROW (exclusive, dedicated, in-street, etc.)

- ***Impacts*** refer to externalities caused by the construction and/or operation of the technology. Generally, there are noise, air quality, and visual impacts resulting from almost all transit technologies. Government regulations provide guidelines or standards for acceptable levels of noise and air quality. Visual impacts, on the other hand, require normative or qualitative judgments on whether negative impacts are excessive.

    - Impacts: Technology effects on the local environment (low, medium, high).
        - ◊ Construction impacts
        - ◊ Visual impacts (structure size)
        - ◊ Noise impacts of operation
        - ◊ Air Quality impacts

- ***Costs*** can be separated into capital and operations and maintenance (O&M) costs. Capital costs are those expenditures associated with implementing the technology such as vehicles, track infrastructure, and station costs. O&M costs refer to expenditures needed to operate the service including labor (salaries), maintenance of equipment, and fuel.

    - Cost: Capital and O&M (critical set of criteria)
        - ◊ Capital costs per mile of alignment (structures, stations, systems)
        - ◊ Capital costs for vehicles
        - ◊ Annual O&M costs

- ***Reliability/safety*** should be one of the most important criteria for any technology assessment. Transit technologies in the research and development stage should not be considered for revenue service. While the promise of a new technology can be seductive, practical considerations must weigh heavily on any decision. It is essential that the selected technology be available off the shelf, proven in revenue service in other markets, and meets all safety guidelines at the local, state, and federal level.

    - Reliability and Safety: Is the technology proven? (critical set of criteria)
        - ◊ Proven technology (number of systems in operation, number of years in service, number of suppliers)
        - ◊ Reliability (percentage of time vehicles are available for service)
        - ◊ Additional safety features (ATP, ATO, ATS, etc.)

- ***Economic Development Impacts*** are very important in the evaluation of alternative transit technologies and alternative alignments. The Federal Transit Administration has included economic development impacts to the list of project justification criteria in the evaluation of New Starts projects (i.e., Impact of Project on Land Use and Economic Growth). Economic development potential can vary for different transit technologies based on its ability to:

  - Generate growth and development
  - Increase development densities
  - Result in change in development types and land use mixes (e.g., mixed land use versus single land use development)
  - Increase transit oriented development

Evaluation Results

An assessment was performed on each technology based on the performance criteria listed above. The intent of this evaluation was to eliminate technologies that do not meet the minimum requirements of Downtown Orlando transit circulation, or present developmental and financial risks.

Table 5-4 provides an evaluation matrix, comparing and scoring each technology based on the seven evaluation criteria described above. Of the six technologies identified as potential transit modes for Downtown Orlando circulation, Bus (standard and BRT), Streetcar and Light Rail Transit score the highest and are the most applicable for Downtown Orlando. Monorail, Personal Rapid Transit (PRT) and Automated Guideway Transit (AGT) all present significant impacts related to capital costs, visual impacts and accessibility (due to elevated alignment requirement) and are not recommended. Additionally, PRT presents significant limitations related to passenger capacity, reliability, safety (unproven technology on a large scale), and unknown costs.

Table 5-4
Transit Technology Evaluation Results

Evaluation Measures	Bus (incl. BRT)	LRT	Streetcar	AGT	PRT	Mono-rail
Expandability	++	+	+	-	-	-
Speed	-	++	++	-	+	+
Capacity	-	++	++	++	- -	+
Right-of-Way Required	+	-	-	-	-	+
Impacts (Overall)	+	+	+	- -	- -	- -
Costs (both Capital and O&M)	++	-	+	- -	- -	- -
Reliability & Safety	+	++	++	++	- -	+
Total Score	+	++	++	+	-	-
Applicable Technologies	Yes	Yes	Yes	No	No	No

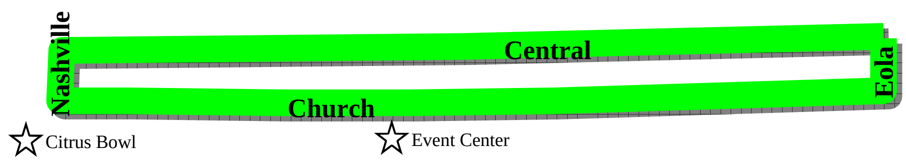
Scale:
- = Low Performance
- = Low to Medium Performance
+ = Medium to High Performance
++ = High Performance

5.6 Transit Circulator Alternatives

The Downtown transportation planning effort includes an evaluation of potential transit circulators that would be either expansion of the LYMMO system or independent, but coordinated transit service. Within this context, four corridors were identified as viable for transit circulators within Downtown – with two corridors being east-west in orientation and two corridors in a north-south orientation.

Circulator Alignments

East-West Corridors

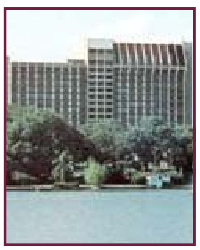


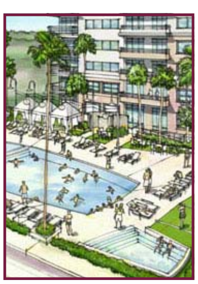
The Thornton Park-Citrus Bowl loop runs counter clockwise on Central Boulevard and Church Street from Nashville Street (near Citrus Bowl to Eola Park Drive.

Thornton Park—Citrus Bowl

The **first** east-west circulator would operate on Church Street and Central Boulevard. This proposed circulator would operate westbound on Central Boulevard from Summerlin Avenue to Parramore Street, south on Parramore Street to Church Street, east on Church Street to Summerlin Avenue, thence north to Central Boulevard. An extension of this service would connect from Parramore Street to Nashville Street west of Orange Blossom Trail, turn south on Nashville Street to Church Street, then continue east on Church Street to Parramore and continue east as previously described. This circulator would operate predominantly in mixed traffic (with automobiles) using the existing travel lanes in the roads.



This east-west alignment would connect the downtown neighborhoods of South Eola, Holden/Parramore, Callahan, and Thornton Park while providing direct service to :

- The Orange County Administration Center
- Orange County Human Resources
- Digital Arts Media Center
- The Mad Cow Theatre
- The Embassy Suites Hotel
- The Farmers Market (Saturday mornings)
- Orange County Public Library
- Heritage Square Park
- Lake Eola Park
- FAMU College of Law
- Orlando Tower (Wachovia Bank)
- Hughes Supply headquarters
- Orlando Police headquarters
- UCF Downtown Ying Academic Center
- Valencia Community College Administration
- Church Street Station
- Suntrust Center
- Orange County Tax Collector and Property Appraiser
- The Waverly
- Capital Plaza I and II
- City Centre
- Orange County Regional Historic Center
- One South Orange
- One North Orange
- City View
- Regions Plaza
- Westin Grand Bohemian
- Solaire at the Plaza
- St. Paul's Lutheran Church
- 100 Eola
- Colonial Bank

- Post Parkside
- 530 East Central.

In addition this alignment would also serve a number of developments that are in planning or construction. These would include:

- The Performing Arts Center
- The Events Center (New Arena)
- Citrus Bowl
- Parramore Heritage Central Park and Pond
- BBIF Building/Carver Theater
- The Esplanade
- Marketplace at SunTrust
- 55 West on the Esplanade
- The U. S. Federal Courthouse
- Premier Trade Plaza
- Capital Plaza III
- Eola and Church
- Paramount on Lake Eola
- Tradition Towers
- The Sanctuary
- The Jackson
- Thornton Commons
- Eola and Church
- Paramount on Lake Eola
- Orlando Lutheran Towers
- Star Tower Condominiums

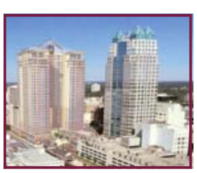
This circulator would therefore provide service to areas with the most population and employment densities in Downtown Orlando.

This alignment would connect to the existing LYMMO route on Magnolia Avenue, and would utilize the existing LYMMO lane for eastbound travel on Church Street between Orange Avenue and Magnolia Avenue. It would also connect to the potential Commuter Rail Station to be located on the CSX rail corridor near Church Street, enhancing access to Downtown destinations for commuters.



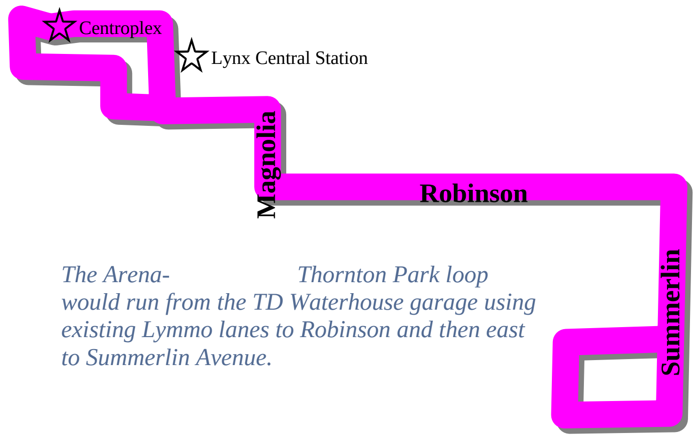





This circulator can be easily implemented with a bus technology given its proposed operations on existing streets. This circulator would not require significant modifications to the existing streets or signal systems. Traffic signals that already exist at the four left turn movements of this circulator could be modified to facilitate the left turn movements of the circulator. A streetcar operating in mixed traffic could also be accommodated along this route, however, crossing the active CSX rail would present significant difficulties and cost most notably due to safety liability and measures to ensure positive stop control for streetcars crossing the tracks when freight or commuter rail is present or approaching.

Existing Arena (Creative Village) to Thornton Park



The Arena-Thornton Park loop would run from the TD Waterhouse garage using existing Lymmo lanes to Robinson and then east to Summerlin Avenue.

The **second** east-west corridor would extend the existing LYMMO system to the east from North Magnolia Avenue to the Downtown neighborhoods of Thornton Park and South Eola. The portion of the existing LYMMO route that would be part of this circulator would include the northbound lane on Garland Avenue, west on Amelia Street, south through the garage at Orlando CentroPlex, east on Alexander Place, south on Hughey Avenue, east on Livingston Street and south on Magnolia Avenue. The eastern extension of this circulator would begin at the intersection of Magnolia Avenue and Robinson Street. At that location the circulator would travel east on Robinson Street, south on Summerlin Avenue, west on Church Street, north on Osceola Avenue, east on Central Boulevard, north on Summerlin Avenue, and west on Robinson Street to Magnolia Avenue where it would rejoin the LYMMO route northbound. This circulator would operate in the LYMMO exclusive lanes and in mixed traffic outside of the LYMMO system.

This east-west alignment would connect the Downtown neighborhoods of Lake Eola Heights, Thornton Park, and South Eola, Callahan, and Lake DOT while providing direct service to:

- TD Waterhouse Centre
- Downtown Recreation and Tennis Centre
- Bob Carr Performing Arts Centre
- Orange County Public Schools Education Center
- Orlando Technical Center
- SAK Comedy Lab
- Orlando Marriott Downtown

- UCF School of Film & Digital Media
- LYNX Central Station
- Orange County Public Defender
- Orange County Court House
- Orange County Civil and Traffic Court
- Bank of America Building
- Downtown Post Office
- One East Robinson
- EO Inn
- Howard Middle School
- Veranda B & B
- One Landmark Centre
- Two Landmark Center
- Day Building
- Reeves House
- Lowndes, Drosdick, Doster, Kantor & Reed, P.A.
- Thornton Park Shopping District
- Thornton Park Central
- Baptist Terrace
- 530 East Central
- Post Parkside
- St. James Cathedral School.

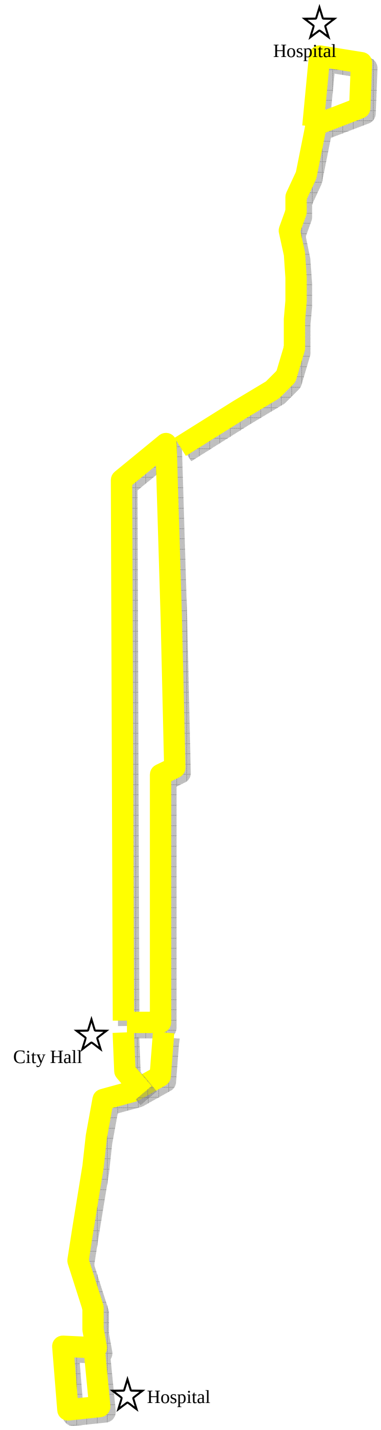
In addition this alignment would also serve a number of developments that are in planning or construction. These would include:

- 400 North Orange
- The Vue at Lake Eola
- 217 North Eola
- The Sanctuary
- The Jackson
- Thornton Commons
- Eola and Church
- Paramount on Lake Eola
- Orlando Lutheran Towers
- Star Tower Condominiums

This circulator would therefore provide service to areas that would include residential, employment and entertainment in Downtown Orlando. With its use of the existing LYMMO route, this circulator would also connect to the potential Commuter Rail Station to be located on the CSX at LYNX Central Station, enhancing access to Downtown destinations for commuters.

This circulator can be easily implemented with a bus technology given its proposed operations on existing streets. This circulator would not require significant modifications to the existing streets or signal systems. Traffic signals that already exist at the four left turn movements of this circulator could be modified to facilitate the left turn movements of the circulator.

The next level of study on this circulator should include further analysis of the southeast loop in South Eola. This analysis should include an assessment of alternative routes and schedule options to avoid roads that have significant traffic delays during peak hours. For instance, Eola Drive could be used as a southbound alternative to avoid delay on Summerlin Avenue in the afternoon peak travel hours. Similarly, there could be a benefit in moving the south end of this loop to South Street, which could extend the service area of this circulator and the other east-west loop through transfers with this one.



The North-South loop consist of two systems, the Downtown-Uptown loop running from South Street to Weber Street on Orange Avenue and Magnolia Avenue, and a second interlined system running from Orlando Regional Medical Center to Florida Hospital. The hospital connections are on new road-way alignments for Lucerne Terrace to the south, and Alden Road to the north.

North-South Corridors

Two north-south transit circulators (Yellow Lines) are proposed as a means of connecting to the Florida Hospital complex north of Downtown and the Orlando Regional Healthcare complex south of Downtown.

North Extension

The extension to the north would comprise two distinct elements. The first element would be an extension of the LYMMO system to the north in exclusive lanes.

This extension has been considered in two alternate circulation patterns, flowing either counter clockwise with the direction of existing traffic flow on Magnolia Avenue and Orange Avenue or flowing clockwise with exclusive lanes on Orange Avenue and Magnolia Avenue for the transit vehicles to travel against the one-way flow of traffic on these roadways (contra-flow).

The contra-flow version of this extension would begin at the intersection of Livingston Street and Orange Avenue. Beginning at this intersection, the northbound movement would be in a median or physically separated contra-flow lane (against traffic) on the east side of Orange Avenue and on the west side of Magnolia Avenue, and would cross between northbound and southbound directions using Livingston Avenue on the south side of the Orange County Courthouse. Modifications will be required at all locations that the circulator must turn and at locations where automobiles would turn across the circulator.

These modifications may require additional lanes at the SR 50 intersection that could impact automobile service levels during peak times. In anticipation of this conflict, a second alternative has been conceived running the circulator in the direction of existing traffic flow on Magnolia Avenue and Orange Avenue. The circulator would operate in mixed traffic along the median (or left-most) travel lanes.

The second element of this circulator would be a continuation of service north Weber Street to the realignment of Alden Road north to Princeton Street, then across Princeton Street on Alden Road to Rollin Street, east on Rollins Street to Camden Street, then south on Camden Street to Princeton Street . This portion of the circulator around the hospital and science center would operate in mixed traffic.

This north-south alignment would provide service to:

- Orange County Public Defender
- Orange County Court House
- Orange County Civil and Traffic Court
- LYNX Central Station
- Bank of America
- Orlando Sentinel
- Bell South
- Marriott Courtyard
- Uptown Place
- Park North at Cheney Place
- One Orlando Centre (Wachovia Bank)
- Dr. Phillips Center for the Performing Arts
- Orlando Regional Chamber of Commerce
- Radisson Plaza Hotel
- Gateway Center
- Ivanhoe Row
- Orlando Science Center
- Loch Haven Park
- Florida Hospital

In addition this alignment would also serve a number of developments that are in planning or construction. These would include:

- 400 North Orange
- The Magnolia
- Offices at Park Lake
- Magnolia Park
- North Orange
- Sky Towers
- Camden Orange Court
- 801 North Orange
- The Ivanhoe
- OUC/Lake Highland
- Hughes Kitchen & Bath Collection Showroom

This circulator would provide connections to the commuter rail station at LYNX Central Station and at Florida Hospital.

South Extension

The extension to the south would begin at the intersection of Magnolia Avenue and South Street with a southbound movement on Magnolia Avenue through the site of the Performing Arts Center and south across Anderson Street., continuing beneath the SR 408 then turn west toward Lucerne Circle, south on the realigned Lucerne Terrace, west on Copeland Drive, south on Sligh Boulevard, east on Miller Street, and then north back on Lucerne Terrace back to Orange Avenue. At Orange Avenue it would turn north and run contra flow to Orange Avenue on the east side of the roadway up to South Street where it rejoins the Downtown-Uptown Loop. This north-south alignment would provide service to:

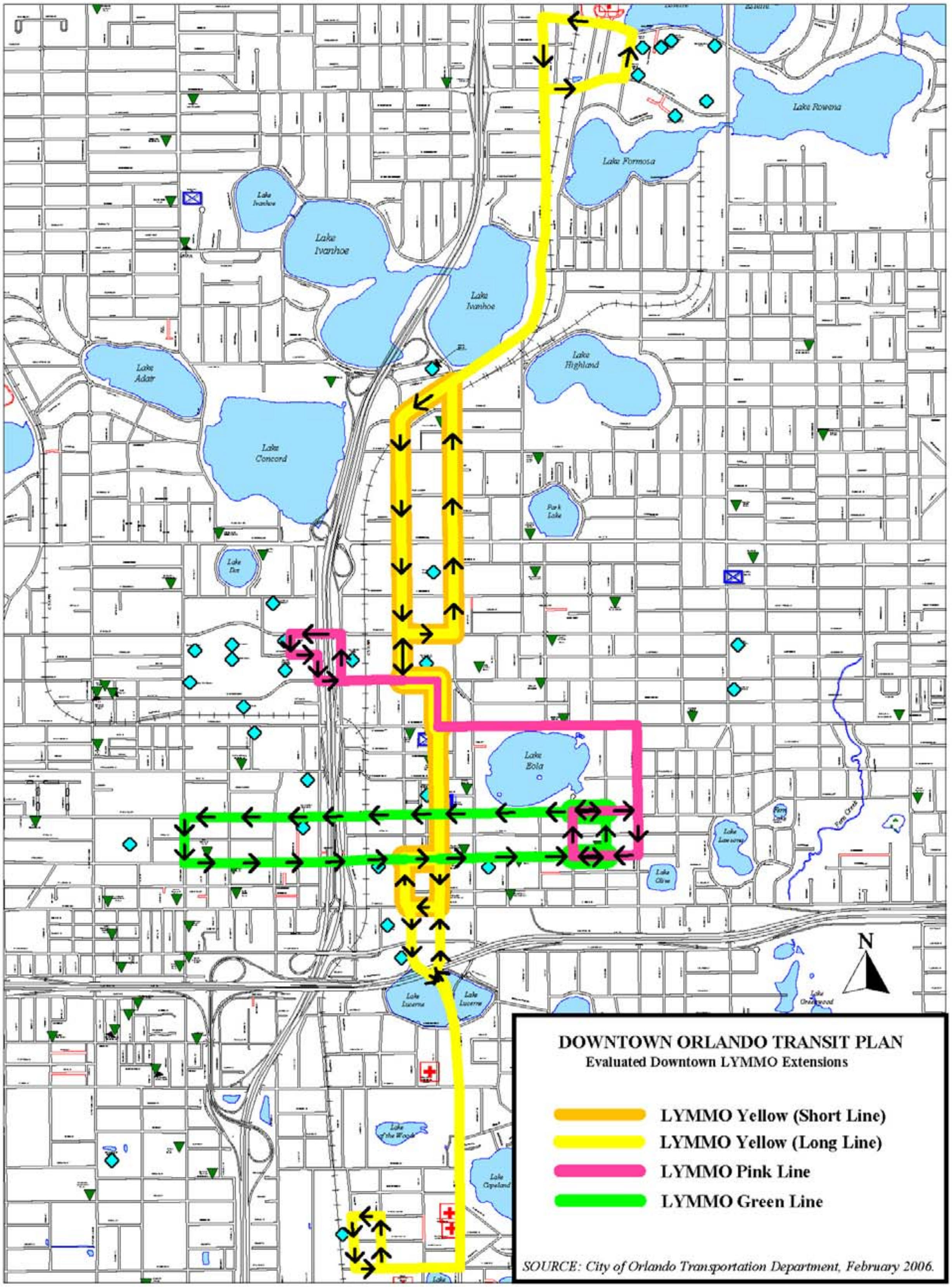
- Orlando Utilities Commission
- Orlando Cloisters
- Banco Popular
- Marriott Courtyard at Lake Lucerne
- Orlando Regional Medical Center.

In addition this alignment would also serve a number of developments that are in planning or construction within the Orlando Regional Medical Center. It would also provide a connection to commuter rail and AMTRAK at the AMTRAK station which is on the western edge of the Orlando Regional Medical Center.

Circulator Operations

These four transits circulators would provide significant mobility within and among Downtown Orlando neighborhoods while enhancing connectivity to regional commuter rail service. Within that context, the operations of these circulators are proposed to have a high frequency so that a high level of service is provided.

Figure 5-9
Downtown Orlando Transit Plan Transit Circulator Alignments



The North-South Circulators would operate as two separate routes.

1. The first circulator route would combine the portion of LYMMO south of Livingston Street with the portion of the north extension that is in exclusive lanes.

2. The second circulator route would include all of the north-south alignment between Florida Hospital and the Orlando Regional Medical Center.

During peak hours both of these circulators would operate on 8-minute headways, which would result in 4-minute headways on the exclusive lane portion of the alignment. The east-west alignments would also operate on 8-minute headways during peak hours.

Two distinct East-West Circulators (described above) would be operated.

1. Church Street / Central Boulevard Circulator

2. Livingston Street / Robinson Street / Lake Eola Circulator

Figure 5-9 illustrates the proposed circulators.

Table 5-5
Assumed Hours of Operation for Circulator

Weekday	❖ Early Morning: 6:00 AM to 7:00 AM ❖ A.M. Peak: 7:00 AM to 9:00 AM ❖ Midday: 9:00 AM to 11:00 AM and 1:20 PM to 3:30 PM ❖ Midday Peak: 11:00 AM to 1:20 PM ❖ P.M. Peak: 3:30 PM to 5:50 PM ❖ Evening: 5:50 PM to 10:00 PM (12:00 AM on Fridays)
Saturdays	❖ Morning / Midday: 10:00 AM to 6:00 PM ❖ Evening: 6:00 PM to 12:00 AM
Sundays/ Holidays	❖ Morning / Midday: 10:00 AM to 6:00 PM ❖ Evening: 6:00 PM to 10:00 PM

Table 5-6
Downtown Orlando Transit Circulator Operations Requirements

Route Patterns	From/To	Day	Frequency			Vehicles		Annual	
			Peak	Non-Pk	E/L	Peak	Total	Veh-Miles	Veh-Hrs
Yellow Long	Florida Hospital to ORMC	M-F	8	10	10	10	12	257,000	19,000
		Sat	n/a	10	10			39,300	2,900
		Sun	n/a	10	15			33,400	2,400
Yellow Short	Orange/Magnolia to South Street	M-F	8	10	10	5	6	91,400	9,500
		Sat	n/a	n/a	n/a			0	0
		Sun	n/a	n/a	n/a			0	0
Green	Central/Church from Sum-merlin to Parramore	M-F	4	5	10	6	7	130,600	10,500
		Sat	n/a	10	10			11,400	1,100
		Sun	n/a	10	15			9,700	900
Pink	Arena to Summerlin/ Church	M-F	4	5	10	10	12	180,800	16,700
		Sat	n/a	10	10			15,700	1,500
		Sun	n/a	10	15			13,400	1,300
ESTIMATED ANNUAL TOTALS:						31	37	782,700	65,800

5.7 Transit Circulator Operating Plans

Service Levels & Operating Requirements

Transit circulator service plans have been developed for each of the circulator alignments identified in **Figure 5-9** Four route patterns serving the North-South and East-West alignments have been identified as:

1. North-South Long (Yellow Line) – Florida Hospital to Orlando Regional Medical Center
2. North-South Short (Yellow Line) – Orange/Magnolia to South Street (City Hall)
3. East-West Central (Green Line) – Central/Church from Summerlin to Parramore
4. East-West Robinson (Pink Line) – Arena to Summerlin/Church

Assumed hours of operation for circulator are shown in **Table 5-5**.

Table 5-6 identifies assumed operating frequencies, days of service, peak and fleet vehicles and annual vehicle miles and hours of service. The North-South Long route pattern and both the East-West route patterns are proposed to operate seven days a week, while the North-South Short route pattern would only operate weekdays only (i.e., accommodating peak travel flows). A total of 31 peak vehicles and 37 fleet vehicles (assumes a 20 percent spare ratio) are required to operate the circulator system. The complete system would operate 782,700 annual revenue vehicle miles and 65,800 annual revenue vehicle hours of service.

Station/Stop Locations

Circulator stations / stops are assumed to be located approximately 600 feet apart and would generally be located on the far-side of crossing intersections. Existing LYMMO stations and stops would remain as is and new stations / stops would be located along the proposed new alignments. Station / stop locations would vary in the level of passenger amenities (much like the existing LYMMO station / stop locations), with some locations having passenger shelters, benches and information kiosks, while others would only have a stop sign and limited seating. Stop level amenities would be dependent on rider use, right-of-way availability and surrounding land uses.

Transit Technology Assumptions

Based on the transit technology assessment, the following three transit technologies are considered for further analysis in an alternatives analysis phase of project development:

- Bus (including standard bus and bus rapid transit applications),
- Streetcar, and
- Light Rail Transit (LRT)

Each transit circulator alignment presents characteristics which would require unique solutions in order to apply each transit technology. Examples of alignment characteristics and transit technology application requiring special attention include: limited turning radii; limited lane widths; transit technology right-of-way requirements; curbside parking; turn lanes (across alignment path); access / egress from parking facilities and local businesses; intersection traffic control devices (traffic signals, stop signs, etc.); automobile, bicycle and pedestrian conflicts; and exclusive versus non-exclusive right-of-way.

Travel Times

Alignment travel times have been developed using general transit technology performance. Operating plan requirements (e.g., revenue service hours) are driven from overall alignment travel times. Improvements to alignment travel speeds results in reductions in operating requirements and ultimately capital (vehicles required) and annual operating and maintenance (O&M) costs. Additionally, signal modifications such as signal prioritization and pre-emption would result in reduced overall alignment travel times. At this phase of project development travel times have been estimated using a conservative approach, assuming no signal prioritization or pre-emption, no queue jumper lanes, and shared right-of-way use with general traffic.

Ridership Projections

The alternative circulator alignments discussed were evaluated for potential ridership using the 2025 OUATS travel demand model. The model was updated to reflect the future expanded Lynx fixed route bus service and includes the planned roadway improvements contained in the METROPLAN ORLANDO 2025 Cost Feasible Plan. This includes I-4 improvements and associated network improvements Downtown. The model also includes the 2025 land use data updated to reflect the City's Growth Management Plan 2004-2030 Growth Projections Report for the study area traffic zones. Future ridership performance for the following proposed circulators have been evaluated:

- LYMMO "Orange" Line - North/south free circulator service between Uptown Orlando and Orlando City Hall. – 6,974 Riders/day.
- LYMMO "Yellow" Line - Hospital-to-Hospital free circulator service between Florida Hospital (north) and Orlando Regional Medical Center (south). - 6,922 Riders/day.
- LYMMO "Pink" Line - East/west free circulator service between the Orlando Arena and Thornton Park. - 5,405 Riders/day.
- LYMMO "Green" Line - East/west free one-way circulator service between Church Street/Division Avenue area and Thornton Park.—8,722 Riders/day.

These proposed circulators were assumed to operate replacing the existing LYMMO service and expanding its actual free coverage from north to south and from east to west within the Downtown Orlando study area. The circulators were coded into the model using the LYMMO mode which assumes transit signal priority and bus operating characteristics for vehicle performance and run-time speeds. The actual type of system will be evaluated in subsequent studies to evaluate alternative technologies, however, it is assumed that the likely system will be rubber tire bus, rail streetcar, or light rail transit. Note, premium transit mode characteristics have not been assumed in the ridership projections.

The ridership projections were tested within the model individually as discreet systems and then together as a network. As expected, when running together the individual ridership on each line diminishes due to market area competition between the routes. However, the total ridership for the system is estimated at 22,100 Riders/day by year 2025.

Average Weekday Ridership Methodology

Because the FSUTMS model does not provide a direct output weekday transit riders, the first task was to estimate weekday average ridership for all of the proposed circulators using a consistent methodology for performance comparison purposes.

Transit passenger trips from model output files are reported for a "peak" and for an "off-peak" period. According to the model, the "peak" period represents a two-hour, work-related (7:00 AM - 8:59 AM) interval, while the "off-peak" period represents a seven-hour, non-work related (9:00 AM - 3:59 PM) interval.

However, LYMMO operates between 6:00 AM and 10:00 PM, or sixteen (16) hours during weekdays. No hourly ridership information was available from LYNX for the LYMMO service but they have observed peaks during three periods in a day: AM, Mid-day and PM. Therefore, the following methodology was developed to obtain an average weekday ridership from the FSUTMS passenger trips figures:

- ❖ The passenger trips for the "peak" period from the 2005 FSUTMS model, LYMMO line, (TASSIGN.OUT file) were divided by two (7:00 AM - 8:59 AM "peak" hours) to obtain an hourly number of "peak" period passenger trips.
- ❖ The passenger trips for the "off peak" from the same TASSIGN.OUT file were divided by seven (9:00 AM - 3:59 PM "off peak" hours) to obtain an hourly number of "off peak" passenger trips.
- ❖ The hourly number of "peak" period passenger trips was then multiplied by six (6) hours to represent the actual LYMMO three peak periods of two hours each (AM, Midday and PM).
- ❖ The hourly number of "off-peak" period passenger trips was then multiplied by ten (10) hours, representing the rest of LYMMO actual off-peak periods.
- ❖ Adding the six "peak" period passenger trips and the ten "off-peak" period passenger trips from the 2005 FSUTMS model resulted in 5,313 weekday riders. The actual collected weekday average ridership for the existing LYMMO service in 2005 was 4,360 passengers a day.

- An overall Model Output Adjustment Factor (MOAF) was then calculated, dividing the actual 2005 average ridership from LYNX by the 2005 model output result. This calculation resulted in a MOAF coefficient of 0.821 (4,360/5,313=0.821). The MOAF coefficient has the overall effect of "smoothing" the hourly riders curve to match the existing weekday ridership figure without knowing the actual hourly numbers.

- Dividing the 4,360 LYMMO weekday riders by sixteen hours of operation results in an average of 272.5 riders per hour (not considering "peak" or "off-peak" periods). The methodology described above produced 431 "peak" riders and 177 "off-peak" riders per hour from model outputs.

Therefore, based on the actual and simulated numbers observed, the methodology described above was considered consistent and appropriate for the purpose of comparing future circulators performance with the existing LYMMO service.

Other Alignment Options

Additional alignment options for expanded transit service should be explored within the context of the four routes described. These options should consider the potential development effects that may be achieved with improved transit service and should reinforce strategies for transit supportive development. Other options include the following:

Alden Road Corridor

The Alden Road corridor may be the preferable route for transit service from Uptown to the Florida Hospital, Orlando Museum and John Young Science Center. The Alden Road corridor was the recommended corridor for the proposed Light Rail System. This option avoids crossing the CSX rail and runs parallel to CSX to the south and east. This alignment option would also use Weber Street to connect between north-south service on Orange Avenue and Magnolia Avenue, and would require new right-of-way for the alignment to connect to Highland Avenue where Alden Road would be extended to connect with Highland Avenue. Lake Highland Drive would be realigned to form a new intersection with the extended Alden Road. At Virginia Avenue the corridor should consider using Philadelphia Avenue instead of Alden Road in order to provide better separation from the CSX corridor and enable potential transit supportive development between CSX and the circulator alignment. If feasible, this corridor would be preferred to using Orange Avenue in order to avoid traffic disruption along Orange Avenue, impacts to on street parking and delay conflicts at the CSX rail crossings.

Lucerne Terrace Corridor

The extension of the circulator from Anderson Street to ORHS should consider creating a new corridor by using Lucerne Terrace for north-south service. Lucerne Terrace does not connect entirely through this alignment and would require realignment of existing roadways to complete the connection. This corridor could be extended further south to the SODO development and provide a new parallel transit corridor to existing Orange Avenue. If feasible, this corridor would be preferred to using Orange Avenue in order to avoid the traffic disruption on Orange Avenue and potential impacts to on-street parking.

Extension to Citrus Bowl

The east-west circulator route along Church Street and Central Boulevard should consider further extension to the west of Orange Blossom Trail. This extension should consider redevelopment opportunities associated with joint use development potential for event parking that can also serve as remote public parking for the Downtown core. Additional development amenities with the structured parking could also serve to attract mid-day and evening trips using transit outward from the core to the Citrus Bowl depending on the types of development and activities planned for the area

Future LYMMO Ridership

According to historical trends, LYMMO ridership has been fairly stable between 1997 and 2005, with an average of approximately 4,000 - 5,000 weekday riders. However, a number of new Downtown projects are under construction and the LYMMO ridership is expected to increase by 2025.

Year 2025 LYMMO ridership was estimated using the described methodology as a performance benchmark for future Downtown circulators but considering the relative flat historical growth trend in eight years (1997-2005).

The previously described approach was used to estimate the 2025 LYMMO ridership from model outputs. The socioeconomic data for all of the traffic zones adjacent to the existing LYMMO service was modified to reflect 2025 land uses. The percent expected growth between 2005 and 2025 reflects a 247 percent increase of residential units and a 36 percent increase in employment.

The 2005 and 2025 boarding and alighting trips by stop location in the model and by peak/off-peak periods are provided in **Appendix 5-A.** The estimated 2025 average weekday ridership for the existing LYMMO is projected at 7,069 riders per day, or an estimated 62.1 percent growth when compared with 2005 ridership. This growth includes the maximum effect of all of the proposed developments adjacent to the existing LYMMO service line. However, when more transit services are serving the same metropolitan area it is expected that the "pool" of passenger trips for transit will be shared among those new routes, somewhat reducing the maximum effect of the adjacent residential and employment growth to the existing LYMMO route. Considering the relative flat historical growth trend in the last eight years (1997-2005), a lower 2025 LYMMO estimated average weekday ridership may be realistic.

Proposed Downtown Circulators Performance

The proposed circulators described before were coded combined and separately into the 2025 FSUTMS model to test the impacts on system ridership. As mentioned before, when more circulators are serving the same area it is expected that less riders per service will be recorded because the "pool" of passenger trips will be further divided.

The first test was to run all of the proposed circulators simultaneously, replacing the existing LYMMO service but utilizing the existing LYMMO infrastructure and additional public roadways. (Note: Other alignment options for north/south service consider using existing LYMMO lanes on Magnolia Avenue for northbound travel only and providing LYMMO service on southbound Orange Avenue. The result of this alternative will be similar using the travel demand model due to the close proximity of the northbound and southbound routes relative to the model zone structure.) It was assumed that the same fare structure (free for circulators and existing fares for surface buses) and operating hours would apply for the proposed circulators. A peak service of four (4) minutes headway and five (5) minutes headway for the off-peak service was tested. The LYMMO Orange Line was interlined with the LYMMO Yellow Line to achieve the four minutes peak service headway and five minutes off-peak service headway for the overlapping area served by both circulators. However, the overall combined service for the LYMMO Orange + Yellow lines was estimated as 6.5 minutes headway for peak service and 8.1 minutes headway for off-peak service, based on route lengths.

Performance Comparison Summary

Figure 5-10 compares the average weekday ridership of 2005 and 2025 LYMMO service with the proposed future circulators, single and together. The total system daily ridership for all routes combined is approximately 22,100 daily riders. Except for the LYMMO Pink Line service, all of the individual proposed circulators will have a better average weekday ridership than the existing LYMMO service in either 2005 or 2025. The LYMMO Pink Line service would perform just as the existing LYMMO service in 2005.

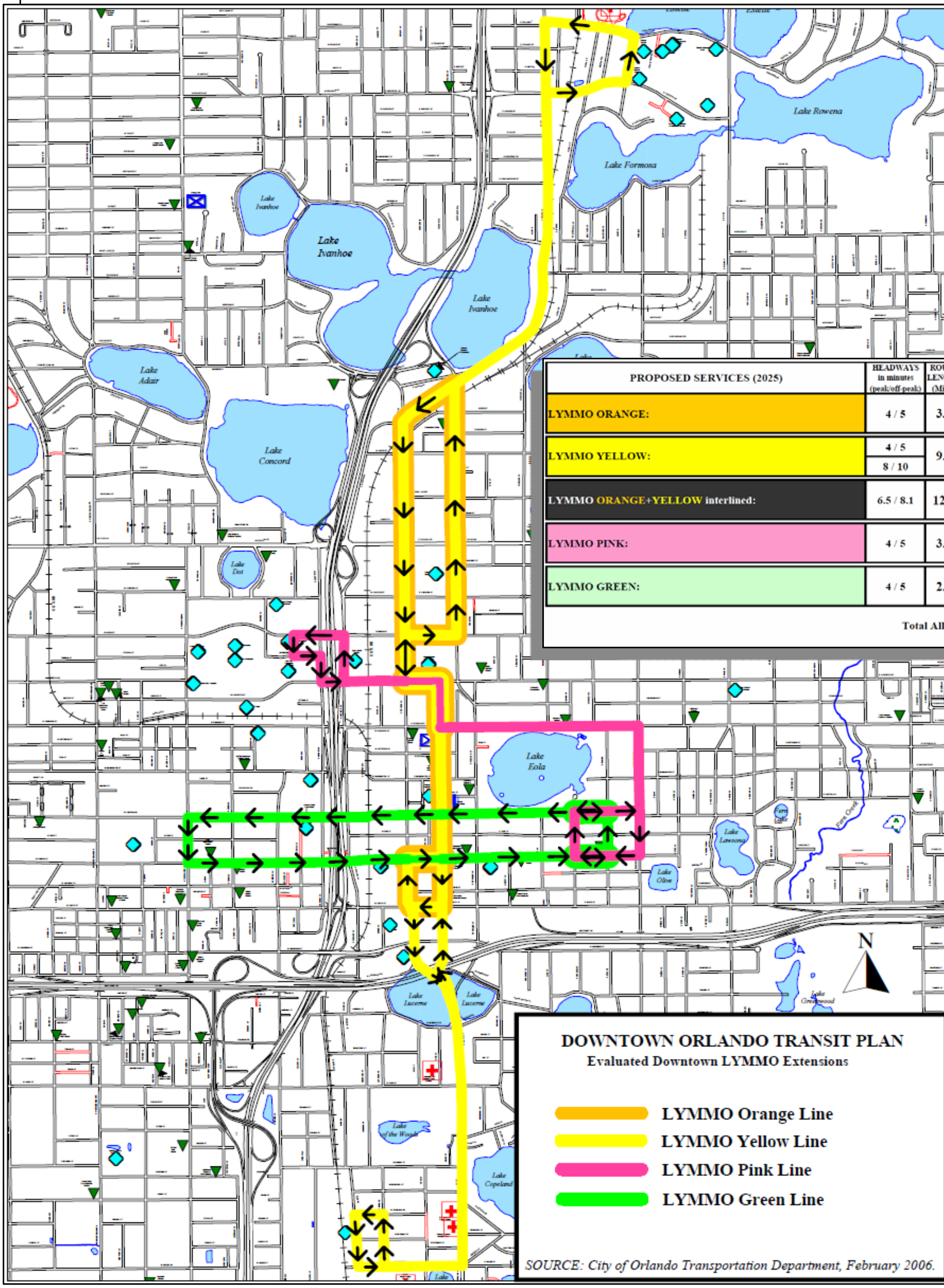
5.8 Transit Circulator Costs

Transit circulator capital and operating & maintenance (O&M) costs have been estimated based on the preferred transit technologies. Capital costs have been estimated using standard industry capital cost estimating procedures for this phase of project development. O&M costs reflect industry average O&M costs associated with each transit technology.

Capital Costs

Capital cost estimation plays a significant role in the evaluation of alternatives for a project. It also plays a key role when comparing the cost-effectiveness of two or more separate projects. Thus, it is important to achieve a high level of confidence in the capital cost estimate. The level of detail achieved at each level of project development increase as projects become more defined and refined. Therefore, capital cost estimation at this level of study effort will be less detailed than that developed at a later stage of project development, such as preliminary engineering or final design. At this level of project development it is appropriate to utilize order-of-magnitude cost estimation. Only a project length (miles in length) is needed to determine order-of-magnitude costs.

Figure 5-10
Projected Daily Transit Ridership 2025



PROPOSED SERVICES (2025)	HEADWAYS in minutes (peak/off-peak)	ROUTE LENGTH (Miles)	Weekday Ridership(*) (Passenger trips/Day)	
			SINGLE	TOGETHER
LYMMO ORANGE:	4 / 5	3.5	6,974	
LYMMO YELLOW:	4 / 5	9.2	13,335	
	8 / 10		6,922	
LYMMO ORANGE+YELLOW interlined:	6.5 / 8.1	12.8		9,797
LYMMO PINK:	4 / 5	3.5	5,405	4,635
LYMMO GREEN:	4 / 5	2.6	8,772	7,691
			Total All Circulators:	22,123

The best yard stick for current capital cost estimation at this level of project development detail is the use of cost estimates for projects in other cities that are in the project development process that propose to utilize the same transit technology. The most comprehensive database of capital costs for other projects in the development process is the FTA New Starts Program. For the purposes of this study effort, FTA New Starts reports for individual transit projects were used to determine order-of-magnitude unit costs. A minimum, average and maximum unit cost was defined from this database. Cost estimates for this phase of project development have been defined for the following four modes: standard bus (low grade bus service investment), bus rapid transit (BRT), streetcar and light rail transit (LRT).

Table 5-7 identifies capital cost estimates for each circulator route alignment by transit technology. At this level of project development, it is assumed that each of the transit technologies can be applied to each of the transit circulator alignments. In some instances, significant engineering and design work would be needed to ensure efficient operations.

Annual Operating and Maintenance (O&M) Costs

Annual O&M costs for each of the transit circulator route alignments have been estimated for the preferred transit technologies using industry standard operating cost per revenue hour. O&M costs for Streetcar (modern version) and Light Rail Transit are very similar when each technology is operated in single car trains or consists. When additional cars are required for either transit technology, and the transit alignment grows in length (generally over 2-3 miles), annual operating costs would begin to vary between the two technologies with LRT costs increasing on a per revenue train-hour basis. For the purpose of this evaluation single car train sets or consists are assumed. It is also assumed that each transit technology can be operated efficiently along each of the transit circulator alignments. **Table 5-8** identifies annual O&M cost estimates.

Table 5-7

Capital Cost Estimates ($2006 millions) by Circulator Alignment & Transit Technology

Route Alignment	Alignment Distance	Transit Technology			
		Standard Bus (1)	Bus Rapid Transit (BRT)	Streetcar	Light Rail Transit (LRT)
North-South Short (Yellow Line)	2.78 miles, 1.74 miles w/o Existing LYMMO	$ 0.87 - $ 2.61 (2)	$ 13.9 - $ 26.1 (2)	$ 69.5 – $ 83.4 (4)	$ 69.5 - $ 166.8 (4)
North South Long (Yellow Line)	6.28 miles, 5.24 miles w/o Existing LYMMO	$ 2.62 – $ 7.86 (3)	$ 41.9 - $ 78.6 (3)	$ 157.0 – $ 188.4 (4)	$ 157.0 - $ 376.8 (4)
East-West Central (Green Line)	2.58 miles	$ 1.29 - $ 3.87	$ 20.64 – $ 38.70	$ 64.50 – $ 77.40	$ 64.50 - $ 154.80
East-West Robinson (Pink Line)	2.49 miles, 1.53 w/o Existing LYMMO	$ 0.77 - $ 2.30 (5)	$ 12.24 – $ 22.95 (5)	$ 62.25 – $ 74.70 (4)	$ 62.25 – $ 149.40 (4)
Order-of-Magnitude Cost per mile ($mil)	--	$ 0.5 – $ 1.5	$ 8 - $ 15	$ 25 - $ 30	$ 25 - $60

Notes:

1. Assumes use of existing street right-of-way, operating in mixed traffic with minimal traffic control enhancements (i.e., low grade signal priority at key intersections only)
2. Assumes the use of existing LYMMO alignment, includes capital costs associated with alignment north of existing LYMMO Alignment
3. Includes only capital costs associated with alignment north and south of existing LYMMO Alignment
4. Assumes reconstruction of portion of the existing LYMMO alignment to install rail.
5. Includes only capital costs associated with alignment east of existing LYMMO Alignment (Magnolia Avenue & Robinson Street.

Table 5-8

Annual O&M Cost Estimates ($2006 millions) by Circulator Alignment & Transit Technology

Route Alignment	Annual Revenue Hours	Transit Technology			
		Standard Bus	Bus Rapid Transit (BRT)	Streetcar	Light Rail Transit (LRT)
North-South Short (Yellow Line)	9.500	$ 0.52 - $ 0.67	$ 0.52 - $ 0.67	$ 1.43 – $ 1.90	$ 1.66 - $ 2.14
North South Long (Yellow Line)	24,300	$ 1.34 – $ 1.70	$ 1.34 – $ 1.70	$ 3.65 – $ 4.86	$ 4.25 - $ 5.47
East-West Central (Green Line)	12,500	$ 0.69 - $ 0.88	$ 0.69 - $ 0.88	$ 1.88 – $ 2.50	$ 2.19 - $ 2.81
East-West Robinson (Pink Line)	19,500	$ 1.07 - $ 1.37	$ 1.07 - $ 1.37	$ 2.93 – $ 3.90	$ 3.41 – $ 4.39
Order-of-Magnitude Cost per Revenue Hour ($mil)	--	$ 55 - $70	$ 55 - $ 70	$ 150 - $ 200	$ 175 - $ 225

5.9 Review of Fare Free Zone Study

In July 2000, LYNX conducted a ***Downtown Orlando Free Fare Zone Study***. This study examined the potential for establishing a free fare zone in Downtown Orlando. Under the free fare zone concept, transit trips that begin and end within the specified zone would not be charged a fare. The assessment included

1. Estimates of potential revenue loss,
2. Estimates of ridership,
3. Identification of zone coverage,
4. Identification of recommended days and hours the service is in effect, and
5. Comparison of alternative approaches to fare collection.

This study was based on a 1996 LYNX On-Board Survey.

The free fare zone assessment considered two options, free fare and a reduced fare ($0.25), as well as two coverage areas: a basic zone (Downtown core) and an expanded zone (extended outside the Community Redevelopment Area). Additionally, this study effort examined three optional time periods for applying the free or reduced fare zone: all-day everyday; off-peak weekday and all-day Saturday and Sunday; and off-peak weekday only. Finally, the following fare collection system options were examined: 1) pay-enter inbound, pay-exit outbound, 2) honor system, 3) proof of payment chit system, and 4) free fare card system.

Since the completion of this study in 2000, major changes have occurred to the transit system as a result of the opening of the Lynx Central Station (LCS) in November 2005. Route changes associated with the opening of the LCS, continued growth in Lynx ridership, and the availability of more current data, have prompted the need to update the original analysis. Specifically, ridecheck data utilized in the year 2000 analysis was based on 1996 on-board survey data (best available at that time). Since that time, LYNX has administered a full system ridecheck survey (Fall 2005 – Spring 2006), providing bus stop level boarding data, by route by day. This new data has been utilized to develop revised revenue impact estimates associated with the implementation of a downtown area fare free zone.

This following sections document the methodology and assumptions that were used to determine the potential revenue impacts from the implementation of a free fare zone in Downtown Orlando.

Fare Structure

Since the completion of the ***Downtown Orlando Free Fare Zone Study,*** LYNX has modified its fare structure to improve customer convenience while increasing fare revenues. The current fare structure utilized in this analysis is as follows:

- Single Ride: $1.50
- Transfers: Free
- Day Pass: $3.50
- 7 Day Pass: $12.00
- 30 Day Passport: $38.00
- Express Route Fare: $2.00

Kids in school (enrolled in grades K-12) and seniors age 65 and older are eligible to pay one-half the standard fare (applies to cash and pass fares).

Free Fare Zone Definition

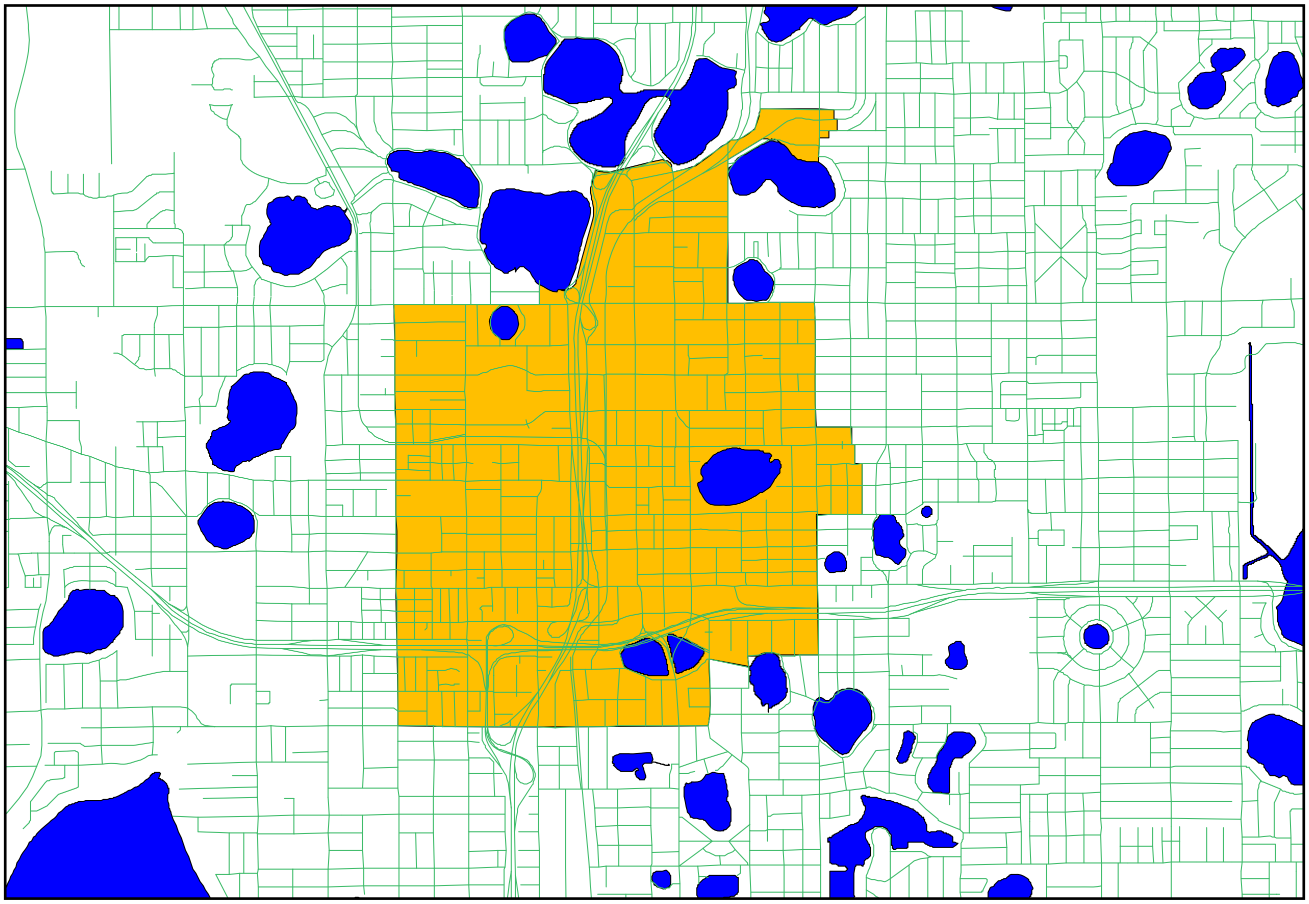
The boundaries of the free fare zone utilized for this analysis are the same boundaries for the Downtown Community Redevelopment Area (CRA). Generally, the zone is bounded by Gore Street on the south, Westmoreland Drive on the west, Colonial Drive on the north, and Summerlin Avenue on the east. On the north end, the boundary protrudes north of Colonial Drive and follows Interstate 4 on the west; South Ivanhoe Boulevard, North Orange Avenue, and Virginia Drive on the north; and Lake Highland Drive and North Highland Avenue on the east. **Figure 5-11** illustrates the boundaries that were used.

Methodology

In order to determine the potential loss in revenue resulting from a free fare zone, an estimate of transit trips with both ends (origins and destinations) in the free fare zone was required. Ridecheck data that were collected for the Comprehensive Operations Analysis (COA) in 2005 were used for this analysis.

The first step involved is identifying those Lynx bus routes that served the free fare zone. A total of 36 routes currently operate with the CRA boundary area. All but one route utilize the LYNX fare structure. The only route that varies from this fare structure is the LYMMO service, which is a free fare service. The second step is identifying transit passenger boardings and alightings within the CRA boundary area that would be eligible for a free fare if this policy were advanced. In order to determine the number of eligible riders, boarding and alighting locations must be determined. Utilizing the recent LYNX COA ridecheck survey database, passenger boarding and alighting locations were identified at all stop locations within the CRA for each route serving the CRA / Downtown area.

Figure 5-11
Free Fare Zone (CRA area)



Free fare riders were determined as follows:

- ❖ On inbound routes (destined for the LCS), passenger boardings that occurred within the free fare zone were counted in the estimate. The assumption was made that these passengers must have alighted the bus when it terminated at the LCS.
- ❖ Outbound routes (leaving the LCS), passenger alightings that occurred inside the free fare zone were counted in the estimate. Once again, a similar assumption was made that passengers alighting within the zone boarded either at the LCS or at another location within the zone

Revenue Impacts

Utilizing the COA ridecheck survey database, the results from the analysis suggest that there were approximately 3,023 transit trips with both trip ends in the hypothetical free fare zone (CRA boundary) in Year 2005. The revenue impact was estimated by using Lynx March 2005 route revenue data. Lynx provided route ridership by fare media and the average fare paid by fare media. Using this fare distribution and the ridership estimates from the COA ridecheck data, the estimate of lost revenue from a free fare zone is approximately $639 during an average weekday or $197,000 annually, assuming an annualization factor of 307.6. This analysis assumes that 0.1 percent had no cash, 50 percent were transfers, and 8.1 percent were free (based on LYNX fare inventory).

Discussion

There are some limitations with using ridecheck data for this type of analysis. The data is not revealing enough to know the exact transfer activity of the passengers. For example, take a hypothetical passenger who boards a route right before it terminates at the LCS. This passenger then alights at LCS and then boards another bus at the LCS and eventually gets off at a stop two blocks away. In the ridecheck data, this passenger's activity would show up as two trips using the accounting method described above — a boarding on the inbound route and an alighting on an outbound route. While this type of trip activity may occur to some extent, it would most likely be carried out by new passengers or those unfamiliar with the system. If a passenger's origin and destination are within the free fare zone, it is probable that a passenger would be knowledgeable of the system to board the correct bus that would take them directly to their desired destination. Nevertheless, the ridership estimates derived here and consequently, the revenue impacts should be considered an upper end estimate of the potential loss in revenue as a result of a free fare zone.

Operations Issues

The following issues influence an effective implementation of a fare free zone from an operations perspective:

- *Free Fare Zone Size* – the size of the zone has a direct impact on the number of potential transit riders that would be eligible for free fare, which impacts the level of interaction / enforcement between the bus operator and transit riders.
- *Time Periods of Free Fare* – should free fare operations occur during limited time periods (e.g., weekday peak periods or weekends only), bus operators would be required to enforce/administer these policies as well as resolve the associated fringe period conflicts.
- *Fare Collection Methodologies / Policies* – four fare collection methodologies were identified above, and each have impacts on the manner in which the transit operator provides transit service to the rider (i.e., how to ride) and the procedures required to effectively and consistently administer such policies (i.e., when fare is collected or not collected and how transit trips are recorded).
- *Fare Collection Equipment* – this equipment would need to be re-programmed to accommodate additional fare categories and require bus operator training to ensure ridership and fare collection is properly recorded.
- *Boarding / Alighting Time* – should fare payment (or free fare) be verified upon alighting the bus (specifically for outbound trips), thus requiring all departing passengers to alight through the front door of the bus, alighting

times would be expected to increase, resulting in additional travel time requirements on outbound trips (at a minimum). Additional travel times may be mitigated by reduced passenger boarding times, however should both these functions occur through the front door of the bus, delays would be expected. Overall, increased travel times associated with a change in fare collection policy may result in increased operating costs.

- *Fare Evasion* – a common problem in all transit systems, can increase under specific fare policies. Fare payment upon passenger departure increases the monitoring function (i.e., level of degree of attention required) currently placed upon the bus operator.

Administrative Issues

The following factors influence an effective implementation of a fare free zone from an administrative perspective:

- *Free Fare Zone Size* – the size of the free fare zone will influence the numbers of existing and potential riders impacted by the free fare policy and will have a direct impact on the manner in which the free fare zone is advertised, how the general public is educated on how to use the system within and around the area, ridership or transit use, levels of fare evasion and degree of revenue loss.
- *Time Periods of Free Fare* – as with the size of the free fare zone, variations in when the zone is effective and when it is not will have impacts on how it is administered, advertised, enforced and how the transit riders are educated to use it.
- *Data Collection and Maintenance* – collecting transit use (ridership) by fare category requires coordination of procedures and policies from the front line staff (bus operator) to data collections to accounting and revenue reconciliation. Procedures will need to be established and consistently followed to ensure proper data collection (use and revenue allocation) and continued maintenance for consistency.
- *Fare Revenue Loss Redemption* – free fare zones by nature are designed to increase transit use and provide improved mobility options for populations within or using transit service within a defined zone or area. The net result however is loss of fare revenues previously collected within the free fare zone. Administrative procedures will need to be established to determine the level of revenue loss associated with the free fare zone policy and methods or sources of funding available to mitigate these revenue losses.

Goals & Opportunities

The purpose and goals for the development of a free fare zone system were identified in the LYNX 2000 ***Downtown Orlando Free Fare Zone Study.*** These goals include the following:

- Improve access to businesses throughout Downtown Orlando,
- Enhance mobility within the Downtown area,
- Encourage transit use by those that currently do not use transit, and
- Provide transit services in the Downtown area that are easy to understand and use.

All of these goals present opportunities for increased transit use and improved the overall mobility of the Downtown area. A Downtown fare free zone would allow area residents the opportunity to make short trips within a defined area without complication, high costs or the need to access their personal automobile (i.e., personal costs and environmental impacts). Opportunities existing within the Downtown area to implement mobility options that are both convenient and low costs, either through free fare zones or through the implementation of fare free transit service (e.g., existing LYMMO service).

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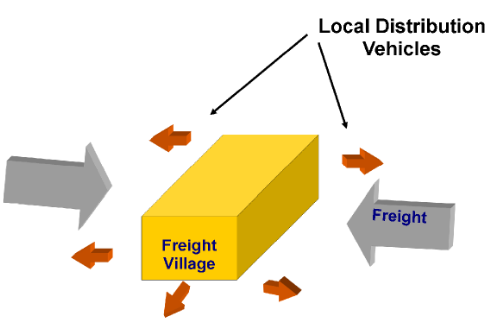
Section 6

Freight Plan

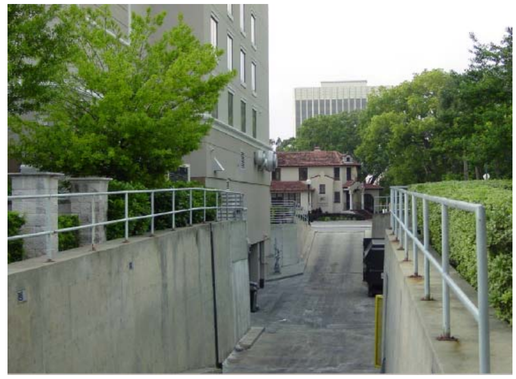
Freight Mobility Plan Overview

Goods and services to the Downtown will continue to be predominantly via truck traffic and the efficient movement of freight is critical to Downtown's success. The plan designates freight friendly streets, where truck traffic can be better accommodated through intersection improvements, lane widths and easy access to the Interstate. City logistics for freight include consolidating deliveries, routes and activities to reduce the number of trucks within the Downtown Core and make freight more cost effective.

Primary and secondary freight streets require wider lanes and larger turning radii at intersections to accommodate heavy vehicles.

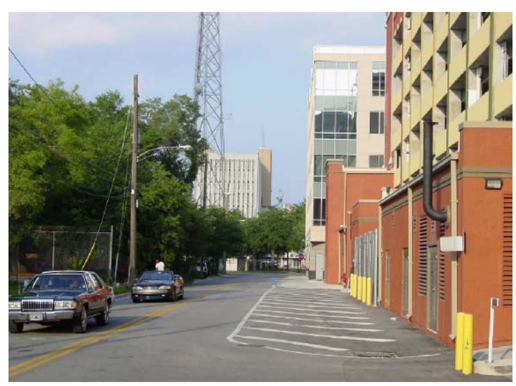


Coordinated efforts to consolidate freight activities for distribution by smaller, electric cargo trucks can reduce truck traffic on busy downtown streets, reduce freight parking, improve air quality, and improve efficiency.

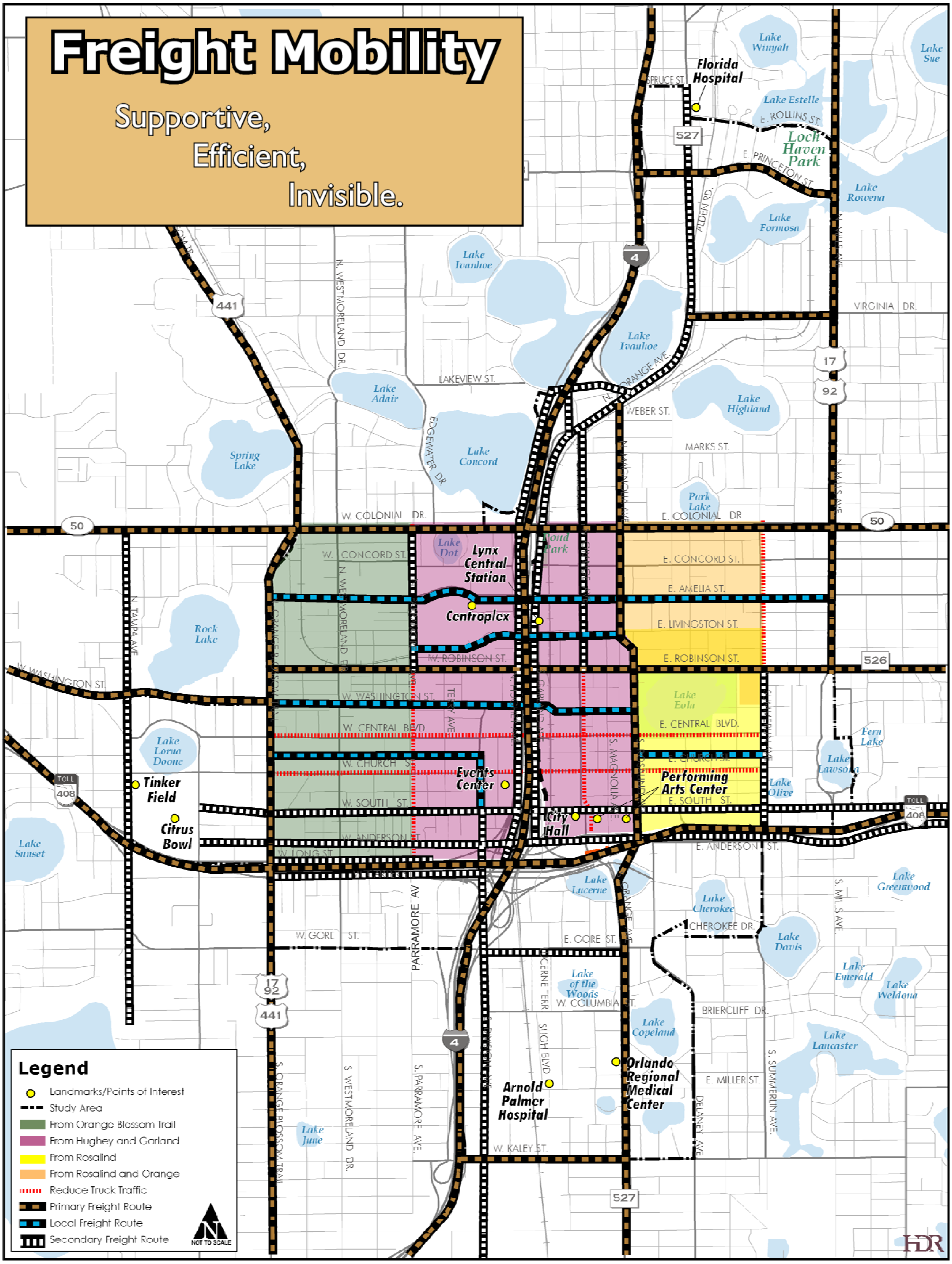


Loading docks for freight should be accessed from freight friendly streets with adequate storage for heavy vehicles within the site.

Court Street is an example of a potential freight only street. Freight only streets provide time restricted freight parking for permitted vehicles. Deliveries during off-peak hours makes freight more efficient and less costly.



Newer building designs include freight accommodations per policy and code, as shown at this loading zone.


Freight Mobility
Supportive,
Efficient,
Invisible.
Legend
Landmarks/Points of Interest
Study Area
From Orange Blossom Trail
From Hughey and Garland
From Rosalind
From Rosalind and Orange
Reduce Truck Traffic
Primary Freight Route
Local Freight Route
Secondary Freight Route
NOT TO SCALE
Florida Hospital
Lynx Central Station
Centroplex
Events Center
Performing Arts Center
City Hall
Tinker Field
Citrus Bowl
Arnold Palmer Hospital
Orlando Regional Medical Center
Loch Haven Park
Lake Winyah
Lake Sue
Lake Estelle
Lake Rowena
Lake Formosa
Lake Ivanhoe
Lake Highland
Lake Adair
Lake Concord
Spring Lake
Park Lake
Lake Dot
Rock Lake
Lake Eola
Lake Lorna Doone
Lake Sunset
Fern Lake
Lake Lawsona
Lake Olive
Lake Lucerne
Lake Cherokee
Lake Greenwood
Lake Davis
Lake Emerald
Lake Weldona
Lake of the Woods
Lake Copeland
Lake Lancaster
Lake Jane
W. COLONIAL DR.
E. COLONIAL DR.
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
E. LIVINGSTON ST.
W. ROBINSON ST.
E. ROBINSON ST.
W. WASHINGTON ST.
W. CENTRAL BLVD
E. CENTRAL BLVD.
W. CHURCH ST.
W. SOUTH ST.
E. SOUTH ST.
W. ANDERSON ST.
E. ANDERSON ST.
W. GORE ST.
E. GORE ST.
CHEROKEE DR.
BRIERCLIFF DR.
E. MILLER ST.
W. KALEY ST.
W. COLUMBIA ST.
VIRGINIA DR.
LAKEVIEW ST.
WEBER ST.
MARKS ST.
E. ROLLINS ST.
E. PRINCETON ST.
SPRUCE ST.
ALDEN RD.
N. ORANGE AVE.
EDGEWATER DR.
N. WESTMORELAND DR.
N. TAMPA AVE.
PARRAMORE AV
S. PARRAMORE AVE.
S. WESTMORELAND DR.
S. ORANGE BLOSSOM TRAIL
S. SUMMERLIN AVE.
S. MILLS AVE
N. MILLS AVE.
S. MAGNOLIA AVE.
DELANEY AVE.
SLIGH BLVD
TERRY AVE
W. LONG ST.
4
17
92
441
50
408
526
527
TOLL
HDR

6.1 Description of Downtown Freight Flows & Infrastructure

Overview of Regional Freight Flows

In 2002, METROPLAN ORLANDO completed its Freight, Goods, and Services Mobility Strategy Plan (FGSMSP). This plan includes a description of the goods movement trends in the Orlando metropolitan area. This section extracts the portion of the plan that is relevant for goods movement in the Downtown area.

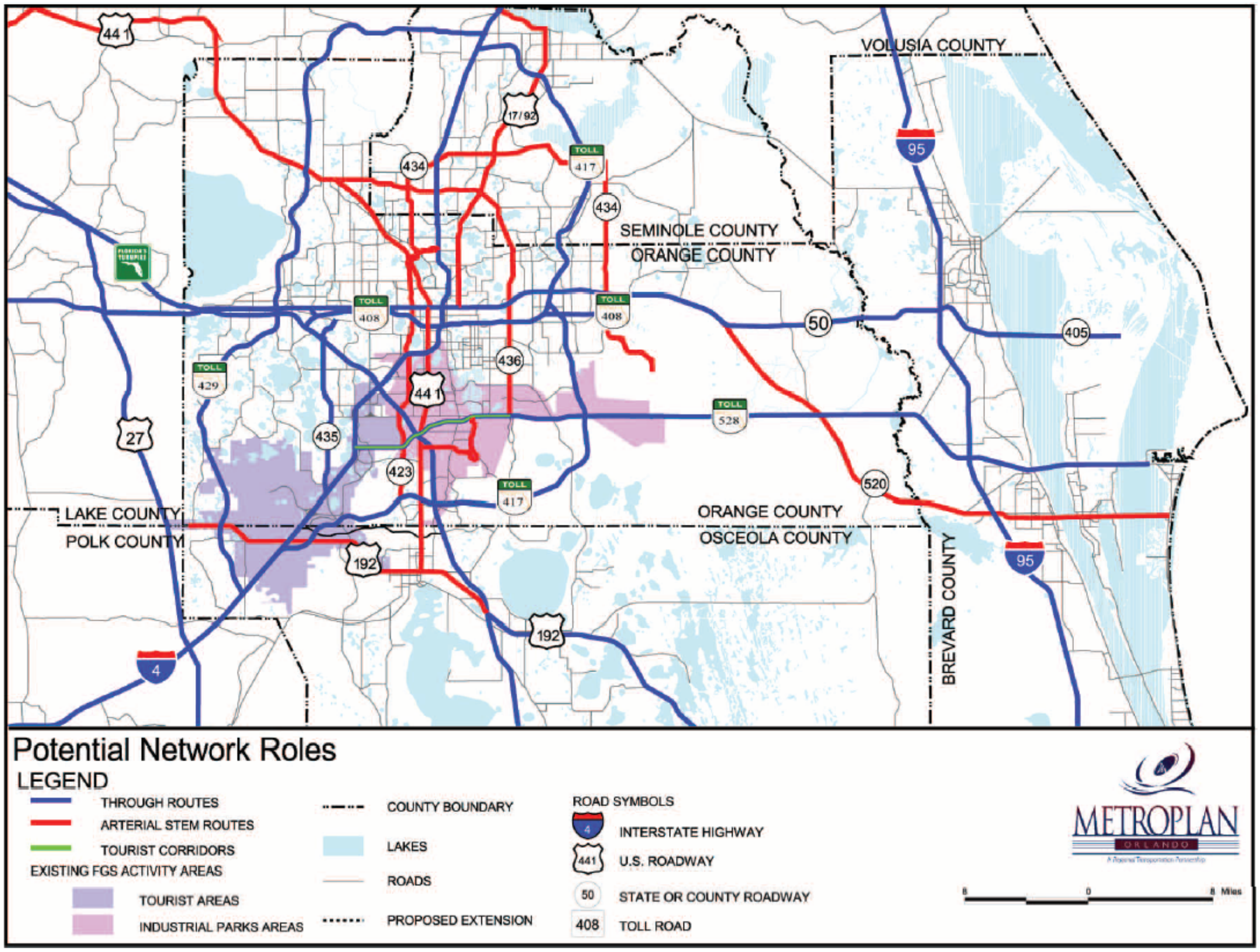
The Orlando metropolitan area is a major consumption center in Florida. The main commodities consumed in the region are consumer goods, automobiles, and food products. By tonnage, 65 percent of the goods consumed in the region are supplied by truck, 35 percent are supplied by rail, and less than 1 percent are supplied by air. In total, Central Florida's transportation network supports 750 million pounds of freight each day.

Regional Truck Flows and Infrastructure

For the Orlando region, the majority of truck trips in the region are short-haul trips (less than 300 miles) with both the origins and destinations within Florida. For the Downtown Orlando area, the truck trips are typically even shorter. Less-than-truckload operations in which trucks make either multiple pickups and/or multiple deliveries of small quantities are the largest type of truck activity with delivery volumes being twice the size of pickup volumes. Based on the FGSMSP, pickups are concentrated in the afternoon with 90 percent occurring between 1:00 PM and 5:00 PM, while deliveries are concentrated in the morning with over 75 percent occurring between 8:00 AM and 1:00 PM.

The FGSMSP also proposed a strategy of designating four network roles for the freight infrastructure in the Orlando region: 1) Through Corridors, 2) Arterial Stem Routes, 3) Existing Freight Goods Service Areas, and 4) Tourist Corridors (**Figure 6-1**). Of particular relevance for the Downtown Orlando Transportation Plan is that a significant portion of the proposed freight network passes through Downtown Orlando. Three of the Through Corridors (I 4, SR 50, and SR 408) and one of the Arterial Stem Routes (U.S. 441) overlap with the Downtown study area. Therefore, these routes are not only used to pick up and drop off goods in the Downtown area, but also as pass-through routes for freight which has neither a Downtown origin or destination.

Figure 6-1
Potential Network Roles



The FGSMSP also provides qualitative descriptions of the freight network in the metropolitan area. A summarized description of the facilities that run through Downtown Orlando is provided below:

- ***Interstate 4 –*** is a key east-west corridor linking Orlando to I 95 and Jacksonville to the northeast and to Tampa to the southwest. The route also has a high truck concentration (12 percent). As Orlando continues to grow, so will the role of I 4 in the safe mobility of people with the productivity of freight, goods, and services. The truck volume on I 4 is estimated to be 21,300 trucks per day, the highest in the Orlando metropolitan region.

- ***SR 50 –*** is a controlled access highway which handles a relatively high percentage of truck traffic (12 percent) for a limited access freight corridor. It is a primary east-west connector for the Orlando urbanized area. SR 50 also serves the Winter Garden cluster of trucking and courier services. The Central Florida Research Park located south of the University of Central Florida and north of SR 50 contains pockets of undeveloped land designated for industrial uses. The truck volume on SR 50 is estimated to be 4,200 trucks per day, the third-highest in the Orlando metropolitan region.

- ***U.S. 441 – Orange Blossom Trail –*** is a major truck corridor that serves the developed and future industrial areas located northwest of the urbanized area. It also serves the U.S. 441/Rosemont clusters of public warehousing and trucking and courier services. A cluster of agricultural processing and distribution centers are also located along U.S. 441. In the center of the urbanized area U.S. 441 remains west of Downtown and provides access to the Tradeport area. Beyond the urbanized area of Orlando, U.S. 441 primarily serves the rural and agricultural areas located in Osceola and Lake counties. The truck volume on U.S. 441 is estimated to be 2,000 trucks per day, the tenth highest in the Orlando metropolitan region.

- ***Toll Road SR 408 – The Holland East-West Expressway –*** is a limited access highway that provides an east-west connection through Downtown and suburban Orlando. This facility and the Central Florida GreeneWay serve as the primary roadways for Orange County transfer facility trucks to deliver waste to the Orange County Landfill. This facility is designated for future industrial development. The truck volume on SR 408 is estimated to be 3,000 trucks per day, the sixth highest in the Orlando metropolitan region.

There are also several pockets of dense truck activity in the Orlando metropolitan area where a significant proportion of trucking, warehousing, and courier operations are located. Two of these pockets are located on the edge of Downtown including the Orange Blossom Trail (just south of Downtown) and west of U.S. 441 between Clarcona Ocoee Road and SR 438 (just west of Downtown). See **Figure 6-2**.

Regional Rail Flows

The two railroads in the Orlando region are CSX Transportation (CSXT) and the Florida Central Railroad (FCRR). CSXT provides direct rail service between Central Florida and the eastern United States, while the FCRR is a local carrier connecting CSX at Taft Yard to local businesses in the region. A map showing rail infrastructure is shown in **Figure 6-3**. CSXT's main line, known as the "A" line, runs through Downtown Orlando. In the City of Orlando, operations over the line are primarily using double-track where trains run with the current of traffic governed by block signals. Based on data contained in CSXT's application to the Surface Transportation Board to acquire its share of Conrail, eight to nine freight trains were expected to use the line post-merger. This freight rail line is shared with several passenger train services. Based on data supplied by CSXT for the FGSMSP, the railroad handles approximately 300,000 cars (loads and empties) in the area annually.

Figure 6-2
Freight Facilities in the Orlando Metropolitan Area

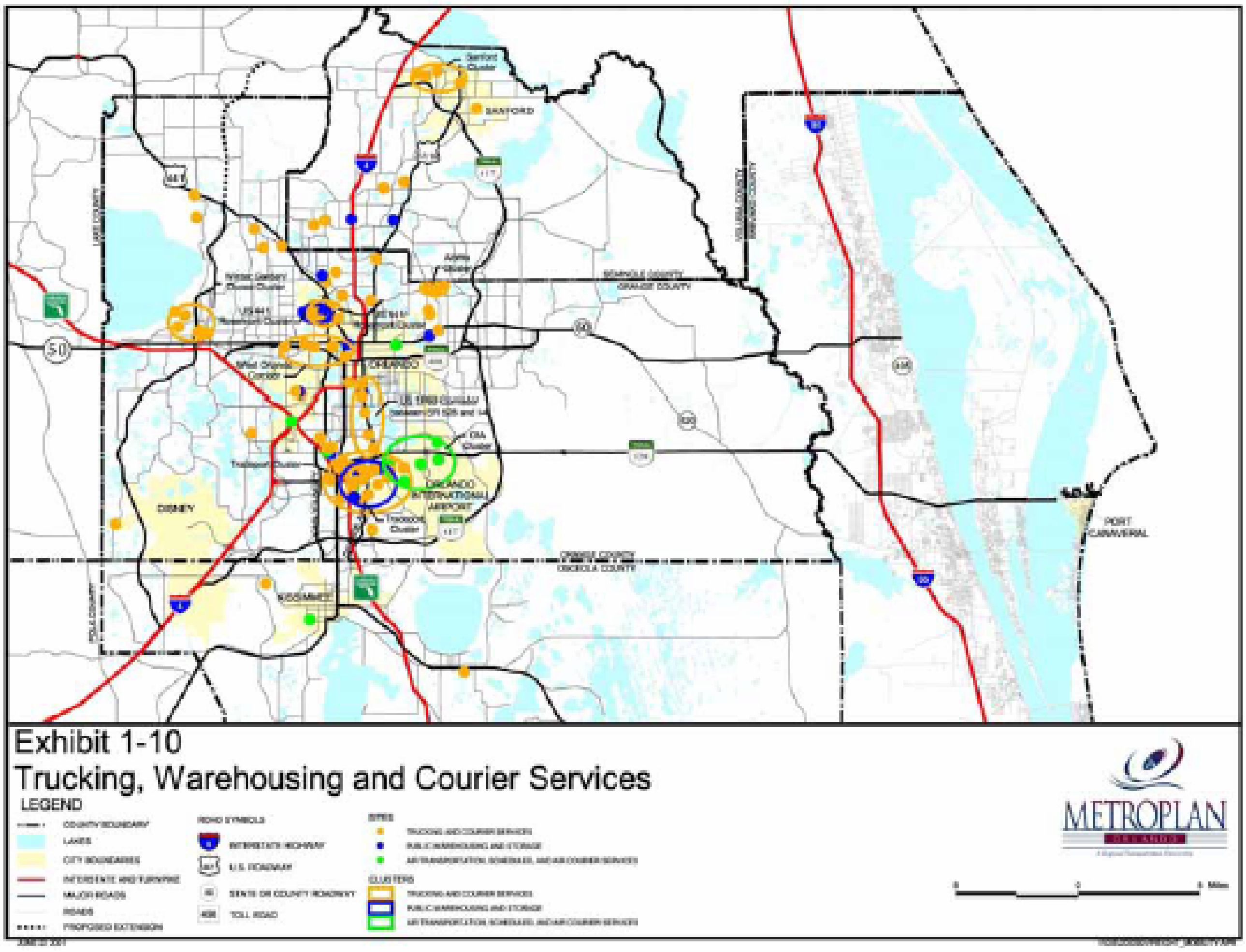


Figure 6-3

Rail Network in Orlando Metropolitan Area

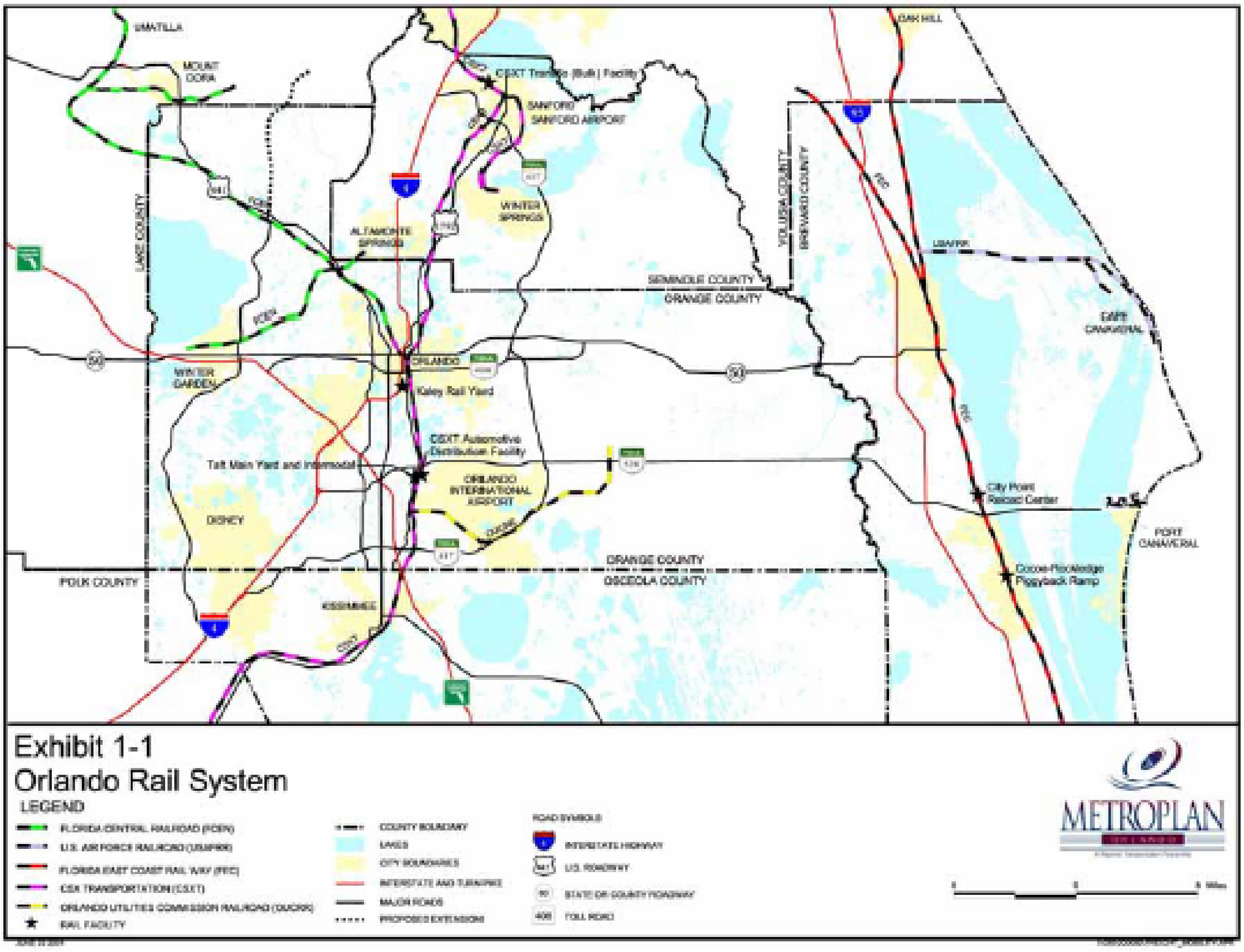
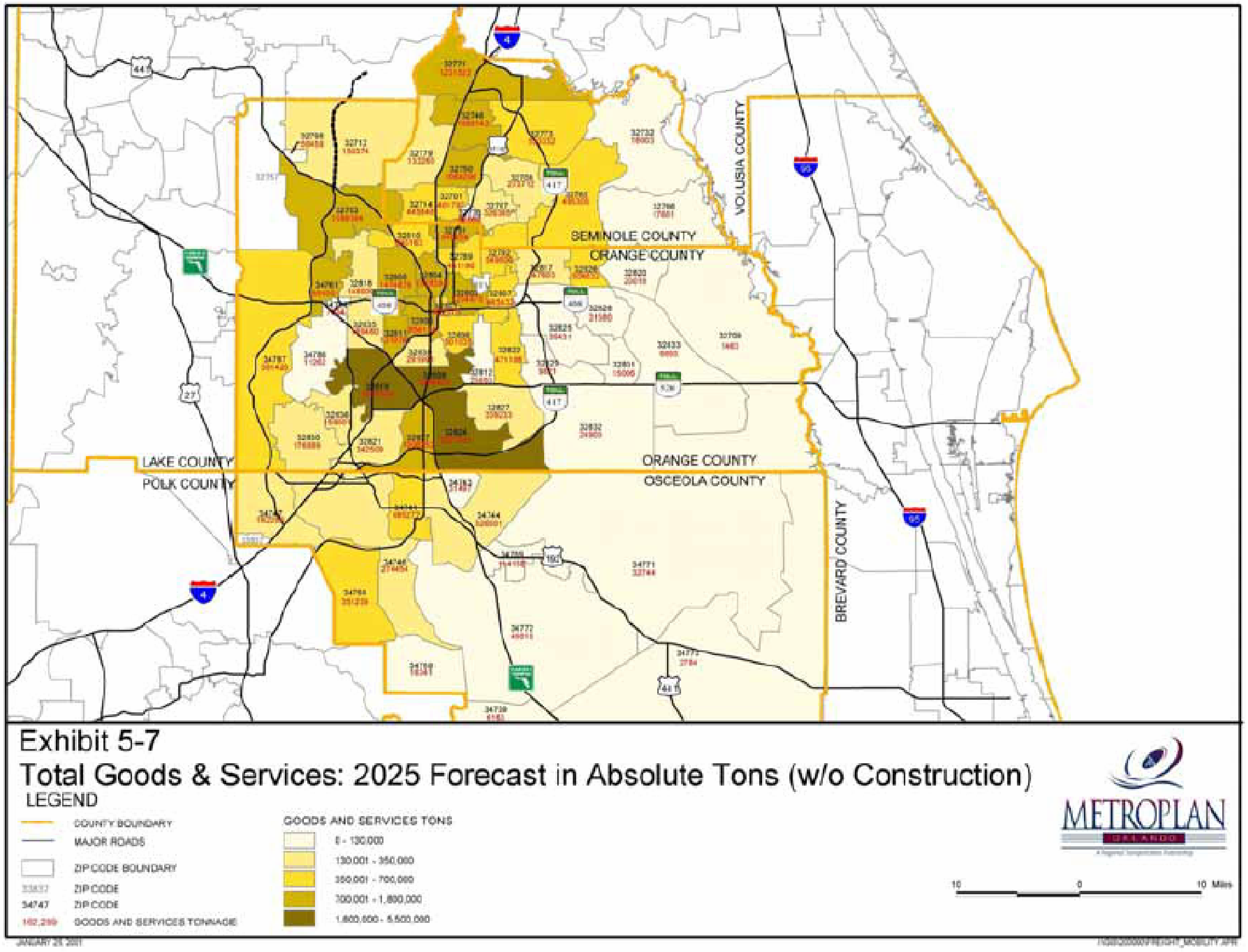


Figure 6-4

2025 Forecast of Freight Movement by Zip Code (Excluding Construction)



Regional Air Cargo Flows

Approximately 10 miles to the southeast of Downtown is Orlando International Airport. This airport is the second largest in the State and carries high-value and time-sensitive freight in and out of the region. In 2000, over 12,000 tons of cargo were transported in and out of the region by air cargo.

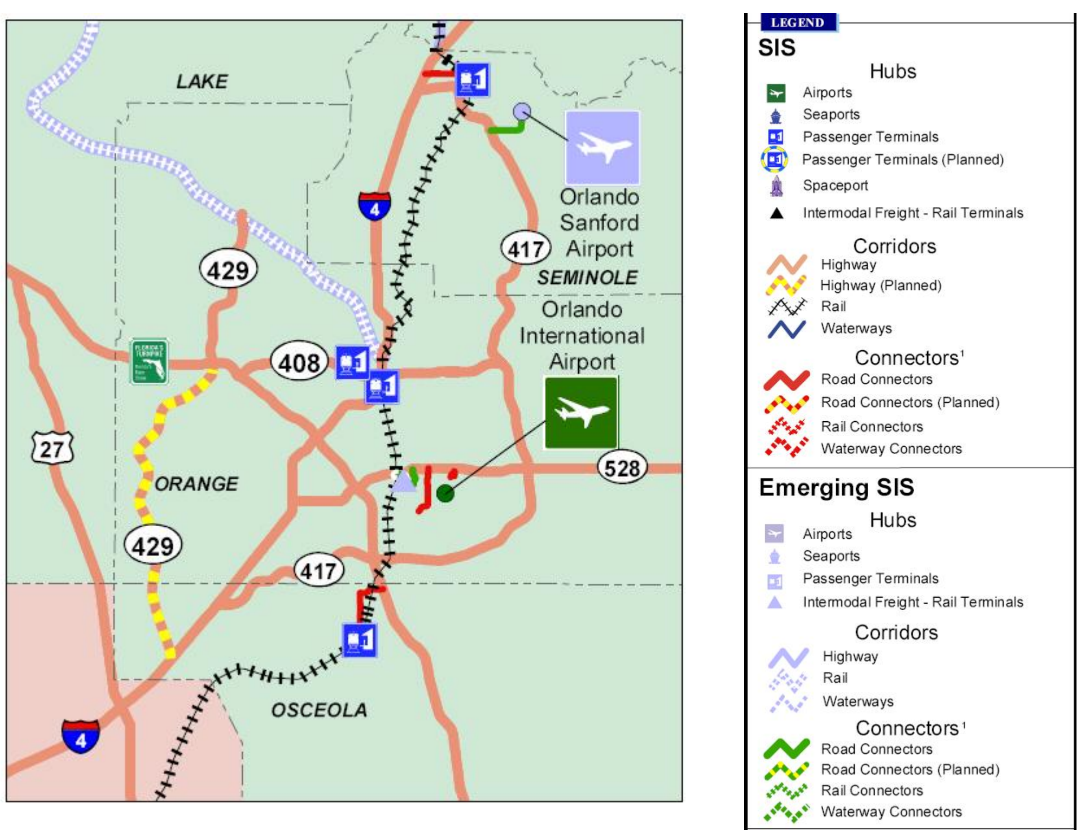
Growth in Freight Flows

Freight in the Orlando region is expected to more than double between 1998 and 2025. As can be seen in **Figure 6-4**, the highest growth region will be nearby to the airport and its adjacent Orlando Central Park freight facilities. Nevertheless, a significant portion of this growth is forecast to be related to growth of the Downtown region and there will also be a growth in the freight flows through the Downtown area (see **Figure 6-4**). Excluding construction, the FGSMSP estimated that three of the top eight zip codes in terms of freight growth overlap with the Downtown area. Therefore, the number of trucks in the Downtown area will likely experience a significant increase over the next 20 years. The chief roadway through the growth districts is Interstate 4 from north to southwest, supported by parallel routes like the John Young Parkway and U.S. 441, the Orange Blossom Trail. As mentioned in the FGSMSP, the magnitude of growth will put stress on the Downtown infrastructure. Road wear will be a significant maintenance issue, as more large trucks pound the main arteries and secondary streets.

Strategic Intermodal System

The Florida Strategic Intermodal System (SIS) was established in 2003 to enhance Florida's economic competitiveness by focusing limited state resources on those transportation facilities that are critical to Florida's economy and quality of life. The SIS is a statewide network of high-priority transportation facilities, including the State's largest and most significant commercial service airports, spaceport, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways and highways. A map of the SIS facilities in the Orlando metropolitan area is shown in **Figure 6-5**. In the Downtown Orlando region, the two facilities that are included in the SIS are I 4 and Toll Road SR 408. This designation enables improvements on these facilities to be funded using state transportation dollars in addition to local matching funds.

Figure 6-5
Freight Facilities in the SIS in the Orlando Metropolitan Region



6.2 Proposed Truck Route Designation

A primary goal of the Downtown Orlando Transportation Plan was to designate portion of the roadways Downtown as truck routes and truck-restricted routes. These designations are designed to streamline the operations of all travel modes in the Downtown areas. By channeling truck traffic to specific routes, truck-friendly roadway design and pavement maintenance can be targeted to specific portions of the infrastructure. Additionally, by restricting traffic from other routes, these restricted roads can be designed to attract travel modes that are the least compatible with truck activity such as pedestrian and bicycle travel. The Downtown Orlando Transportation Plan technical and consultant teams held a three-day charrette in July 2005 to determine the proposed truck route designation for the study area. This section summarizes the methodology used and the proposed truck route network.

Designation of Truck Routes

There were three types of truck routes that were considered for designation. The first were truck routes through Downtown. These truck routes are important because Downtown Orlando's transportation network will continue to be a key part of the regional and statewide goods movement system. The second set of truck routes are those that go into and out of Downtown. These truck routes are used to get from the interstates and highways to the major local road network in Downtown. The third set of truck routes are those that are used to circulate around Downtown. These truck routes get trucks from the major local roads to each of the possible final destinations in the Downtown area

Criteria to Identify Truck Routes

For each truck route type, the criteria developed were checked based on the knowledge of the technical team and consultant team in regards to truck activity in Downtown and in the larger metropolitan area.

Truck Routes Through Downtown

The criteria to identify freight routes were different for each set of truck routes. For truck routes through the Downtown Orlando area, the criteria used were:

- Ensuring connectivity for regional and statewide goods movement;
- Limiting disruption to current truck traffic patterns;
- Limiting the number of through truck routes for Downtown to preserve other roads for different uses; and
- Compatibility with existing road geometries.

To ensure connectivity for the region, it was determined that truck routes were needed in both the north-south direction in addition to the east-west direction. This would provide maximum connectivity for the region and for the State. To minimize disruption to current traffic patterns, recent truck volumes were used as a first cut to indicate which routes trucks are currently using to perform truck trips through trips Downtown. Routes with high truck volumes were assumed to be those that are used for through truck trips. Truck volume information was provided as part of the FGSMSP and described in more detail in Section 6.1. The highest north-south truck volume roadway is I 4 with an estimated 21,300 trucks per day. This is an obvious candidate for a through truck route for Downtown Orlando. This also satisfies the last two criteria in that I 4 can serve as the sole through truck route for Downtown and the road geometry of I 4 is highly compatible for truck movements.

The primary east-west routes currently used as through routes for the region include SR 50 and SR 408. There is not a large discrepancy in truck volumes between these two roads. SR 50 has 4,200 trucks per day and SR 408 has 2,800 trucks per day. However, to be consistent with the third criteria for through truck routes (minimizing the number of truck routes), it would be preferred to have only one east-west through route rather than using both. Therefore, the fourth criteria (compatibility of road geometry for trucks) is used as the deciding factor. SR 408 is a limited access highway, while SR 50 is a major arterial with multiple traffic signals. SR 408 has higher speeds and less converging vehicle traffic than SR 50. Based on these factors, SR 408 is the better choice for a through truck route for the region. This means that policies and measures should be considered to encourage through truck traffic on SR 408 and away from SR 50. However, based on the current high volume of truck traffic on SR 50, this route should not be considered a candidate for a truck-prohibition.

Truck Routes In and Out of Downtown

The criteria used to develop truck routes in and out of Downtown are similar to those used for through truck routes. The criteria are:

- Ensuring efficient connectivity for Downtown to the regional and statewide goods movement system;
- Limiting disruption to current truck traffic patterns;
- Limiting the number of truck routes to preserve other roads for different uses; and
- Compatibility with existing road geometries.

To ensure connectivity to the regional and statewide goods movement system, it was determined that there would need to be connectivity to a core set of roads within the Downtown study area and the larger Orlando metropolitan region. From this core set of roads, access can then be provided around Downtown as described in the following section. The core roads for this analysis are SR 50, SR 408, US 441/Orange Blossom Trail, and Rosalind/Magnolia Avenue. These roads form a rectangle within the Downtown study area and around the core of the Downtown commercial and retail area. Each of these roads connect with the larger metropolitan area thereby providing connectivity between the region and Downtown.

Based on technical team experience, each of these roads carry the largest volume of trucks in their relative nearby location, thereby limiting disruption to current truck traffic patterns and satisfying the second criteria. Similarly, there are not nearby roadways that are better able to carry truck traffic, satisfying the fourth criteria. The use of only four roadways preserves many roads in Downtown for other uses satisfying the third criteria.

Truck Routes Around Downtown

The criteria used to develop truck routes around Downtown are based on the criteria for the other truck route types, but also focus on limiting the interaction between truck traffic and other modes of travel. These criteria are:

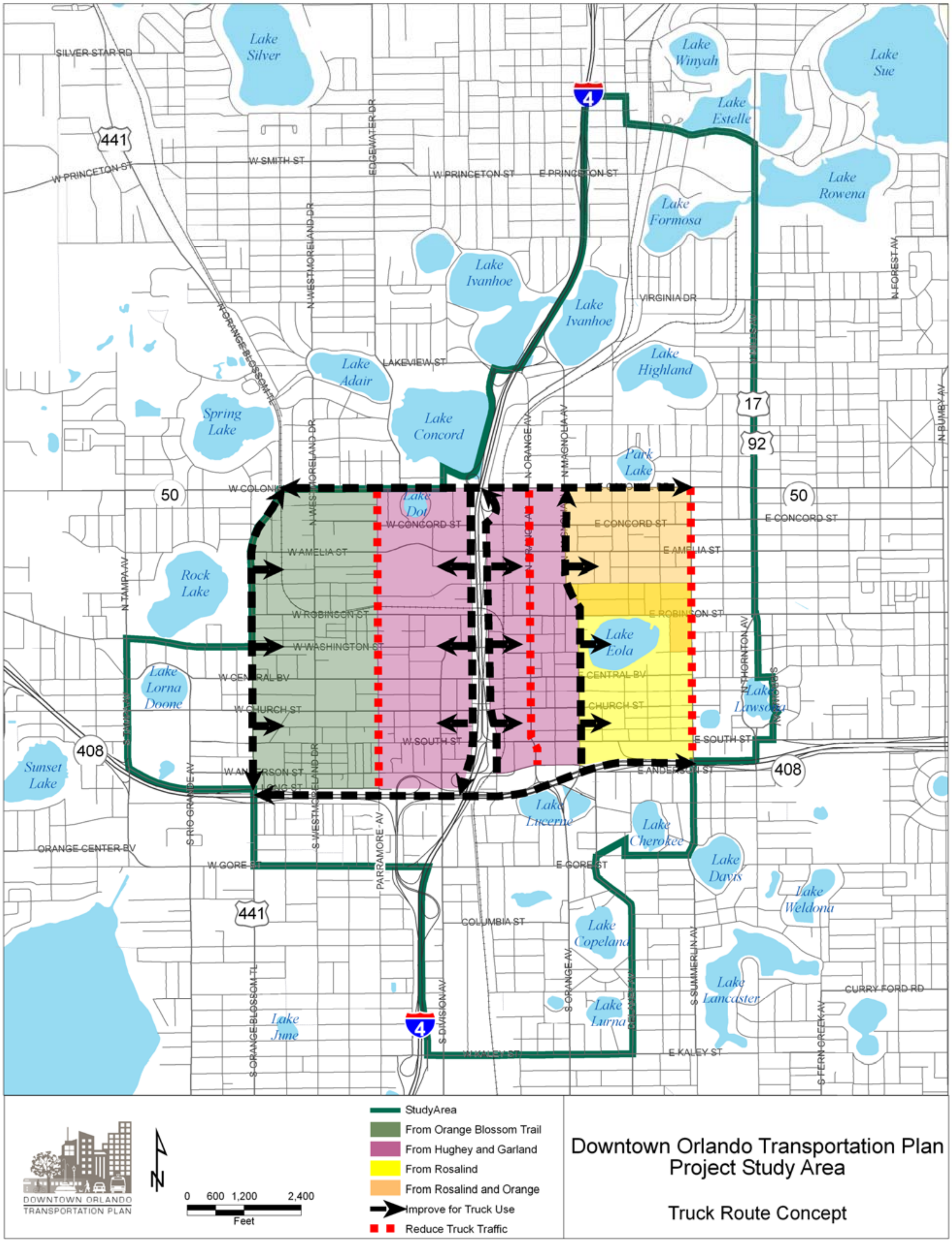
- Ensuring access for all Downtown establishments;
- Limiting the number of truck routes to preserve other roads for different uses;
- Minimizing truck activity on nontruck routes; and
- Compatibility with existing road geometries.

A new truck route concept was developed to meet these criteria for Downtown. The goal of this concept is to focus truck traffic on specific north-south truck routes and to preserve other major north-south truck routes for other modes of travel. To accomplish this, two additional north-south truck routes are proposed for the Downtown area: Garland Avenue and Hughey Avenue. In conjunction with these truck routes, truck-prohibited routes are introduced to the Downtown area: Orange Avenue and Parramore Avenue. This truck-prohibition is consistent with these roads being designated as primary bicycle and pedestrian roadways for the Downtown area. This truck-prohibition extends to the minor roadways that run north-south through the core of the area. In this fashion, all of the north-south traffic through the core Downtown area is funneled to Garland Avenue and Hughey Avenue.

In addition to minimizing north-south truck traffic on the nontruck routes, another goal of this truck route concept is to minimize the amount of traffic on the east-west routes in the core Downtown area. Trucks are required to use specific north-south routes depending on the specific location of the pickup or delivery in the core Downtown area. First, trucks must use the four roads that define the core of the Downtown area (SR 50, SR 408, US 441/Orange Blossom Trail, and Rosalind/Magnolia Avenue) to get to the north-south road that is closest to their final destination. The four north-south roads that can be used are Orange Blossom Trail, Rosalind/Magnolia Avenue, Garland Avenue, and Hughey Avenue. Then, the north-south road is used to get as close as possible to the final destination, before using the east-west roads a minimum distance. Therefore, a specific north-south road is used depending on where the final destination is located as shown in **Figure 6-6**.

Figure 6-6

Proposed Truck Route Concept



Summary of Recommended Truck Routes

In summary, the recommended truck routes for the region are as follows:

- Truck routes through Orlando:
  - I 4; and
  - Toll Road SR 408.
- Truck routes in and out of Orlando:
  - SR 50;
  - SR 408;
  - Orange Blossom Trail; and
  - Rosalind/Magnolia Avenue.
- Truck routes around Orlando:
  - Garland Avenue; and
  - Hughey Avenue.
- Restricted truck routes around Orlando:
  - Parramore Avenue;
  - Orange Avenue; and
  - All other minor north-south routes in core Downtown area

This truck route structure has several implications for the road infrastructure in the Downtown area. I 4 maintains its role as the primary through route for the Downtown area. SR 408 becomes the preferred route for east-west through truck traffic in the region. Trucks are discouraged from using SR 50 as a through route, but it is a key component of the truck routes for goods being transported to and from Downtown along with SR 408, Orange Blossom Trail, and Rosalind/Magnolia Avenue. Garland Avenue and Hughey Avenue also become major roads for truck activity in the Downtown region.

6.3 Freight-Friendly Operations

This section describes the road design and traffic operations requirements implied by the truck route system defined in Section 6.2. These requirements are then compared to current road geometries to identify deficiencies in the system relative to potential future demand. The two specific areas of concern for roadway design standards in Downtown Orlando are geometric design and signalization. The geometry of a truck-friendly road network, including the turning radii and lane widths need to be consistent with their role in the overall transportation system. Major truck routes need to be able to accommodate both large (five-axle) trucks and small (two- or three-axle) trucks. While, minor roads in the Downtown area need to be able to accommodate at least small, two-axle pick-up and delivery trucks. **Table 6-1** shows the key geometry characteristics for each of the Downtown truck routes.

Truck-friendly traffic operations need to take into account the unique performance characteristics of trucks. They are less mobile than passenger vehicles and nonmotorized forms of transportation, particularly from an acceleration and deceleration standpoint. This requires unique signal timing to accommodate truck-friendly routes, particularly the duration of the yellow (caution) light and the green (go) light, is important. A longer cautionary phase gives trucks an opportunity to safely slow down for the subsequent red phase. A longer green phase allows truck traffic an opportunity to gain speed and flow through intersections fluidly. The signal timing at these intersections should be reviewed based on the current and expected truck traffic at these intersections. Additionally, the existence of separated left-turn lanes and left-turn signals minimizes the occurrences of truck traffic blocking mainline traffic operations. **Table 6-2** shows the primary truck intersections and which of these signalization criteria are met.

Based on these two tables, the truck route concept is capable of supporting truck movements. However, truck improvements need to be focused on the following areas:

- ❖ Adding shoulders to the main truck roadways in the truck route concept. As shown in Table 6.1, none of the roadways have shoulders, so if a vehicle breaks down on the road or there is an accident, there is no surplus capacity to remove stopped vehicles from the mainline traffic.

- ❖ The intersection and SR 50 and Magnolia Avenue does not have an exclusive left-turn lane or a left-turn signal on either SR 50 or Magnolia Avenue. Therefore, vehicles that are turning left at this intersection will block a lane of traffic until traffic clears.

6.4 Downtown Orlando Truck Parking Strategy

This section describes the current truck parking policies and practices within Downtown Orlando. This section also describes current usage of Downtown truck parking facilities based on field data collection, phone interviews and previous studies. Based on this information, changes in the truck parking policies are proposed.

Current Policy

The City of Orlando has set up specific truck parking zones for the loading and unloading of freight in the Downtown area. Permit holders can park for up to 30 minutes alongside orange-marked curb in the Downtown area. A map of the freight zone locations is shown in **Figure 6-7**. Based on discussions with City of Orlando Parking Division staff, these locations were developed in the 1980s and have not been updated since that time. Permits to park in the Freight Zones are $70 plus sales tax for the first permit and $30 plus sales tax for each additional permit. Applications for freight parking zones are downloadable from the City of Orlando web site. Freight permits are effective for one year starting and ending on the City's fiscal year of October 1. The freight parking zones are governed by Orlando Municipal Traffic Code, Chapter 39.24 (2):

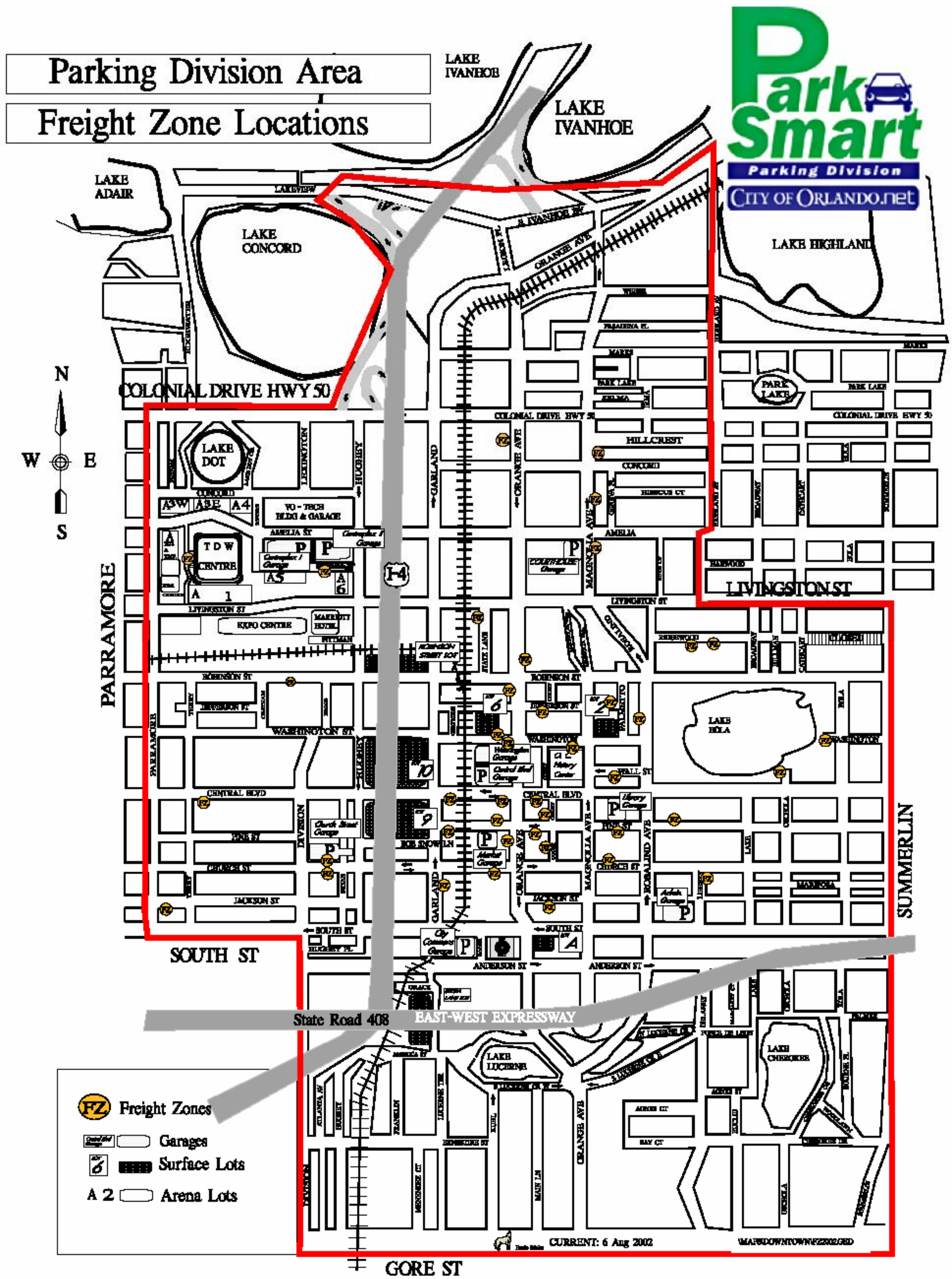
Table 6-1
Features of Key Roadways in Downtown Orlando

Roadway	Sufficient Lane Width	Road Signage	Shoulders
SR 50	Y	Y	N
US 441/Orange Blossom Trail	Y	Y	N
Rosalind/Magnolia Avenue	Y	Y	N
Hughey Avenue	Y	Y	N
Garland Avenue	Y	Y	N

Table 6-2
Features of Key Intersections in Downtown Orlando

Roadway	Adequate Turning Radii	Adequate Separated Left-Turn Lanes	Adequate Separated Left-Turn Signals
SR 50 and Orange Blossom Trail	Y	Y	Y
SR 50 and Garland Avenue	Y	Y	Y
SR 50 and Hughey Avenue	Y	Y	Y
SR 50 and Magnolia Avenue	Y	N	N
SR 408 near Magnolia Avenue	Y	Y	n/a
SR 408 near Garland Avenue	Y	Y	n/a
SR 408 and Orange Blossom Trail	Y	Y	n/a
I 4 and Garland Avenue	Y	Y	n/a
I 4 and Hughey Avenue	Y	Y	n/a

Figure 6-7
Map of Orlando Freight Zone Locations



No person shall stop, stand or park a vehicle for any purpose or length of time than for the expeditious unloading and delivery or pickup and loading of material in any place marked by an orange curb or official sign as a loading zone during the hours when the provisions applicable to loading zone are in effect. Such vehicle must have attached in a conspicuous place on the rear of the vehicle a permit issued pursuant to section 39.25 for such loading and unloading. In no case shall the vehicle stop for loading and unloading of materials exceed the period of time indicated by signs or other appropriate markings and for which the permit holder is authorized to park.

Current Usage of Freight Zones

Field Data Collected

Field data on Downtown truck parking were collected specifically for this study. The field data were collected by observing truck parking in the Downtown region. The data collector drove through the core of the Downtown area where the truck parking spaces are concentrated and recorded the number and location of trucks. The data collector also attempted to note whether or not the vehicles parked in the freight zones had active permits. The driving route of the data collector was as follows:

1. Begin at the corner of Garland Avenue and South Street;
2. Head north on Garland Avenue;
3. Right on Washington Street;
4. Right on Orange Avenue;
5. Left on Church Street;
6. Left on Magnolia;
7. Left on Washington Street;
8. Left on Orange Avenue;
9. Right on South Street to Garland Avenue; and
10. Repeat steps again starting at Step No. 2.

This route enabled observation of 17 locations. Because Orange Avenue is driven twice during each route, there are six locations along Orange Avenue which are observed twice in the data set. This allows for a more accurate estimation of the vehicle turnover time for freight zones on and nearby Orange Avenue. The time to drive the entire route was roughly 10 minutes. Therefore, any truck parked for 10 minutes or more was included in the sample, trucks parked more than 7.5 minutes had a 75 percent chance of being captured in the data set. Trucks parked for 5 minutes had a 50 percent chance of being captured in the survey. Data were collected during a single day between 11:00 AM and 3:00 PM on a Monday in January 2006 with a break between 12:30 PM and 1:30 PM. The results of the survey are shown in **Tables 6-3a** and **6-3b.**

There are several important results shown in the data collection. First, is the dominance of 4-axle vehicles parked in the freight zone locations. 83 percent of the vehicles observed in freight zones were 4-axle vehicles and 17 percent were single-unit trucks with 6-tires. There were no 3-axle or combination trucks observed in the freight zone locations. Next is the importance of Orange Avenue as a delivery location in the Downtown. Of the larger 6-tire trucks, there were only two observations of these trucks at locations that were not close by to Orange Avenue. The other 6-tire

Table 6-3a
Results of Field Data Collection on Truck Parking

	Time at Beginning Route						
	A.M.			A.M./P.M.			
Truck Parking Location	11:00	11:17	11:27	11:41 A.M.	11:58 A.M.	2:43 P.M.	2:58 P.M.
Garland Avenue and Church Street	0	0	0	0	0	0	0
Garland Avenue and Pine Street	4	0	0	S	4	0	4
Washington Street and Orange Avenue (North)	S	**S**	**S**	**S**,4	0	4(2)	4(**1**)
Orange Avenue and Central Boulevard	4	4	**4**	4	0	4	?
Orange Avenue and Pine Street	4(2)	S	**S**,4	**S**	4(2),S	S	0
Orange Avenue between Pine and Church Streets	4(3)	4(3)	4(2)	4(4)	4(4)	4(4)	4(4)
Orange Avenue and Church Street	0	4(2)	?	4(2),S	?	S,4	4(2)
Jackson Street and Orange Avenue	4	4(3)	**4(3)**	**4(2)**	4(**2**+1)	4(3)	4(2)
Magnolia Avenue and Church Street	4	0	S	**S**,4	**4**	4	4
Magnolia Avenue and Wall Street	0	0	0	4	**4**	0	0
Magnolia Avenue and Washington Street	0	0	0	0	0	0	0
Washington Street and Orange Avenue (North)	4	0	4,S	S	**S**	4(2)	4
Washington Street and Orange Avenue (South)	S	S	S	0	0	4	**4**
Orange Avenue and Central Boulevard	4(2)	4(2)	4(2)	0	S	**S**	4
Orange Avenue and Pine Street	S,4	**4**	4(**1**+1)	0	4(2),S	?	4,S
Orange Avenue between Pine and Church Streets	4(4)	4(3)	4(2)	4(4)	4(3)	4(3)	?
Orange Avenue and Church Street	?	4(2)	4(2)	4(2)	4(2)	?	4

Note: 0 = no vehicle; 4 = two-axle, four-tire vehicle; S = single-unit truck w/6-tires; and C = combination truck. ? = missed observation. Bolded items indicate vehicles that were the same as the previous route. Items in parentheses indicate the number of vehicles of the type indicated to the left of the parentheses.

trucks were either observed on Orange Avenue or just off of Orange Avenue. Similarly, all of the locations that are far away from Orange Avenue have a low observed number of total vehicles. This result is exaggerated by the fact that there are multiple readings on Orange Avenue, but it still highlights the importance of Orange Avenue in the Downtown Orlando supply chain. Finally, of the 132 observations made on or nearby Orange Avenue, only nine observations (7 percent) showed empty freight zone parking spaces. This compares to 37 of the 55 observations (67

Table 6-3b
Results of Field Data Collection on Truck Parking

	Time at Beginning Route						
	P.M.			P.M./Totals			
Truck Parking Location	3:07	3:16	3:29	3:41	4-tire total	SU Total	Grand Total
Garland Avenue and Church Street	0	0	n/a	0	0	0	0
Garland Avenue and Pine Street	**4**	**4**	n/a	0	1	5	6
Washington Street and Orange Avenue (North)	4(**1**+1)	0	n/a	0	5	4	9
Orange Avenue and Central Boulevard (West)	4	4	n/a	4	7	0	7
Orange Avenue and Pine Street	4	4	n/a	4	7	5	12
Orange Avenue between Pine and Church Streets	4(4)	4(4)	n/a	4(2)	32	0	32
Orange Avenue and Church Street	4	4	n/a	?	9	2	11
Jackson Street and Orange Avenue	4	4(2)	n/a	4	20	0	20
Magnolia Avenue and Church Street	0	0	0	S	5	3	8
Magnolia Avenue and Wall Street	0	0	0	0	2	0	2
Magnolia Avenue and Washington Street	4(2)	0	0	0	2	0	2
Washington Street and Orange Avenue (North)	4(2)	0	0	0	4	3	7
Washington Street and Orange Avenue (South)	0	0	0	0	3	2	5
Orange Avenue and Central Boulevard	**4**	**4**	0	4	9	2	11
Orange Avenue and Pine Street	4	4	4	**4**	10	3	13
Orange Avenue between Pine and Church Streets	4(3)	4(3)	4(3)	4	28	0	28
Orange Avenue and Church Street	4	S,4	**S**	S,4	11	2	13
Totals					**155**	**31**	**186**

Note: 0 = no vehicle; 4 = two-axle, four-tire vehicle; S = single-unit truck w/6-tires; and C = combination truck. ? = missed observation. Bolded items indicate vehicles that were the same as the previous route. Items in parentheses indicate the number of vehicles of the type indicated to the left of the parentheses.

percent) away from Orange Avenue showing empty freight zone parking spaces. Therefore, the freight zones closes to Orange Avenue have a higher occupancy than the freight zones away from Orange Avenue.

There is also a noticeable difference between truck activity in the morning compared to the afternoon. In the morning, the number of vehicles were greater and the likelihood of observing a larger vehicle was also greater. Of the 31 6-tire trucks, only five were observed in one of the six afternoon routes. This compares to 26 6-tire vehicles observed in the five morning routes. The data collector noticed an even more significant decline in truck activity after 4 PM on the day of data collection.

Overall, there were not significant issues with truck traffic parking. However, a number of factors appear to be converging that are worrisome regarding Downtown truck parking. First is the high demand for truck parking on Orange Avenue. This demand will increase in the future based on the ongoing and planned construction of residential, commercial, and retail facilities on Orange Avenue. Additionally, there is actually very limited truck parking on Orange Avenue itself. The one marked freight zone is also a marked 15 minute passenger parking zone. The other locations are actually nearby to Orange Avenue (within one block). As mentioned previously, these locations already have the highest occupancy in the Downtown region, so additional truck demand on Orange Avenue will be difficult to satisfy using these current freight zones. It is likely that in the future there will be excess demand for Orange Avenue parking that could negatively impact traffic flows in the Downtown by forcing freight vehicles to double park and block mainline traffic, increasing parking spot search time for trucks and thereby increasing their on road travel time, and forcing trucks to park far from their destinations increasing delivery times.

During this data collection, there were several other observations that were made about truck parking in the area. These include observations made during the preparation phase of the data collection (9 AM to 11 AM) and during the shutdown phase of the data collection (4 PM to 5 PM). The observations are as follows:

- ❖ All observed vehicles parked curbside were 2-axle vehicles including cars, pickup trucks, sport utility vehicles, 2-axle/4-tire trucks and 2-axle/6-tire trucks. There were no combination vehicles or 3-axle vehicles observed parking curbside. This includes parking in designated freight zones, loading zones, and all other curbside locations.

- ❖ A large fraction of the vehicles parked in the designated freight zones were passenger vehicles. While these vehicles are legally eligible to participate in the freight zone parking program, the data collector noted that many of these vehicles appeared to be used for passenger activities rather than freight activities. No data were collected to differentiate passenger cars, pickup trucks, SUVs and panel trucks within the 4-tire vehicle category, but based on visual observation a surprisingly high percentage of these vehicles were indeed sedans or SUVs, not typically used for hauling freight.

- ❖ It is unclear, how many of the vehicles parked in the freight zones had legal permits. For most of the observation period, the data collector was traveling at too high a speed to sufficiently count permitted and non-permitted vehicles. However, based on the judgment of the data collector, far less than half (and probably as low as 20 percent) of the vehicles parked in the freight zones had freight zone permits.

- ❖ Duration of parking varied substantially by location. A truck of a small parcel delivery company was observed as being parked in the same location from roughly 9:00 A.M. until about noon. The truck driver used a cart to deliver packages throughout the Downtown area from its parked location. Trucks of another small parcel delivery company were also observed to be parked for long periods of time as drivers delivered packages to several buildings from a single location. At other parking locations, there appeared to be rapid turnover of vehicles, so that the vehicles changed on roughly every cycle through the parking route.

Based on the data collected, freight parking locations are categorized into one of four categories:

1. Unused Freight Zones – based on observations, locations rarely used or often used by vehicles that appear to be passenger purposes.
2. Minimal Freight Zones – locations with low volumes of freight traffic and some passenger traffic.
3. Moderate Freight Zones – either a) locations with moderate amounts of freight traffic and some mixed traffic or b) locations with a high percentage of freight traffic, but low turnover in the vehicles.
4. Ideal Freight Zones – locations with high amounts of freight traffic and high turnover in the parked vehicles.

The designation of each freight zone is shown in **Table 6-4**. In the policy portion of this chapter, different policies will be assigned to each of these freight zone types.

Interviews of Truck Fleet Operators

The consultant team also worked with the City of Orlando Parking Division to identify participants in phone interviews about parking in Downtown Orlando. A sample of truck fleet operators were collected using historical Downtown parking permit applications. The response rate from these phone interviews was relatively low. Only 9 of 35 identified surveyors responded. The sample survey questionnaire is shown in **Appendix 6-A**. However, the information collected from the surveys still sheds some light on Downtown parking activities. Additionally, the responses are consistent with the field data collected on parking activities. There were twelve locations mentioned by the survey respondents as the most commonly used as follows:

1. Orange Avenue and Central Avenue (five responses);
2. Orange Avenue and Church Street (three responses);
3. Orange Avenue and Washington Street (two responses);
4. Orange Avenue and Pine Street (two responses);

Table 6-4
Categorization of Each Freight Zone in Observed Route

Truck Parking Location	Freight Zone Type	Additional Comments
Garland Avenue and Church Street	Unused	On-street parking blocks travel lane and creates safety hazard. Off-street parking is convenient.
Garland Avenue and Pine Street	Moderate	One vehicle at a time, lots of turnover, but plenty of parking options
Washington Street and Orange Avenue (North)	Moderate	
Orange Avenue and Central Boulevard (West)	Moderate	Lots of freight vehicles, lots of fleet turnover
Orange Avenue and Pine Street	Ideal	Lots of freight vehicles, lots of fleet turnover
Orange Avenue between Pine and Church Streets	Minimal	Lots of vehicles, but most appeared to be for passenger trips
Orange Avenue and Church Street	Ideal	Lots of freight vehicles, lots of fleet turnover
Jackson Street and Orange Avenue	Minimal	Lots of vehicles, but most appeared to be for passenger trips
Magnolia Avenue and Church Street	Moderate	One vehicle at a time, lots of turnover, but plenty of parking options
Magnolia Avenue and Wall Street	Minimal	Very few vehicles
Magnolia Avenue and Washington Street	Unused	1 vehicle for entire day
Washington Street and Orange Avenue (South)	Minimal	Few vehicles, and most appeared to be for passenger trips

5. Orange Avenue and Robinson (two responses);
6. Jackson St. and Orange Avenue;
7. Orange Avenue and Jefferson Street;
8. Orange Avenue and Wall Street;
9. Magnolia Drive and Colonial Drive;
10. Hughey Avenue and Church Street;
11. Pine Street and Magnolia Avenue;
12. Pine Street and Rosalind Avenue;
13. Church Street and Division Avenue;
14. Copeland Street;
15. Sturtevant Street; and
16. Kuhl Street and Columbia Avenue.

It is of particular note that 17 of the 25 responses regarding most often used parking spaces were at intersections with Orange Avenue. The only other street that was mentioned multiple times was Church Street. It was mentioned by five of the 15 responses. The dominance of Orange Avenue is consistent with the data collected in the field on truck parking behavior. It also reinforces the notion of Orange Avenue being a critical parking demand location.

It should also be noted that four of the nine respondents mentioned that the 30-minute time limit was sometimes a problem. These respondents suggested that 45 minutes or one hour would be sufficient time. Three of the respondents did identify locations that they felt had inadequate parking as illustrated by the following quotes:

- "Church and Rosalind does not have adequate parking";
- "Parking problems exist along Pine Street between Magnolia and Rosalind"; and
- "Parking in the vicinity of Orange and Jefferson is becoming more of a challenge since the Water Authority moved to that area."

As mentioned earlier, the results from these surveys are by no means scientific, because there were only nine respondents. However, these limited survey results indicate that a broader data collection effort could be used to develop a long list of parking needs in addition to locations that repeatedly are noted as having parking problems. It is recommended that at least once every five years, the City of Orlando Parking Division conducts this data collection to monitor the performance of its freight parking system in meeting the evolving needs of shippers to Downtown Orlando. This can be done relatively easily (and with higher response rates) if the survey questions are included as part of the permit application and renewal process over a period of a few months.

Parking Issues Mentioned in the FGSMSP

Some information on Downtown parking was collected from stakeholders as part of the FGSMSP. This information indicated that parking capacity during peak-commute periods is a major concern of truck fleet operators based on industry interviews. Even truck operators with parking permits stated that they have experienced increases of between 15 and 20 minutes per stop during peak-traffic periods. FGSMSP interviews with operators of local truck fleets, specifically those that conduct Downtown and commercial deliveries, indicated that the size of heavy-duty vehicles used for commercial delivery will increase in terms of size and weight. This presents a challenge given that the freight zone parking in Downtown Orlando is designed for smaller vehicles such as pickup trucks, vans, and single unit trucks.

Draft Parking Zone Policy and Recommendations

The draft parking zone policy includes a rationalization of freight zone parking in the Downtown. The draft parking zone recommendations include future data collection and monitoring to further rationalize the freight parking zone system and determine future locations of freight zone parking.

Draft Parking Zone Policy

The draft parking zone policy is based on the results presented in Table 6-4 in which each of the freight zones observed in the field data collection are categorized into four types: 1) unused, 2) minimal, 3) moderate, and 4) ideal. The policy is as follows:

- For freight zones that are categorized as unused, these freight zones should be converted to regular metered parking. This will allow all but the 6-tire trucks to use these parking spots for a limited amount of time and allow for flexibility of parking space utility for a full range of vehicles, thereby making the overall parking system more effective.
- For freight zones that are categorized as minimal, these locations should be put on a "probation list". From this probation list, the freight zone location can either be reclassified as metered street parking if either a survey of permit holders reveals that these spaces are not used by that group or if a critical shortage of the supply of another type of parking has been demonstrated. Alternatively, if surveys of permit holders indicate that these spaces are indeed used, then the freight zone remains as is.
- Freight zones that are categorized as moderate or ideal remain as is regardless of the demand of parking for other uses in the Downtown area.

Orange Avenue should be designated as a critical truck parking corridor and measures should be considered to expand truck parking on Orange Avenue and nearby locations to Orange Avenue.

Draft Freight Parking Zone Recommendations

The draft freight parking zone recommendations include a recommendation to continue the field data collection to cover all of the Downtown freight zones. Each zone should be categorized into one of the four parking types to determine if redesignation of the freight zone should be considered. As mentioned earlier, it is also recommended that the City of Orlando expand the survey of permit holders to capture real-time data on freight parking zone usage by those that are confirmed to be paying for this parking.

Additional activities to consider include data collection on the percent of freight zone parking that is by legal permit holders and potential increasing of parking enforcement (if this percent is high) and truck parking location, particularly in high demand locations such as on and near Orange Avenue. The demand for freight parking along Orange Avenue is conflicts with the goals to accommodate transit and improve pedestrian conditions in the core of Downtown. Accommodations for smaller freight vehicles, in conjunction with the Freight Village/City Logistics concept should be considered on Orange Avenue between Church Street and Pine Street into freight zone parking based on this high demand.

6.5 Downtown Truck Loading Zone Strategy

Current Truck Loading Zone Policies in Orlando

The City of Orlando has lengthy loading zone policies. These are referred to as the off-street parking requirements and they are defined in Chapter 61 of the City's Land Development Code as follows:

Section 61.420. Purpose of Off-Street Loading Requirements

The off-street loading requirements of this Part are intended to provide minimum standards necessary for the loading and unloading of goods for the various commercial and industrial uses permitted by this Chapter, to protect the capacity of the City's street system and avoid undue congestion resulting from loading and unloading activities, and to lessen unnecessary conflicts between trucks and other vehicles.

(Ordinance of 9-16-1991, Document No. 25098)

Section 61.421. General Requirements

The requirements of this Part shall apply to all commercial and industrial development, whether new structures or alterations to existing structures. Off-street loading shall be available to use prior to the issuance of any Certificate of Occupancy or Occupational License, and its continued maintenance shall be the obligation of the property owner and occupant as long as the use requiring loading facilities continues. No off-street loading shall be altered or discontinued except in accordance with this Chapter.

Determinations in Cases of Uncertainty. Where loading design standards are not specifically stated herein, determinations shall be made by the Zoning Official based on the standards and guidelines of the Institute of Transportation Engineers. Determinations of required number of berths for uses not specifically listed in this Part shall be made by the Zoning Official based on requirements for similar uses.

(Ordinance of 9-16-1991, Document No. 25098)

Section 61.422. Loading Berth and Aisle Dimensions

Loading Berth Dimensions: 12 × 55 feet.

- Aisle Width (one-way): 16 feet.
- Aisle Width (two-way): 28 feet.
- Turning Radius: 47 feet.

Delivery Truck Berth Dimensions: 12 × 25 feet.

- Aisle Width (two-way): 24 feet.
- Turning Radius: 42 feet.

Minimum Height Clearance: 14 feet.

GRAPHIC LINK: MINIMUM HEIGHT CLEARANCE

(Ordinance of 9-16-1991, Document No. 25098)

Delivery Truck Berth Dimensions: 12 × 25 feet.

Aisle Width (two-way): 24 feet.

Turning Radius: 42 feet.

Minimum Height Clearance: 14 feet.

GRAPHIC LINK: MINIMUM HEIGHT CLEARANCE

(Ordinance of 9-16-1991, Document No. 25098)

Section 61.423. Locational Requirements

All loading facilities shall be located on the same building site as the use they serve, and outside of existing public rights-of-way and proposed right-of-way lines established by the Major Thoroughfare Plan (Chapter 61, Part 2B); and shall be well separated and buffered from residential uses abutting the building site in accordance with the Bufferyard Requirements of Chapter 60, Part 2.

Separation From Parking Facilities. All loading berths and maneuvering areas shall be separated from required off-street parking facilities, except in industrial and office/warehouse uses. Directional information to assist traffic flow shall be provided by either pavement marking or signage. Delivery Truck Berths may be combined with parking facilities, but shall be reserved and marked exclusively for loading purposes. In all cases, access aisles may serve both parking and loading facilities.

Maneuvering Area. All loading facilities and vehicular use areas shall be designed so as to eliminate the need for backing and maneuvering from, on, or onto streets, sidewalks, pedestrian ways, or bikeways. Loading berths shall be provided with a maneuvering area not less than 40 feet in depth for counter-clockwise traffic flow, or 100 feet for clockwise traffic flow.

(Ordinance of 9-16-1991, Document No. 25098)

Section 61.424. Number of Loading Berths

All commercial and industrial uses, except banks and savings institutions, shall provide loading berths in the following amounts. In the case of multiple uses within a single building, the required number of berths shall be based on the total gross floor area (GFA) of the building in commercial or industrial use:

0-2,999 square feet GFA	1 delivery truck berth
3,000 square feet GFA or more	At least 1 loading berth

Where loading berths are provided in excess of these standards, the exact number of berths shall be at the option of the developer based upon the needs of the particular use(s). However, all loading facilities provided shall comply with the development standards of this Part.

Determinations by Zoning Official. Where the Zoning Official determines, based on the standards and guidelines of the Institute of Transportation Engineers, that the number of loading berths proposed is clearly insufficient for the needs of the particular use(s), he shall be authorized to require additional berths to be provided. Appeals to such determinations shall be through the Board of Zoning Adjustment in accordance with Chapter 65, Part 2D.

(Ordinance of 9-16-1991, Document No. 25098)

Truck Loading Zone Issues in Downtown Orlando

The FGSMSP noted several issues in relationship to truck loading zones in Orlando. In particular it noted that an area of concern is the adequacy of truck parking at commercial retail strips, shopping malls, hotels and recreational areas, convention centers, and office parks. Given the fact that warehouses and distribution centers are typically designed with truck traffic in mind, these were considered of lesser concern. The report recognized that the construction of truck bays and docks adds to the cost of constructing facilities, and unless the facility is built for a specific truck-related purpose, there is a tendency to minimize these costs. Therefore, building codes where truck traffic is generated should specify the criteria for the number of bays required based on square foot of floor space and these criteria should vary based on the use of the building (office space, retail strip malls, and shopping malls should have different metrics).

Draft Loading Zone Ordinances

During July of 2005, the City of Orlando held a charrette to discuss each of the issues of relevance for the Downtown Transportation Plan. There were some novel ideas for truck loading zones that were presented during the freight portion of the charrette. One idea was to allow for multiple buildings to share a single loading zone. This would potentially rationalize the truck loading requirements and reduce total building and maintenance costs for participating building owners. Informal discussions with shippers revealed resistance to this idea due to issues over liability for stolen goods and accidents in loading areas. Additionally, the added delivery times for truck drivers was considered undesirable. Finally, there was some mention about the infrequent use of loading facilities, but that there is some peaking that occurs for these facilities that would hamper the sharing process.

The mini Freight Village concept involves a cooperative effort between freight shippers and the City to centralize deliveries and transfer smaller goods to smaller vehicles to quickly and efficiently move goods to buildings. At just 55-inches wide and 11 ft. long, this example electric vehicle can carry 1,200 lbs. over 24 miles using alleyways, and on-street loading zones to make faster deliveries without taking up space and blocking streets.

Another idea presented at the charrette was the idea of a mini Freight Village(s) just within the Downtown area in which goods from large 5-axle trucks could be transshipped into 2-axle trucks or even electric for final delivery to the Downtown area. Similarly, shipments out of the Downtown area could be consolidated at these freight villages. Implementing this idea would reduce the amount of truck loading and parking locations needed, because smaller freight vehicles would be on the roads in Downtown Orlando. Informal discussions with shippers revealed resistance to this idea currently due to the additional costs of transshipment facilities which were noted as a significant cost in the supply chain. The added travel times and added complexity to liability was mentioned as negatives for this idea. However, it is expected that as development related traffic congestion increases and parking supply becomes limited, this innovative idea will prove to be both more time and cost efficient than current delivery methods.

The one idea which was identified as a critical need for Downtown loading was the need to ensure the ability to load and unload on or near Orange Avenue. This translates into the need to ensure that the new construction is designed to accommodate the future demand of both off-street parking and on-street parking along Orange Avenue. For example, the Premier Trade Plaza intends to use the Court Avenue access within the parking garage to accommodate freight and delivery needs. While off-street parking based on the current loading zone policy appears to have been successful in Downtown Orlando, field data collection did not observe any excess demand for off-street parking spilling on to the mainline street. Nor was there any observable queuing of vehicles at building locations as they waited to be loaded or unloaded. However, new construction along Orange Avenue should require that if curbside parking is not available, that this must be compensated by off-street parking within the new construction itself.

The Freight Mobility Plan includes the designation of streets for Primary, Secondary and Local freight truck traffic. These designations are defined according to the street functional hierarchy, and conflicting goals towards primary pedestrian street designation or transit corridors. Primary freight streets include I-4, SR 408, SR 50, Orange Blossom Trail, North Magnolia Avenue and South Orange Avenue. These streets should maintain minimum 12 ft. travel lanes to accommodate larger vehicles and provide a minimum 25 ft. intersection turning radius (NCHRP Report 348). At intersections with heavy pedestrian volumes a 15 ft. minimum may be used to maintain shorter crossing distances for pedestrians. Secondary freight streets should provide on-street freight loading accommodations in conjunction with on-street parking. Local freight streets are needed to provide freight traffic entry into neighborhoods and to provide access to properties that have back access for freight and deliveries (i.e. Pine Street between Central and Church east of Rosalind Avenue).

Example Freight Loading Policies from Other Cities

Through Truck Traffic

- **Baltimore –** Created zones for the metro area. At zone boundaries, alternate through truck routes are indicated. Enforcement has been an issue.

Truck Access to Downtown

- **Boston –** Back Streets Program designates sites that have convenient access to highway or rail as prioritized for preservation for industrial uses.

- **Boston –** Nighttime truck ban on through trucks on certain routes. Eventually lifted due to political and industry misgivings.

- **New York City –** Truck route mapping tool. Considering implementation of a web-based mapping tool to allow truck drivers to identify optimal routes with respect to size/weight characteristics and destination. Note: this can be used for parking as well.

- **St. Petersburg –** MPO Countywide truck route ban.

Trucks Moving around Downtown

- **Boston –** Nighttime truck ban on through trucks on certain routes. Eventually lifted due to political and industry misgivings.

- **Seattle –** Time-of-day restriction on trucks entering the City. Trucks can only operate during off-peak hours within the City.

- **New York City –** Truck route mapping tool. Considering implementation of a web-based mapping tool to allow truck drivers to identify optimal routes with respect to size/weight characteristics and destination. Note: this can be used for parking as well.

Truck Parking/Loading in Downtown

- **Portland, Oregon –** Angled Parking Permit Program. Suggests strategies such as setting up cones, using a flagger, and parking at an angle to maximize truck parking.

- **San Francisco, California –** Curbside management. Separates curbside parking into general commercial use and truck-only areas and trucks with six or more vehicles. All loading zones have 30-minute time limits and some have parking meters charging 75 cents for 30 minutes. Compliance weak.

- **New York City –** Pricing strategies. 7:00 AM-6:00 PM = $2.00 for one hour, $5.00 for two hours, $9.00 for three hours. Businesses are able to purchase debit cards with memory chips for drivers. Average time at a spot dropped from five hours to 90 minutes. Projected revenue for 2005 is $10 million.

- **New York City –** Plug-in power sources to provide electricity for idling trucks reducing fuel consumption and emissions.

Land Use

- **Portland, Oregon –** Designated industrial infrastructure for future investment and upgrade.

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Section 7

Roadway Network & Traffic Plan

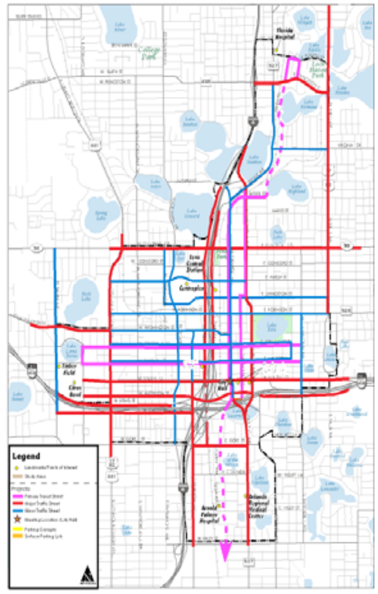
Streets

Solutions designed to provide additional roadway capacity in the Downtown street network will be costly and can only provide a limited amount of new capacity. Therefore, the plan focuses on moving people on "complete streets" that accommodate all users, rather than simply moving cars.

Improvements recommended for the Downtown street network focus on maximizing the efficiency of the system through the following strategies:

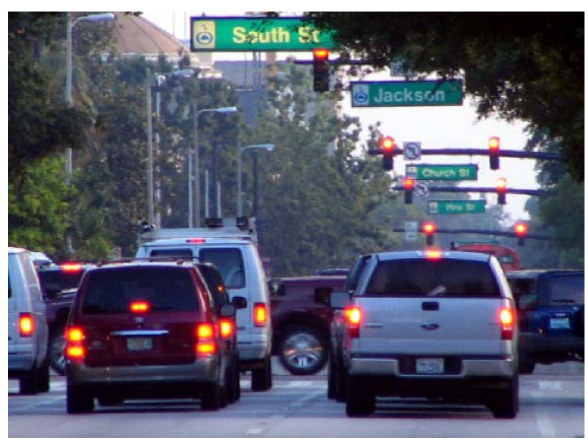
- Enhance connectivity by extending and reconnecting streets
- Reduce circulating traffic by converting streets to two-way traffic
- Focus corridor and intersection improvements on Major and Minor Traffic Streets
- Upgrade to intelligent signal system which adapts in real time to changing conditions
- Implement Transportation Demand Management strategies

The plan provides alternatives to traveling by single occupant vehicle, thereby allowing the available Downtown street right-of-way to be used more efficiently.

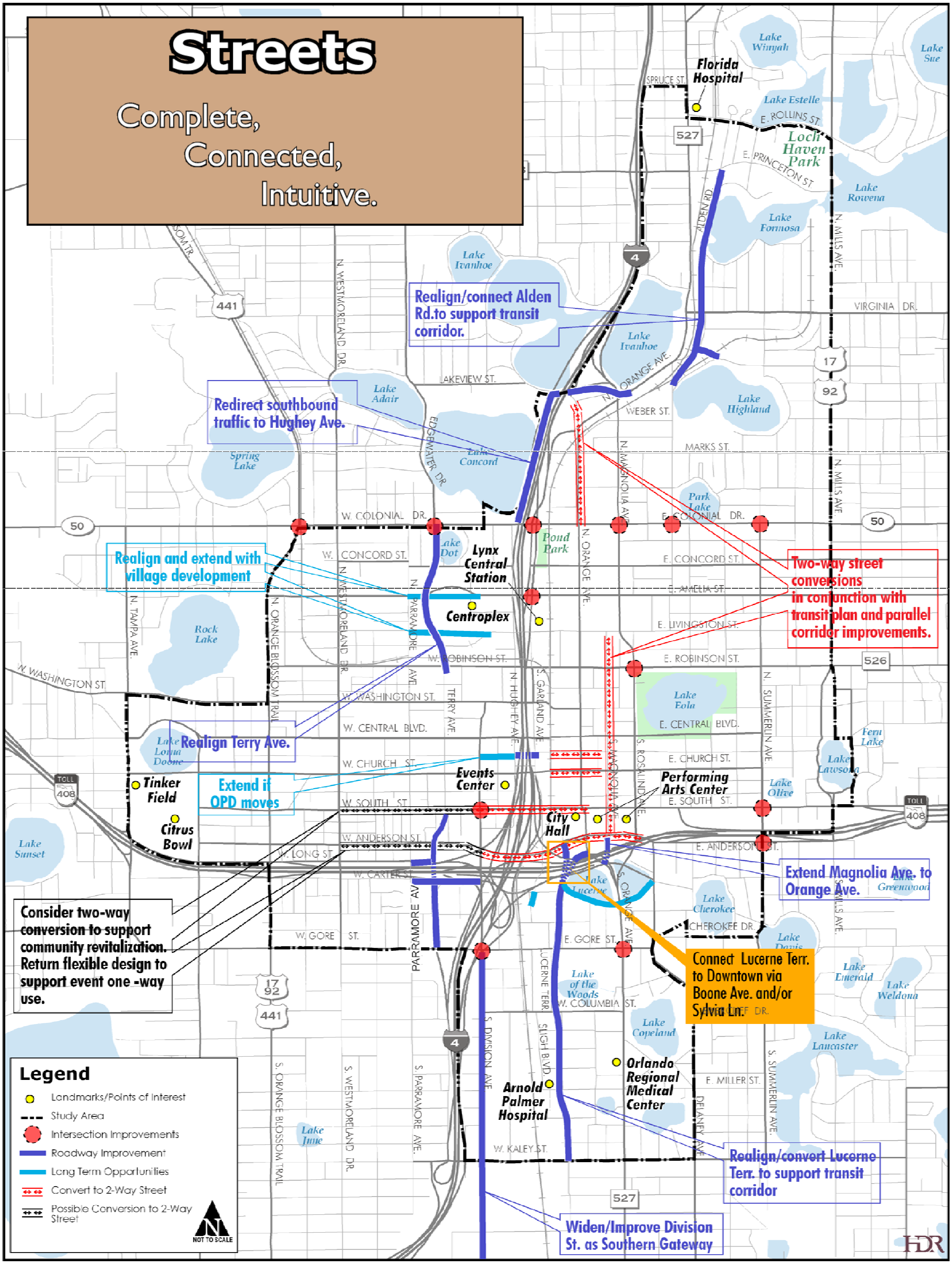


Surface Street Hierarchy – The system of surface streets have a hierarchy based upon their functional role in the downtown network. Lane widths, on-street parking, bicycle lanes, sidewalk widths, turning radii, signal priority and transit provisions vary accordingly with the street type and function.

Converting streets to allow two-way traffic will help make travel in Downtown more intuitive and simplify circulation.



Intersection improvements have been recommended at 13 of the busiest intersections in Downtown to improve traffic flow. In addition, the signal system will be improved to allow the signal timings to adapt to real time traffic conditions.


Streets
Complete,
Connected,
Intuitive.
Realign/connect Alden Rd. to support transit corridor.
Redirect southbound traffic to Hughey Ave.
Realign and extend with village development
Realign Terry Ave.
Extend if OPD moves
Two-way street conversions in conjunction with transit plan and parallel corridor improvements.
Extend Magnolia Ave. to Orange Ave.
Connect Lucerne Terr. to Downtown via Boone Ave. and/or Sylvia Ln.
Consider two-way conversion to support community revitalization. Return flexible design to support event one-way use.
Realign/convert Lucerne Terr. to support transit corridor
Widen/Improve Division St. as Southern Gateway
Florida Hospital
Lynx Central Station
Centroplex
Events Center
Performing Arts Center
City Hall
Tinker Field
Citrus Bowl
Orlando Regional Medical Center
Arnold Palmer Hospital
Legend
Landmarks/Points of Interest
Study Area
Intersection Improvements
Roadway Improvement
Long Term Opportunities
Convert to 2-Way Street
Possible Conversion to 2-Way Street
NOT TO SCALE

7.1 Traffic Plan Introduction

The purpose of this chapter is to develop a forecast of the projected traffic flow conditions within the Downtown Orlando area while incorporating all the other elements of the Downtown Orlando Transportation Plan; perform an evaluation of the operating performance of the roadway system; and identify a plan of intersection improvements that would achieve a reasonable level of service to the motoring public traveling on the streets of Downtown Orlando.

7.2 Development of Future Year Traffic Flow Forecasts

The City of Orlando Public Works Department staff and the Downtown Orlando Transportation Plan team of consultants conducted a brainstorming session in December 2005 about developing a methodology to generate the traffic flow projections within the study area using readily available information. For starters, the City of Orlando Transportation Planning Bureau has developed a SYNCHRO model representing a portion of the Orlando Downtown area as part of a series of traffic impact studies associated with the surge in high rise condominium/office complexes in the Thornton Park area. This SYNCHRO model represents 2008 p.m. peak hour traffic flows that were based on current traffic counts that were factored up to 2008 levels and superimposed with projected trips from all the proposed condominium/office complexes.

Secondly, a more comprehensive study was developed by the Florida Department of Transportation in 2001 as part of the Interstate 4 PD&E Study that included a detailed analysis of the impacts of the proposed access modification plan within the Orlando Downtown area when the I-4/SR 408 (East West Expressway) interchange is reconstructed. The I-4 PD&E Study looked at a.m. and p.m. peak hour traffic flow projections in the year 2020 for all the major intersections located within the area bounded by SR 50 (Colonial Drive) to the north, Parramore Avenue to the west, Gore Street to the south and Rosalind Avenue to the east.

These two sources of information (the Orlando 2008 Downtown SYNCHRO model and the FDOT I-4 PD&E study) became the basis for developing the traffic flow projections used in the Downtown Orlando Transportation Plan. City staff conducted an evaluation of historical traffic growth trends by comparing current traffic counts, with the 2008 SYNCHRO model and the 2020 traffic projections from the I-4 PD&E study for seven common intersections. The analysis conducted by City staff concluded that an annual growth rate of three (3%) percent has been experienced within Downtown Orlando. The 3% annual traffic growth rate represents a reasonable trend that takes into account a sustainable economic activity in a vibrant downtown area like Orlando's.

In addition, an analysis year of 2015 was selected for evaluating the traffic flow conditions for the Downtown Orlando Transportation Plan. The 2015 analysis year represents the anticipated completion of the I-4/SR 408 interchange which also results in the closing of the Robinson Street eastbound exit and westbound entrance ramps to I-4 and the conversion of South Street and Anderson Street to two-way operation between Division Street and Magnolia Avenue.

The project team developed the 2015 traffic flow projections by downscaling the I-4 PD&E year 2020 traffic flows using the 3 percent annual adjustment rate. Corollary to this exercise, the project team also applied the 3 percent annual adjustment rate to the 2008 SYNCHRO model to develop a second set of 2015 traffic flow projections. The set that resulted in a higher year 2015 forecast was selected for use in the analysis.

7.3 Year 2015 Traffic Operations Analysis

The project team developed the base year 2015 SYNCHRO model of the Downtown Orlando Transportation Plan study area by expanding the City's 2008 SYNCRHO model. The expanded area extended north to Lake Ivanhoe, west to US 441, south to Gore Street and east to Summerlin Avenue. The 2015 Downtown Orlando SYNCHRO model incorporated the intersection geometric and traffic control characteristics (i.e., number of lanes on each intersection approach, length of turning lanes, and traffic signal controller and coordination timing plans). SYNCHRO is a traffic simulation and analysis tool that traffic engineers use to evaluate traffic flow characteristics along an arterial corridor or through a roadway grid network.

Traffic engineers typically use level of service (LOS) to measure the quality of traffic flow through an intersection or a roadway segment. Levels of service ranging from A to E represent acceptable operating conditions, while LOS F represents breakdown or forced flow conditions. For purposes of this study, intersection delays of LOS E or better represent acceptable operating conditions.

Traffic engineers also use the volume-to-capacity ratio as an analytical tool. The v/c ratio is a measure of the relationship between traffic volume and the capacity of the respective movement. A v/c ratio greater than one indicates over-capacity conditions, which typically results in congested, stop-and-go operation. Traffic engineers use this measure as an indicator for implementing capacity improvements when the ratio exceeds or approaches one.

Delay is another measure of efficiency in evaluating the operation of signalized intersections. Delay is defined as the time spent by a vehicle waiting at the intersection. Delay is measured whether the vehicle is physically stopped or his forward progress is slowed or impeded by other vehicles moving in front of him. Delay is directly associated with level of service.

These three performance indicators (level of service, v/c ratio, and delay) will be used to evaluate the traffic flow conditions at the major signalized intersections within the study area.

7.4 Analysis of Year 2015 Traffic Flow Conditions

An initial test of the 2015 SYNCHRO model was developed using the intersection geometries that are expected to be in place in the year 2015 and signal timing plans that are currently in place. Based on the 2015 SYNCHRO model, **Figures 7-1-A** through **7-1-E3** illustrate the year 2015 intersection traffic flows for the p.m. peak hour condition, the intersection turn lane features, and the resulting level of service operation. According to the SYNCHRO analysis, the following intersections are found operating at LOS F condition in 2015:

- US 441 (Orange Blossom Trail) at SR 50 (Colonial Drive)
- SR 50 (Colonial Drive) at Garland Avenue
- SR 50 (Colonial Drive) at Magnolia Avenue
- Amelia Street at Garland Avenue/I-4 Eastbound Exit Ramp
- Robinson Street at Rosalind Avenue
- Central Boulevard at Rosalind Avenue
- Pine Street at Rosalind Avenue
- Orange Avenue at Jackson Street
- Orange Avenue at South Street
- Orange Avenue at Anderson Street
- Orange Avenue at Gore Street
- Rosalind Avenue at Anderson Street
- Anderson Street at Summerlin Avenue

7.5 Proposed Improvements

Those intersections that were found with operational deficiencies were evaluated in further detail to understand the cause of deficiencies and to identify potential improvements that would mitigate these capacity deficiencies. The following sections discuss the mitigation plan for these deficient intersections.

US 441 (Orange Blossom Trail) at SR 50 (Colonial Drive)

This intersection is located west of Downtown and is surrounded by a residential neighborhood in the northwest corner, the CSX railroad tracks along the east side of US 441, and an office complex in the southwest corner. Opportunities to construct additional turn lanes can not be accomplished without relocating the active railroad tracks or acquiring right-of-way from adjacent property owners. Based on the volume of traffic crossing this intersection, a single point urban interchange similar to the design configuration proposed for SR 50 at SR 436 and SR 436 at US 17-92 was considered. However, it cannot be constructed without adverse right-of-way impacts to the surrounding neighborhood. Given the physical constraints facing potential improvements to this intersection, it was decided to maintain the existing configuration under the Downtown Orlando Transportation Plan.

Figure 7-1
Study Area

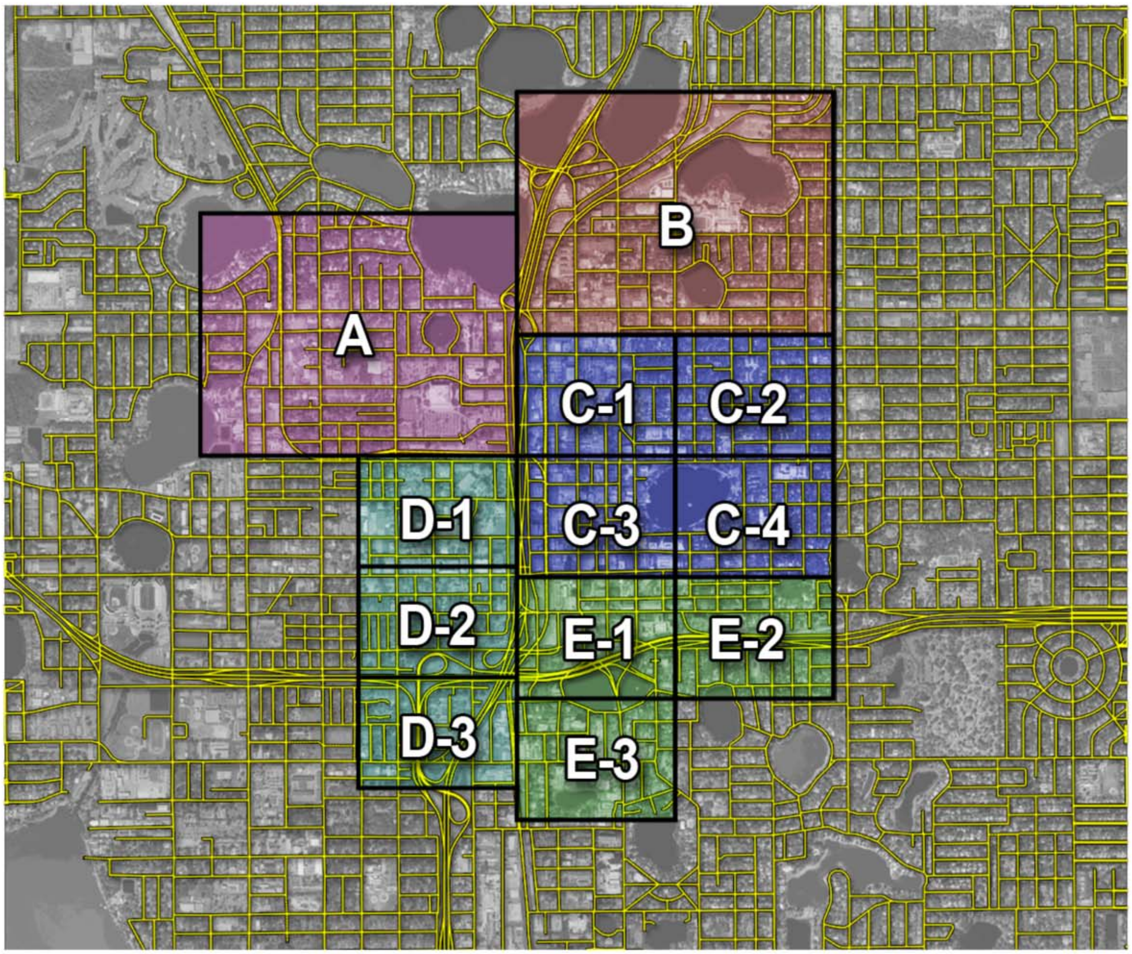
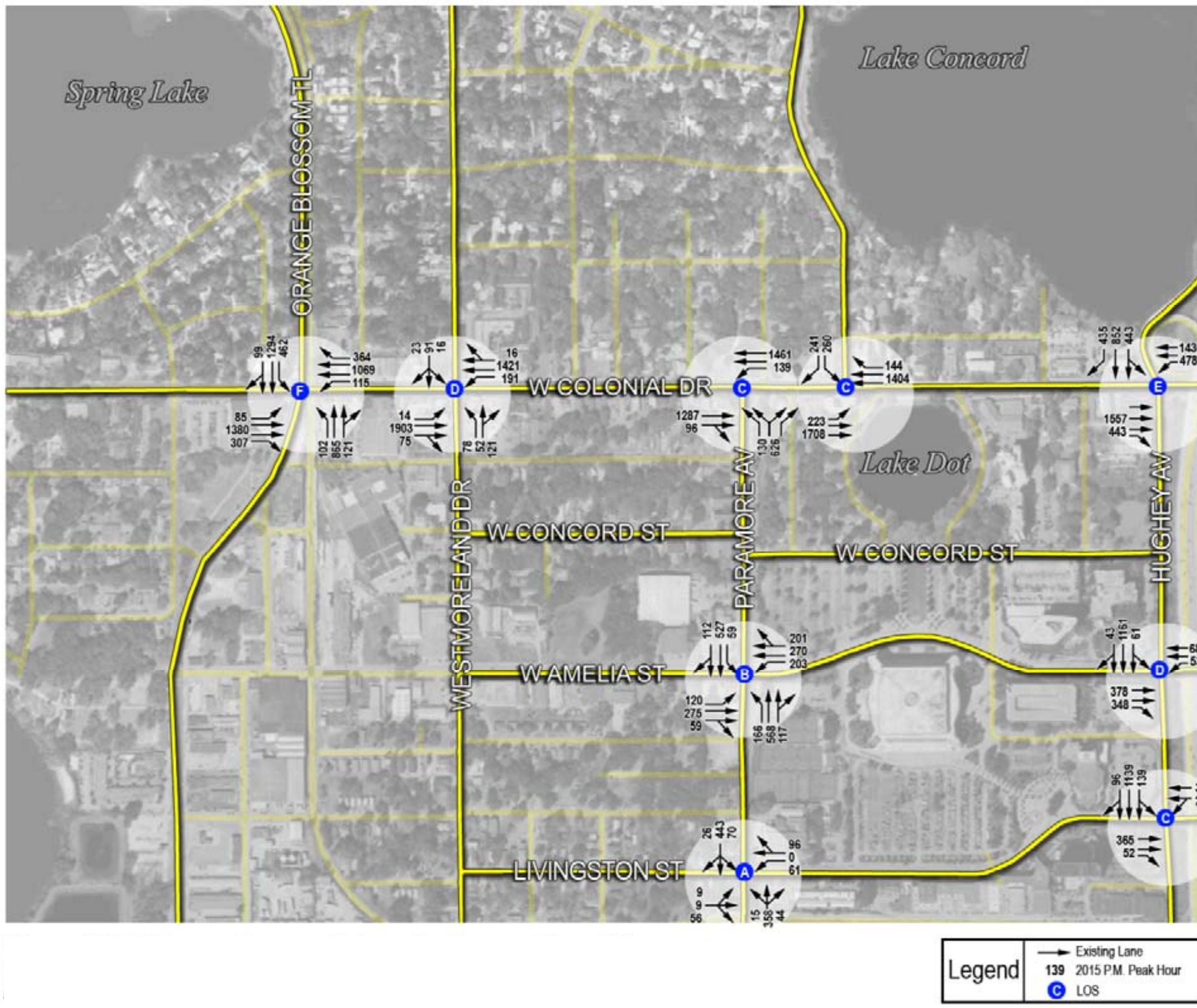


Figure 7-1: Section A
Year 2015 Downtown Orlando Base Condition



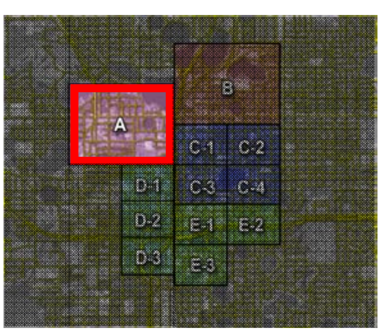
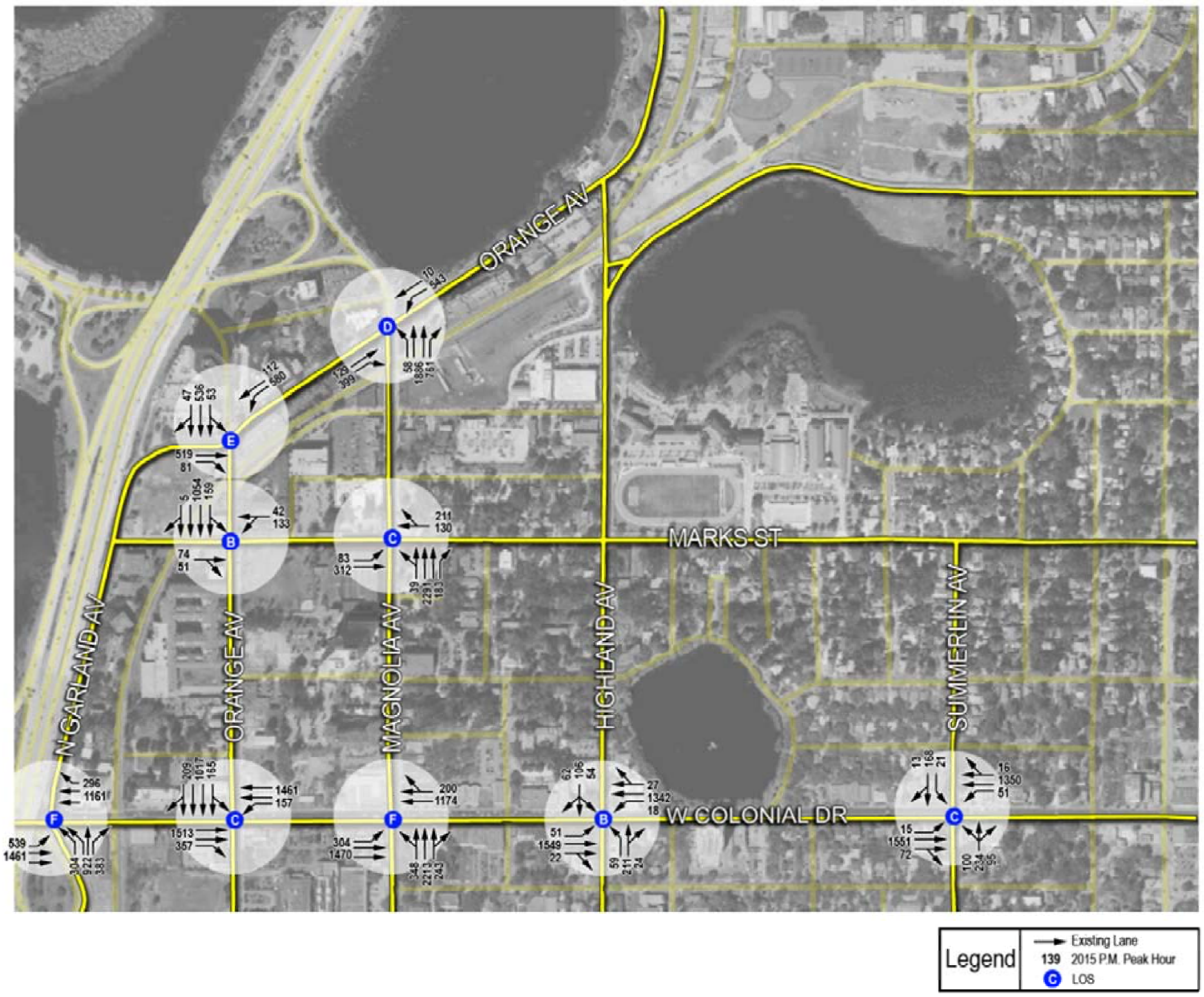


Figure 7-1: Section B
Year 2015 Downtown Orlando Base Condition



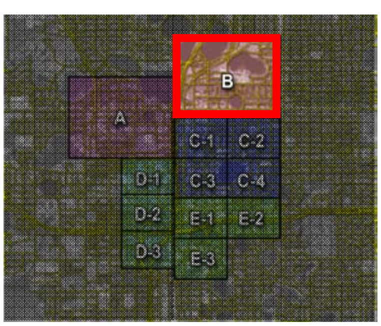
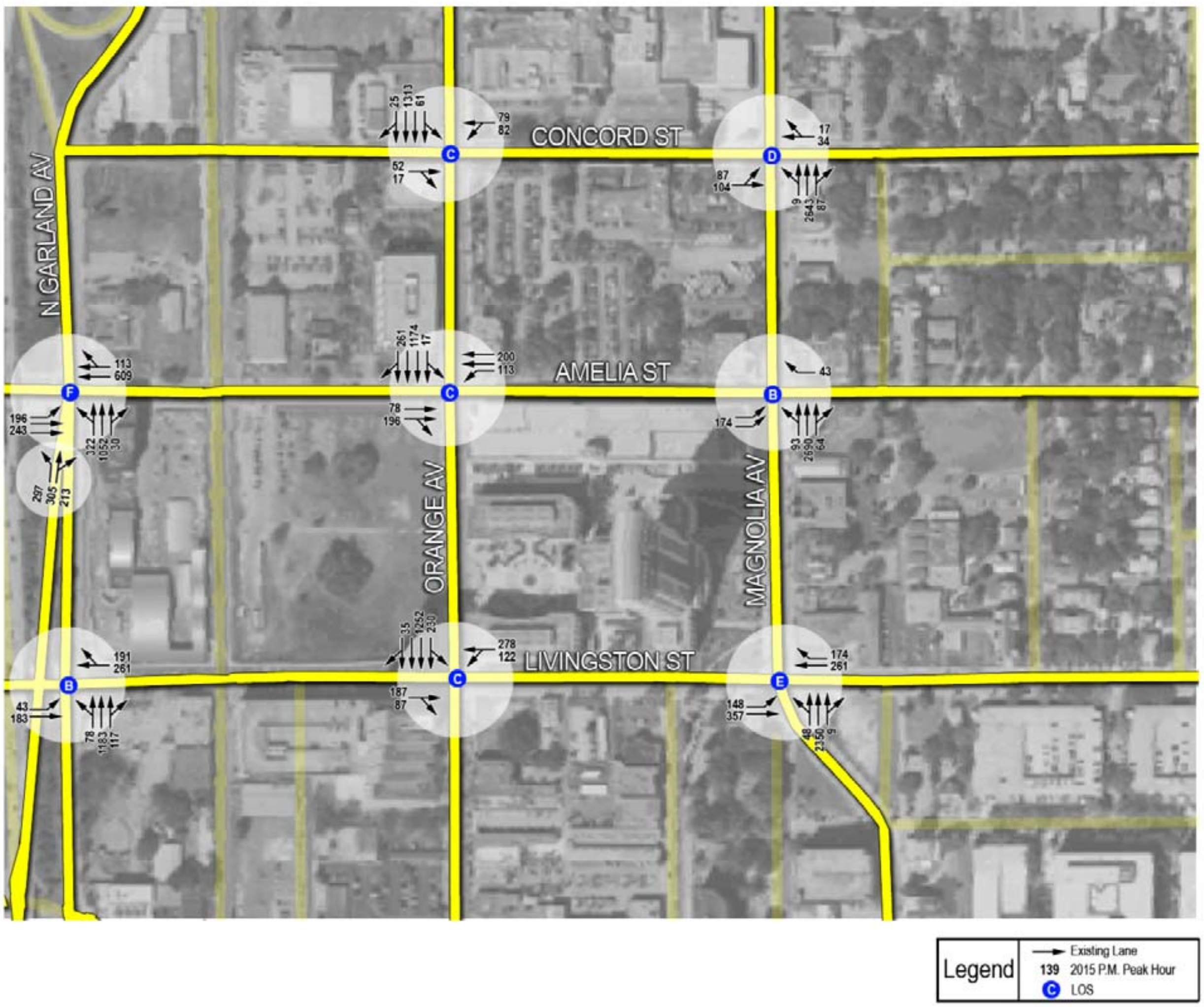


Figure 7-1: Section C-1
Year 2015 Downtown Orlando Base Condition



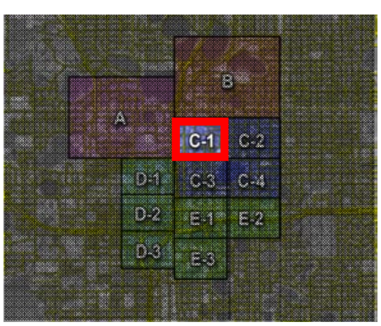


Figure 7-1: Section C-2
Year 2015 Downtown Orlando Base Condition

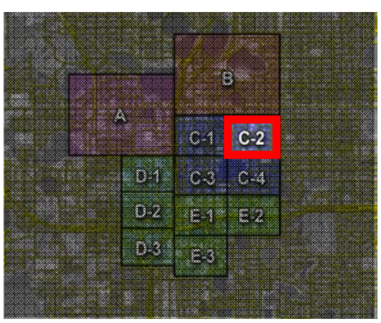
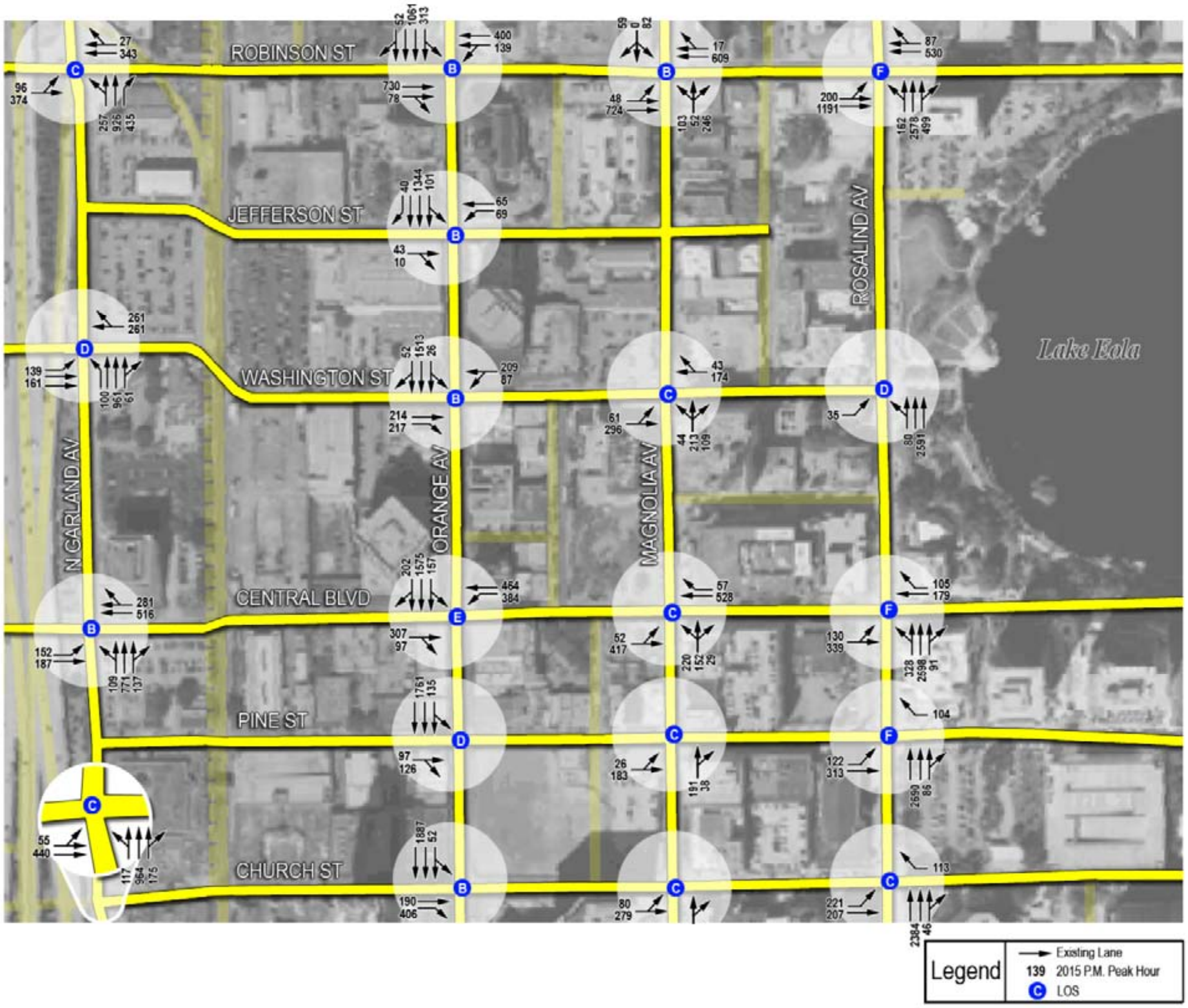


Figure 7-1: Section C-3
Year 2015 Downtown Orlando Base Condition



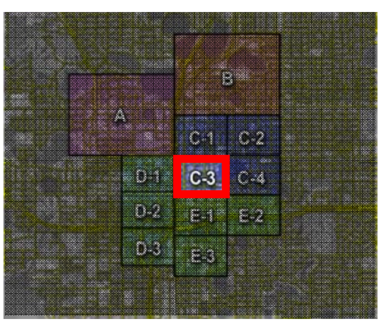
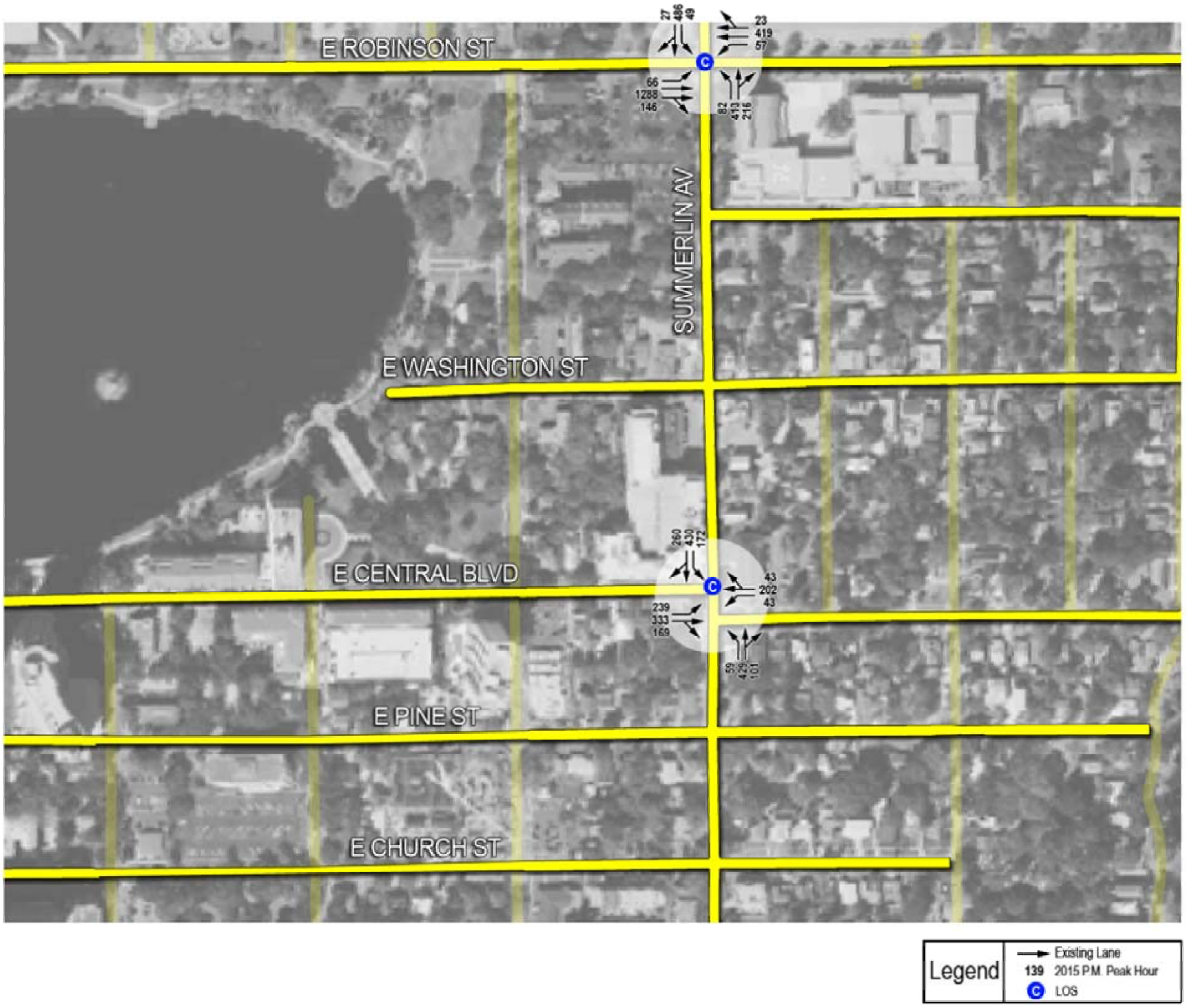


Figure 7-1: Section C-4
Year 2015 Downtown Orlando Base Condition



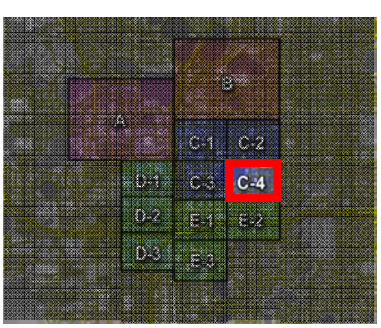
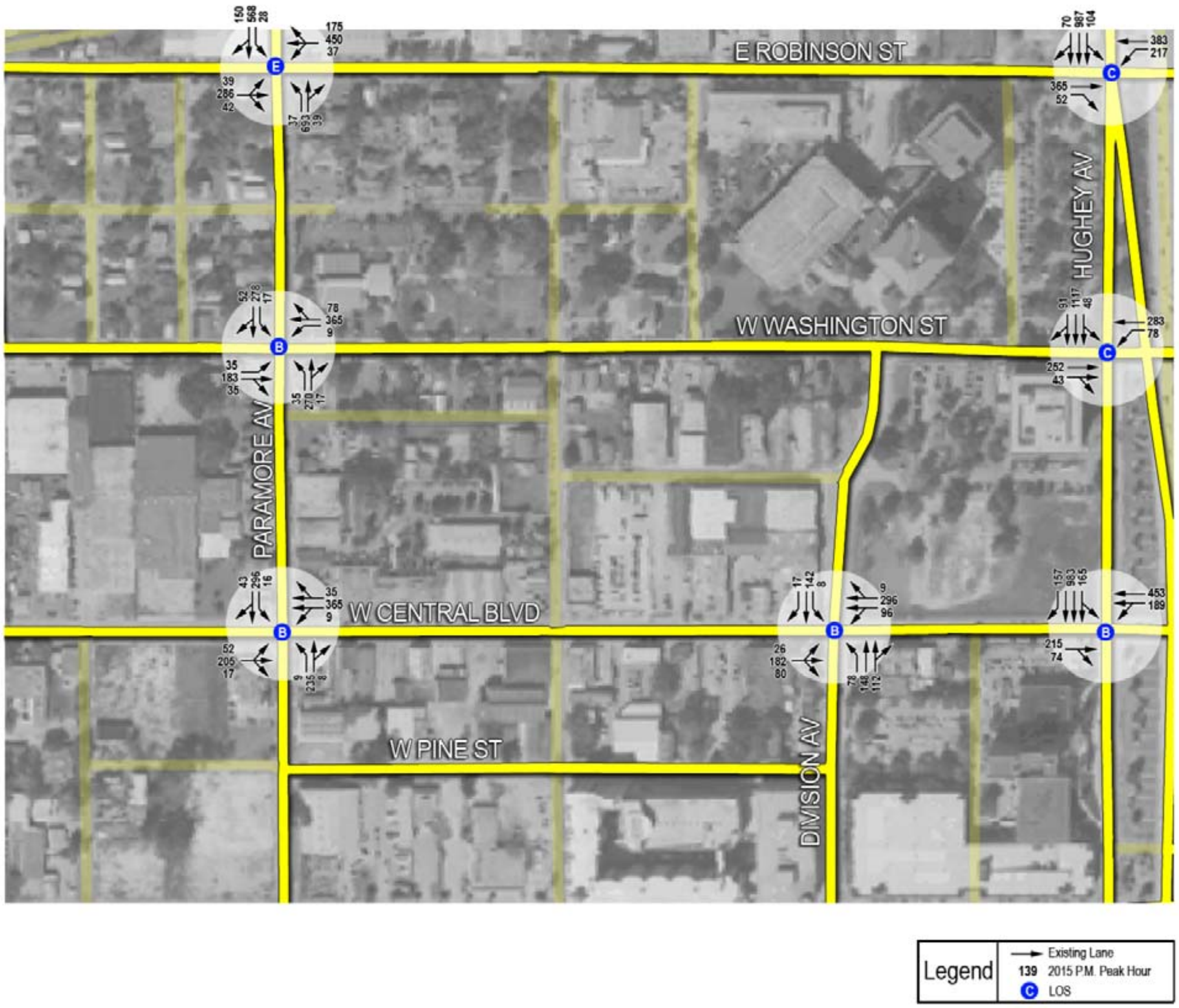
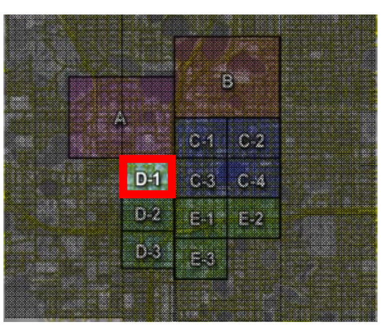


Figure 7-1: Section D-1

Year 2015 Downtown Orlando Base Condition





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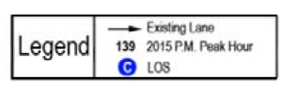
Year 2015 Downtown Orlando Base Condition



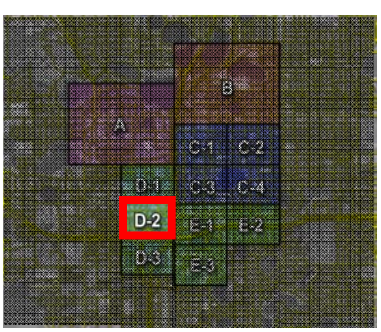
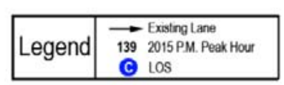


Figure 7-1: Section D-3
Year 2015 Downtown Orlando Base Condition



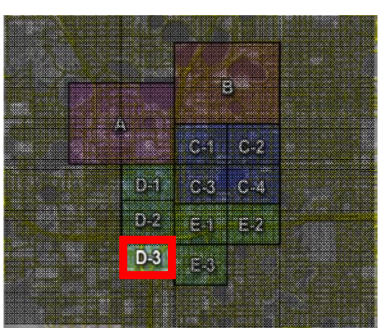
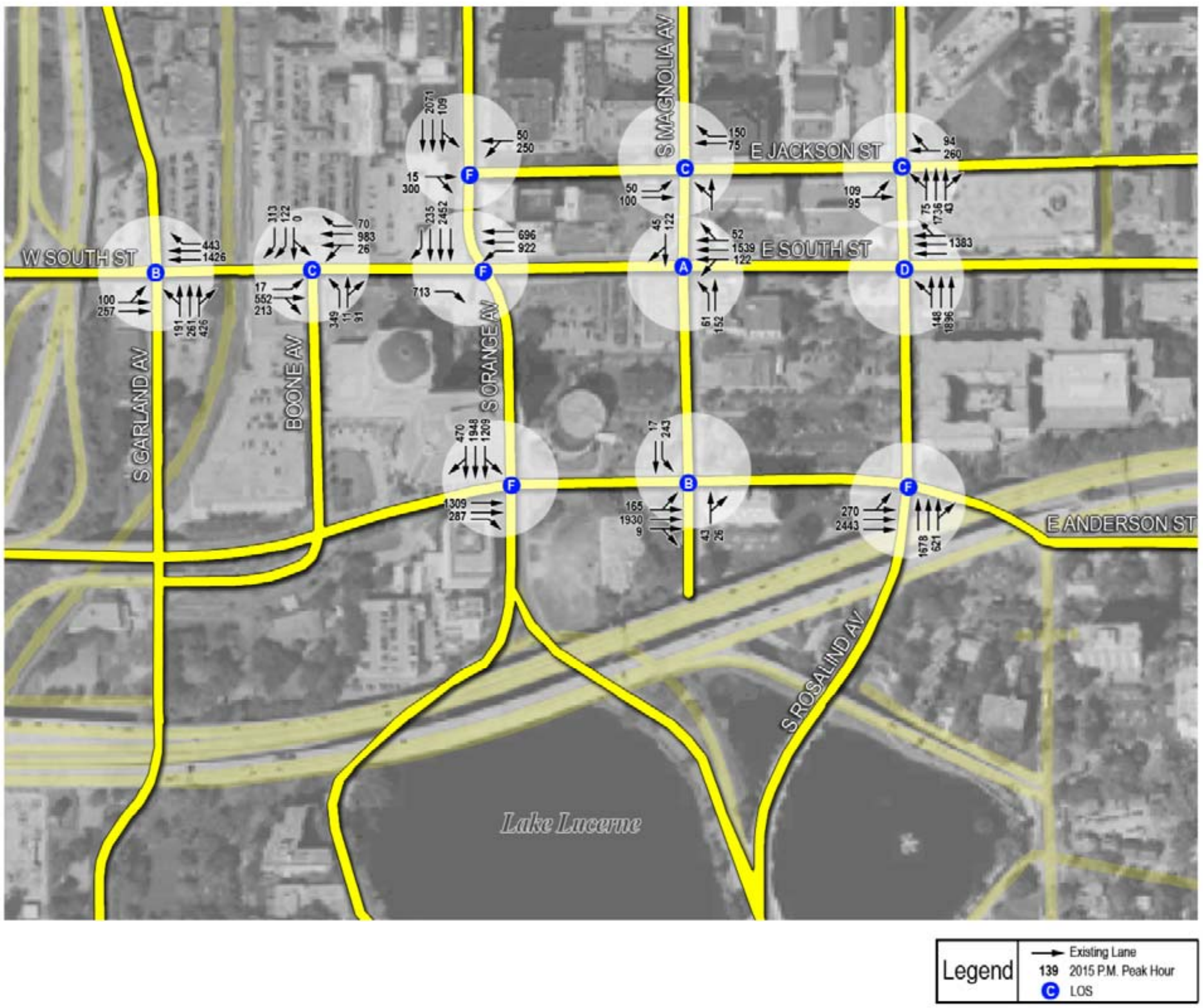


Figure 7-1: Section E-1
Year 2015 Downtown Orlando Base Condition



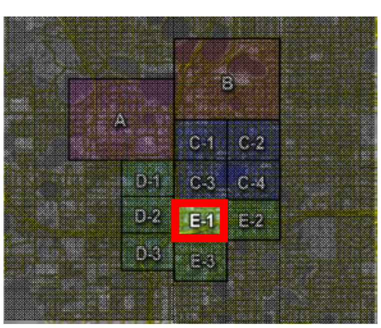
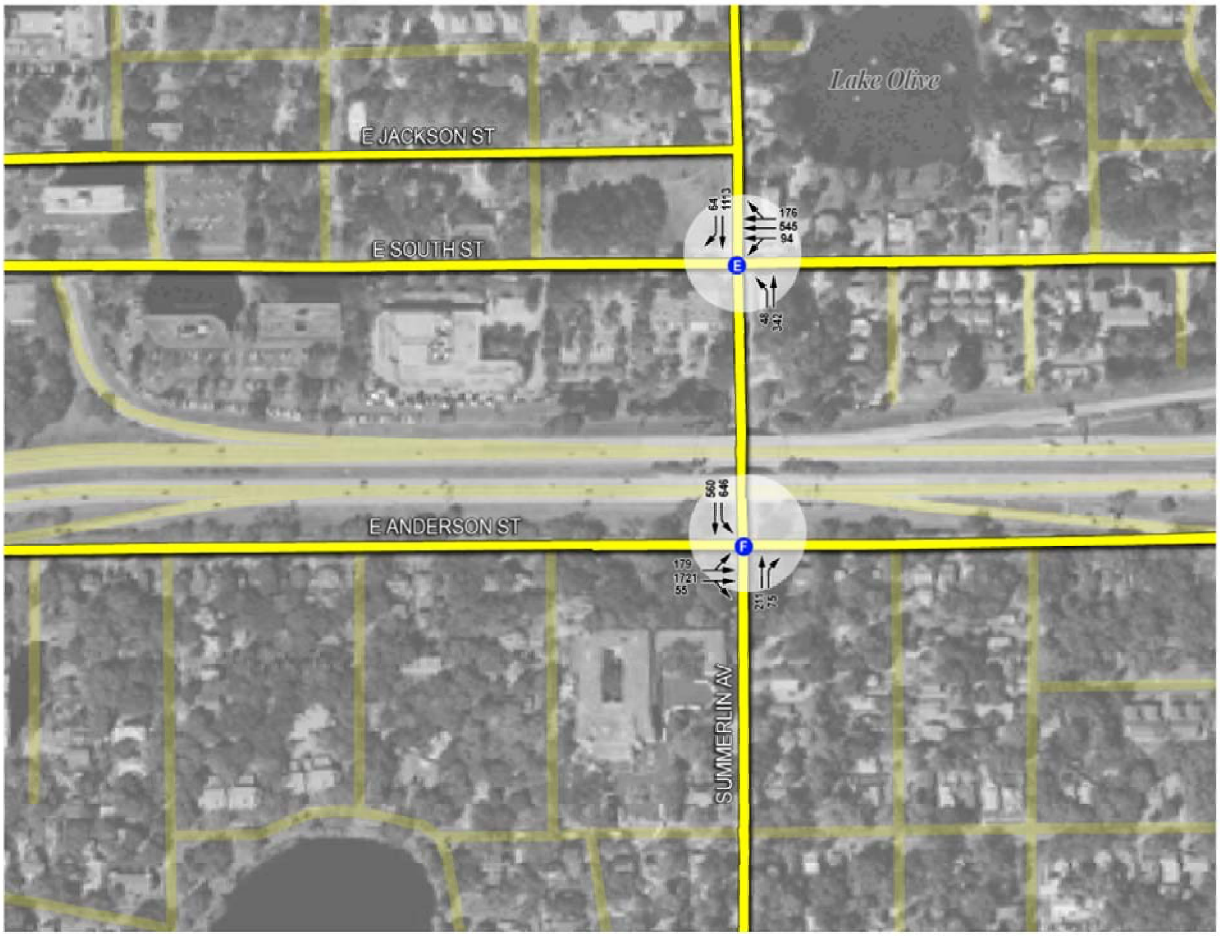
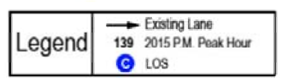


Figure 7-1: Section E-2
Year 2015 Downtown Orlando Base Condition





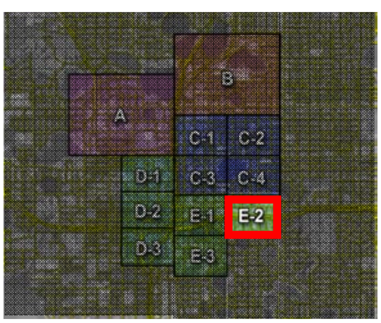


Figure 7-1: Section E-3
Study Area

SR 50 (Colonial Drive) at Garland Avenue

The I-4/SR 50 interchange will be reconstructed as part of the FDOT's plan to widen the interstate through Downtown. The proposed improvement consists of:

- ❖ Construction of a Single Point Urban Interchange at this location. The proposed improvements also include the 6-laning of SR 50 between west of Hughey Avenue and Orange Avenue.

SR 50 (Colonial Drive) at Magnolia Avenue

Since there are no proposed plans to increase the SR 50 mainline capacity from its existing 4-lane urban design, improvements at this intersection will involve:

- ❖ Constructing a second eastbound left-turn lane to facilitate demand turning north on Magnolia Avenue.

This turn lane addition can be accomplished without additional right-of-way by removing on-street parking on SR 50.

Amelia Street at Garland Avenue/I-4 Eastbound Exit Ramp

The closing of the I-4/Robinson Street Exit Ramp due to the reconstruction of the SR 408 (East-West Expressway) interchange with I-4 will divert motorists onto the Amelia Street Exit Ramp. The proposed improvement at this intersection involves:

- ❖ Adding a third approach lane on the exit ramp and a westbound right-turn lane on Amelia Street to facilitate right-turn demand turning north to Garland Avenue.

Robinson Street at Rosalind Avenue

The projected deficiency at this intersection is caused by the absence of an eastbound left-turn lane on Robinson Street. The existing geometry provides two through lanes serving the eastbound approach. Eastbound left-turning vehicles must wait for gaps in the westbound traffic stream and while doing so, stopped vehicles restrict the eastbound flow into a single through lane. The traffic demand on the eastbound approach requires two lanes of capacity and there is no opportunity to acquire right-of-way as adjacent properties are completely built out including the Vue at Lake Eola which is under construction. As such, an alternative was examined that consisted of:

- ❖ Imposing an eastbound No Left Turn restriction at this location. Left turns would be routed to go north onto Magnolia Avenue, then turn right at Livingston Street, then left on Rosalind Avenue.

Central Boulevard at Rosalind Avenue and Pine Street at Rosalind Avenue

These two intersections are closely linked together because of proximity and function. Central Boulevard, Pine Street and Church Street form parallel roads separated one block apart from each other. Pine Street and Church Street currently flow one-way eastbound between Garland Avenue and Rosalind Avenue, while Central Boulevard operates two-way. Because of recently approved high-rise condominium and office complexes along Pine Street and Church Street, servicing traffic flow generated by these developments is a major concern.

These three parallel roadways provide an imbalanced system capacity with three eastbound lanes and one westbound lane (via Central Boulevard). By converting Pine Street to flow one-way westbound, a more balanced capacity is achieved with two eastbound lanes (Central Blvd. and Church Street) and two westbound lanes (Central Blvd. and Pine Street).

A concern was also expressed by City staff about traffic exiting from the 55 West high rise development getting trapped on westbound Pine Street when traffic is held up by an active AMTRAK or CSX train crossing. The frequency of rail crossing may also rise when the proposed Central Florida Commuter Rail system goes on line in the future. Given this concern, the Church Street and Pine Street should be converted to two-way operation between Garland Avenue and Orange Avenue.

In summary, the proposed initial short-term improvements consist of the following:

- Maintain Church Street and convert Pine Street to two-way flow between Garland Avenue and Orange Avenue
- Maintain Church Street as one-way eastbound and convert Pine Street to one-way westbound between Orange Avenue and Rosalind Avenue.
- Optimize and coordinate the signal timings on all intersections affected by these conversions including those on Central Boulevard.
- The design of the Pine Street one-way westbound conversion should maintain parking on at least one side for metered parking and/or deliveries between Orange Avenue and Rosalind Avenue.

In the mid term, it is proposed that Pine Street will be extended from Garland Avenue to Hughey Avenue as a two-way street.

The long-term improvements proposed for Pine Street and Church Street are to revert both Pine Street and Church Street to two-way traffic between Orange Avenue and Rosalind Avenue. These improvements must be accompanied by the conversion of Magnolia Avenue to two-way traffic from Livingston Street to Anderson Street and would include changes to the transit circulator to use the Magnolia Avenue corridor and Orange Avenue corridor as north-south pairs. This conversion would be dependent upon further local traffic circulation study of the development block between Central Avenue and South Street. If successful, this long-term improvement would restore all two-way traffic on east-west streets within the Downtown core (except Wall Street behind the Orange County Library).

Orange Avenue at Jackson Street

The proposed improvement to this intersection consists of optimizing the traffic signal timing. The buildup of surrounding properties around this intersection prevents adding turn lanes from being economically feasible.

Orange Avenue at South Street

This intersection will feature an eastbound contra-flow lane on South Street proposed by the FDOT as part of the I-4/SR 408 interchange reconstruction. The contra-flow lane proposed by FDOT extends between Division Street and Orange Avenue. The City of Orlando plans to extend the contra-flow lane to Rosalind Avenue in order to serve the site for the future Performing Arts Center.

The extra movement introduced by the contra-flow lane requires an additional phase to the traffic signal operation. This intersection services high vehicular and pedestrian traffic flows which contribute to the poor level of service operation.

Anderson Street Intersections with Orange Avenue and Rosalind Avenue

Anderson Street will feature a westbound contra-flow lane proposed by the FDOT as part of the I-4/SR 408 interchange reconstruction. The contra-flow lane proposed extends between Division Street and Orange Avenue. The City of Orlando plans to extend the contra-flow lane to South Street via Rosalind Avenue in order to serve the site for the future Performing Arts Center. When completed, the contra-flow lane loops south on Rosalind Avenue at South Street, goes west on Anderson Street all the way to Division Street.

The extra movement introduced by the contra-flow lane requires an additional phase to the traffic signal operation which contributes to the poor intersection level of service operation.

A potential benefit derived from the Rosalind/Anderson contra-flow lane is it provides an alternate route for commuters wanting to go south on Orange Avenue to bypass the busy South Street/Orange Avenue intersection.

Orange Avenue at Gore Street

This intersection is surrounded by the employee and visitor parking lot for ORHS Lucerne located at the northwest corner, the City of Orlando Neighborhood Services Office at the northeast corner, and fuel filling stations at the southwest and southeast corners. High traffic volume demand contributes to the poor operating performance of this intersection. One potential mitigation plan is to eliminate on-street parking on Orange Avenue, south of Gore Street and re-stripe the northbound approach to provide three through lanes (since there are three receiving lanes north of Gore Street). This plan was deemed not feasible because of the anticipated outcry from business operators wanting to retain on-street parking.

Recognizing the high traffic demand on Orange Avenue, the City plans to develop Division Street as a second gateway to and from the south. Division Street can be accessed from I-4 via the Kaley Avenue interchange and when the I-4 Master Plan improvements are implemented, Division Street will be equally accessible to Downtown as Orange Avenue does today.

Anderson Street at Summerlin Avenue

The development boom experienced by the Thornton Park area of Downtown Orlando will contribute to the intersection capacity deficiencies projected to occur at this intersection. Recognizing this future problem, the City of Orlando Public Works developed a plan to widen Summerlin Avenue to a four-lane section between Anderson Street and South Street. The intent of this plan is to bring two southbound lanes and one northbound lane, with the median lane (i.e., the 4^{th} lane) providing room to develop a second southbound left-turn lane at the Anderson Street intersection and a northbound left-turn lane at the South Street intersection.

7.6 Analysis with Proposed Improvements

The proposed intersection improvements described in the previous sections were coded into the 2015 SYNCHRO model and re-analyzed. In addition to these intersection improvements, the reanalyzed SYNCHRO model incorporated the following additional improvements:

- Bus-only contra-flow lanes for the extension of LYMMO service north of Amelia Street. This LYMMO service extension loops north along Orange Avenue, turns south on Magnolia Avenue near Lake Ivanhoe and west on Amelia Street. The segments on Orange Avenue and Magnolia Avenue involve contra-flow lane operation.
- At SR 50 (Colonial Drive) and Edgewater Drive, a second southbound left-turn lane will facilitate the heavy left-turn lanes crossing this intersection
- At SR 50 (Colonial Drive) and Highland Avenue, the southbound approach will be widened to accommodate a left-turn lane.
- At SR 50 (Colonial Drive) and Summerlin Avenue, the northbound approach will be widened to accommodate a left-turn lane.

Table 7-1 (following page) compares the performance indicators between the base network and the proposed improvements for the critical downtown intersections. It should be noted that a few intersections remain at LOS F even after proposed intersection improvements are included in the analysis. A description of these capacity deficient intersections is discussed below:

SR 50 (Colonial Drive) at Magnolia Avenue

Although this intersection is projected to operate at LOS F even after a second eastbound left-turn lane is added, the operating characteristics reveal that average delay improves from 207.7 seconds to 132 seconds, a 36 percent reduction

Table 7-1
Year 2015 MOE Summary

	Base Geometry			Proposed Investments		
	V/C	Delay	LOS	V/C	Delay	LOS
Colonial Dr. at:						
Edgewater Dr.	0.77	21.8	**C**	0.66	15.0	**B**
Hughey Ave.	1.87	178.5	**F**	0.87	58.4	**E**
Garland Ave.	2.06	166.4	**F**			
Orange Ave.	0.77	34.4	**C**	0.94	42.6	**D**
Magnolia Ave.	1.88	207.7	**F**	1.27	132.0	**F**
Highland Ave.	0.69	14.6	**B**	0.61	12.4	**B**
Summerlin Ave.	0.84	32.3	**C**	0.68	16.3	**B**
Amelia St. at:						
Garland Ave.	1.19	104.7	**F**	0.86	47.4	**D**
Robinson St. at:						
Rosalind Ave.	1.48	226.6	**F**	1.20	99.2	**F**
Central Blvd. at:						
Rosalind Ave.	1.08	183.8	**F**	1.21	118.4	**F**
Pine St. at:						
Orange Ave.	0.6	8.1	**A**	0.73	9.8	**A**
Magnolia Ave.	0.28	24.7	**C**	0.37	23.3	**C**
Rosalind Ave.	0.86	172.2	**F**	0.72	27.6	**C**
Church St. at:						
Garland Ave.	0.47	34.9	**C**	0.47	26.6	**C**
Orange Ave.	0.77	13.0	**B**	0.77	17.6	**B**
Magnolia Ave.	0.44	33.7	**C**	0.57	32.7	**C**
Rosalind Ave.	0.73	32.1	**C**	0.81	17.8	**B**
Jackson St. at:						
Orange Ave.	0.88	82.9	**F**	0.88	30.2	**C**
South St. at:						
Division St.	0.63	16.5	**B**	0.65	17.9	**B**
Orange Ave.	1.18	196.1	**F**	1.44	161.2	**F**
Magnolia Ave.	0.51	10.0	**A**	0.59	9.8	**A**
Rosalind Ave.	0.91	53.6	**D**	0.95	29.6	**C**
Summerlin Ave.	0.98	66.2	**E**	0.64	20.7	**C**
Anderson St. at:						
Orange Ave.	1.33	195.7	**F**	1.10	77.8	**E**
Magnolia Ave.	0.72	15.2	**B**	0.79	28.9	**C**
Rosalind Ave.	1.22	145.3	**F**	1.22	148.2	**F**
Summerlin Ave.	1.39	131.4	**F**	1.09	106.2	**F**

from the base condition, and the v/c ratio also goes from 1.88 to 1.27. It should also be noted that the intersection features a bus-only contra-flow lane along Magnolia Avenue, which contributes to additional delay and vehicular conflicts that the intersection must serve.

Robinson Street at Rosalind Avenue

The eastbound left-turn movement is prohibited as part of the proposed improvement resulting in an improvement in average delay from 226.6 seconds to 99.2 seconds, a 56 percent reduction. The intersection v/c ratio also improves from 1.48 to 1.20. No other capacity improvements can be implemented without impacting adjacent properties.

Central Boulevard at Rosalind Avenue

With the conversion of Church Street (eastbound) and Pine Street (westbound) into a one-way pair, Central Boulevard is projected to experience a slight increase in the eastbound traffic flow, with a corresponding decrease in the westbound flow. Average delay is projected to decrease from 183.8 seconds to 118.4 seconds; however, the v/c ratio increases from 1.08 to 1.21. Intersection level of service remains at LOS F.

Orange Avenue at South Street

With no capacity improvements proposed at this intersection, traffic growth, and the introduction of the contra-flow lanes on South Street, the intersection operation is expected to worsen. The contra-flow lane proposed on Rosalind Avenue and Anderson Street offers an alternative route to relieve the heavy westbound left-turn movement at this intersection. Predictably, the v/c ratio increased from 1.18 to 1.44 with a level of service F condition.

Anderson Street at Rosalind Avenue

This is another intersection where no capacity improvements are proposed; yet, contra-flow lanes are introduced along Rosalind Avenue and Anderson Street. The intersection operates at very similar operating characteristics in the base and proposed conditions.

Anderson Street at Summerlin Avenue

The proposed improvement at this intersection involves adding a second southbound left-turn lane. This improvement results in a lower v/c ratio, lower average delay, and the same LOS F operating condition.

7.7 Recommended Intersection Improvements

Figures 7-2 through **7-9** schematically illustrate the intersection improvements proposed for the critical Downtown Orlando intersections and the resulting level of service operation derived from the SYNCHRO analysis. These improvements offer a reasonable level of traffic flow performance to accommodate the anticipated growth in vehicle trips through Downtown Orlando through the next ten year period. Like all other major urban cities in the United States, Orlando should rely on a multi-modal system that provides users alternative means of completing their travel through the downtown area. Without the other travel modes, reliance on the single driver auto travel mode will overwhelm the system capacity resulting in increased travel congestion and lost economic opportunities.

Figure 7-2
Year 2015 Downtown Orlando Proposed Improvements

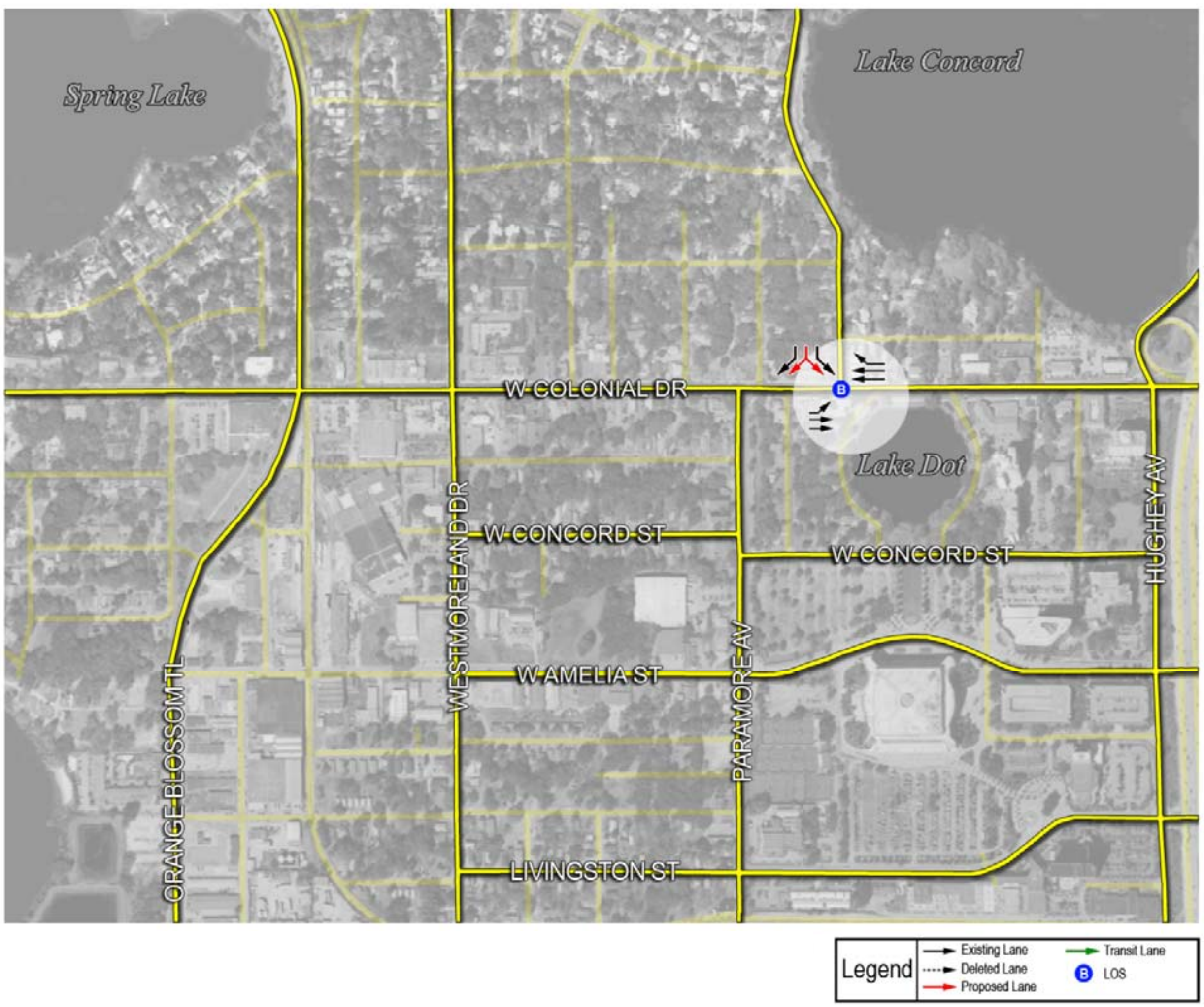


Figure 7-3
Year 2015 Downtown Orlando Proposed Improvements

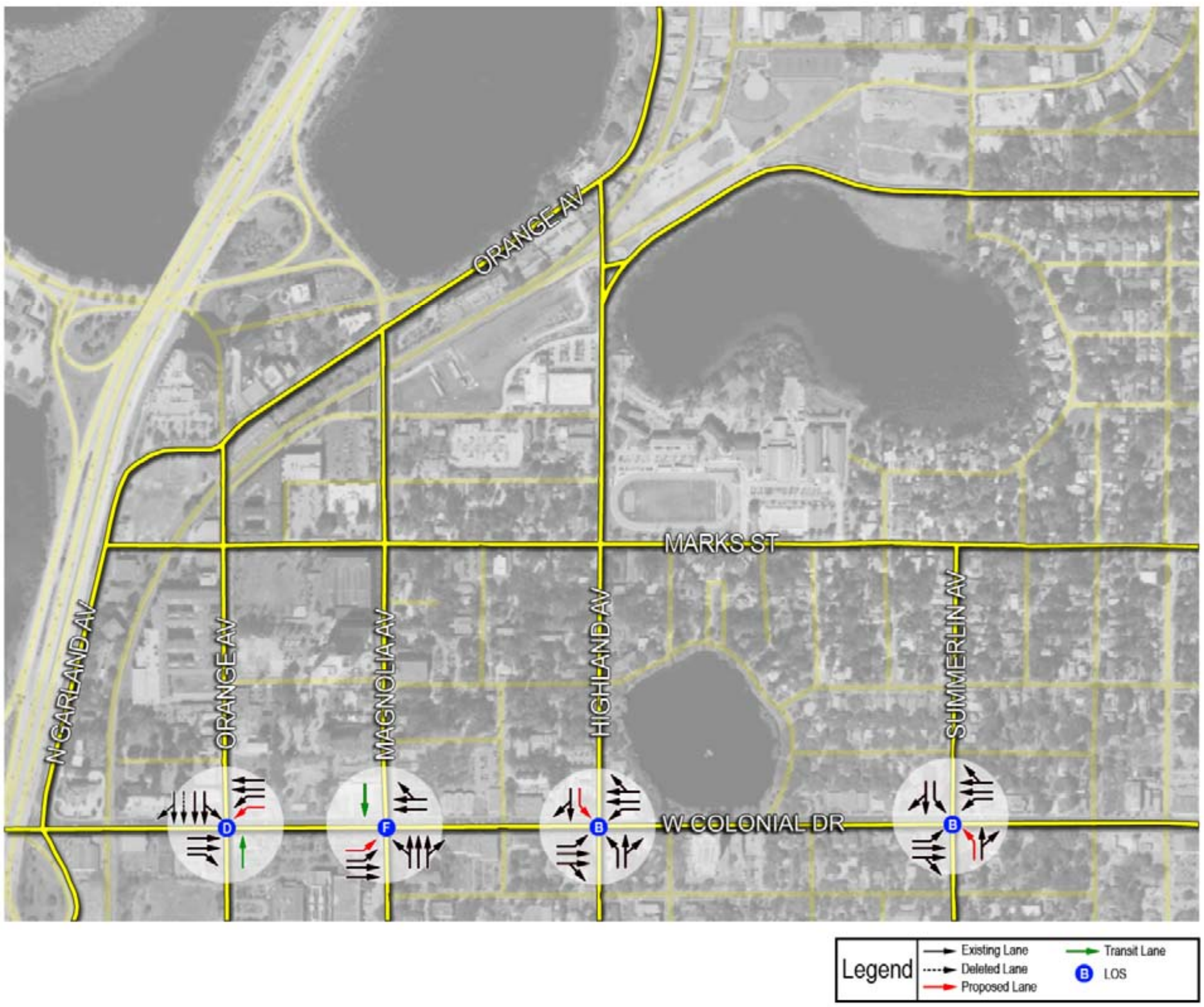


Figure 7-4
Year 2015 Downtown Orlando Proposed Improvements

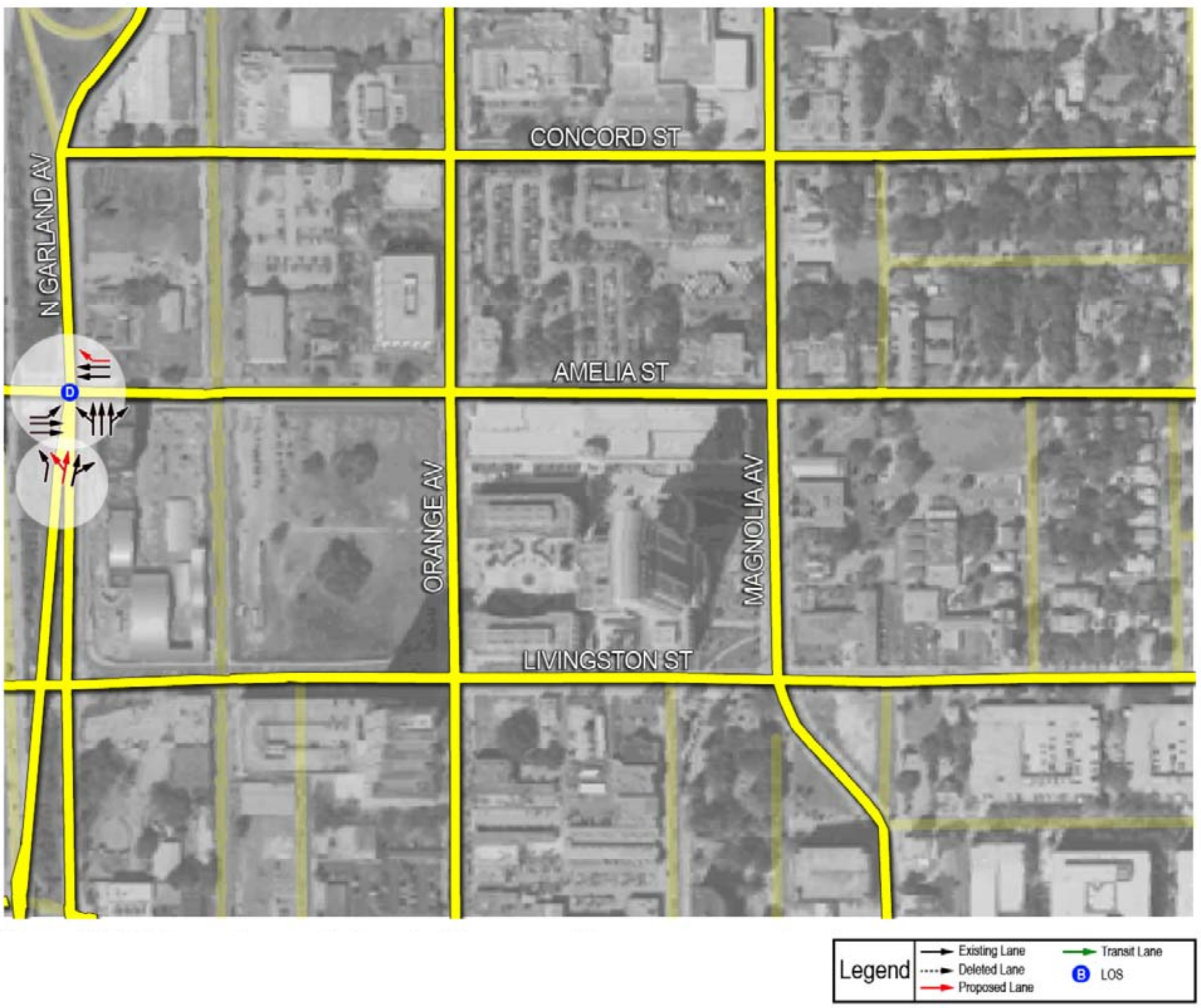


Figure 7-5
Year 2015 Downtown Orlando Proposed Improvements

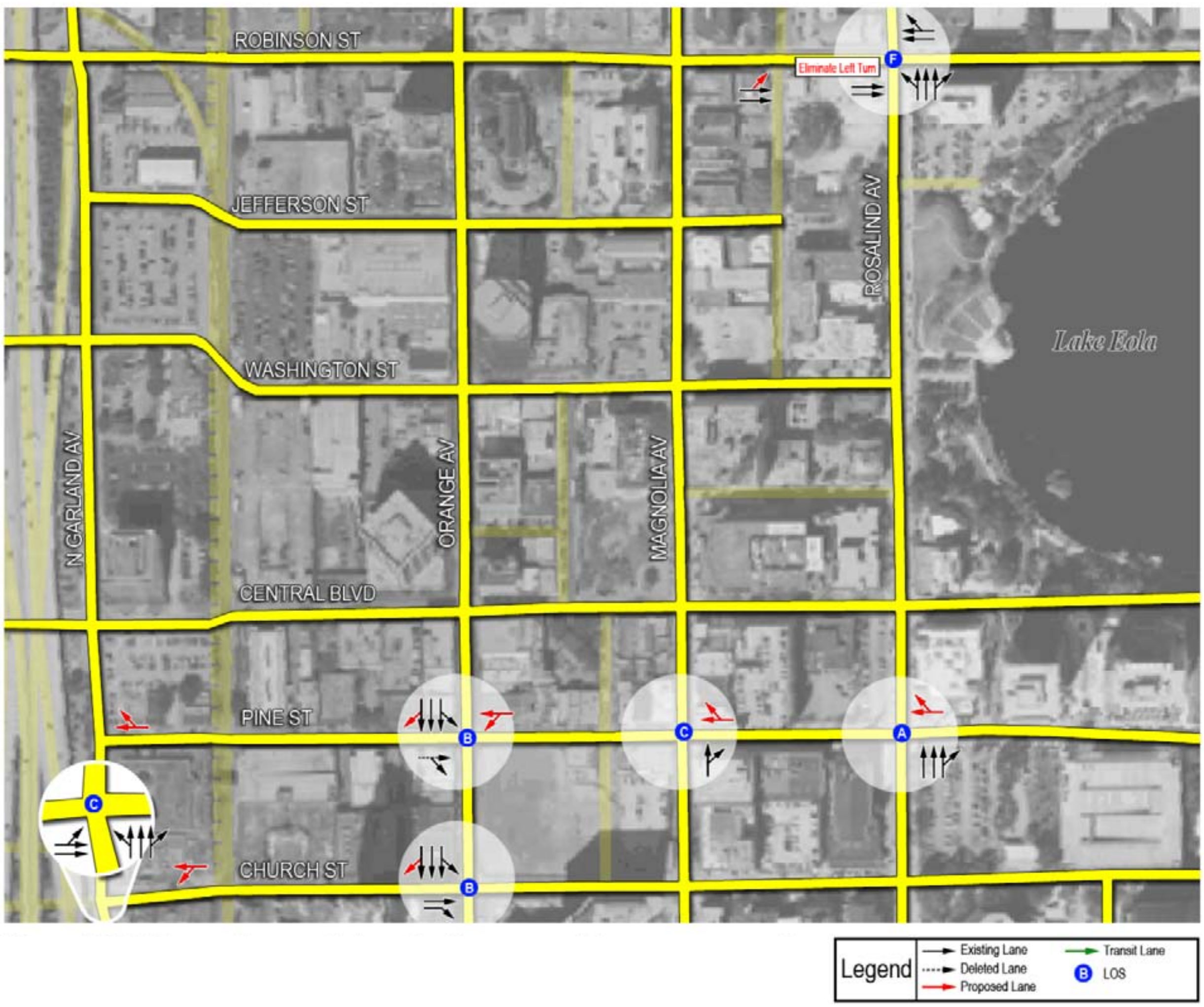


Figure 7-6
Year 2015 Downtown Orlando Proposed Improvements

Figure 7-7
Year 2015 Downtown Orlando Proposed Improvements

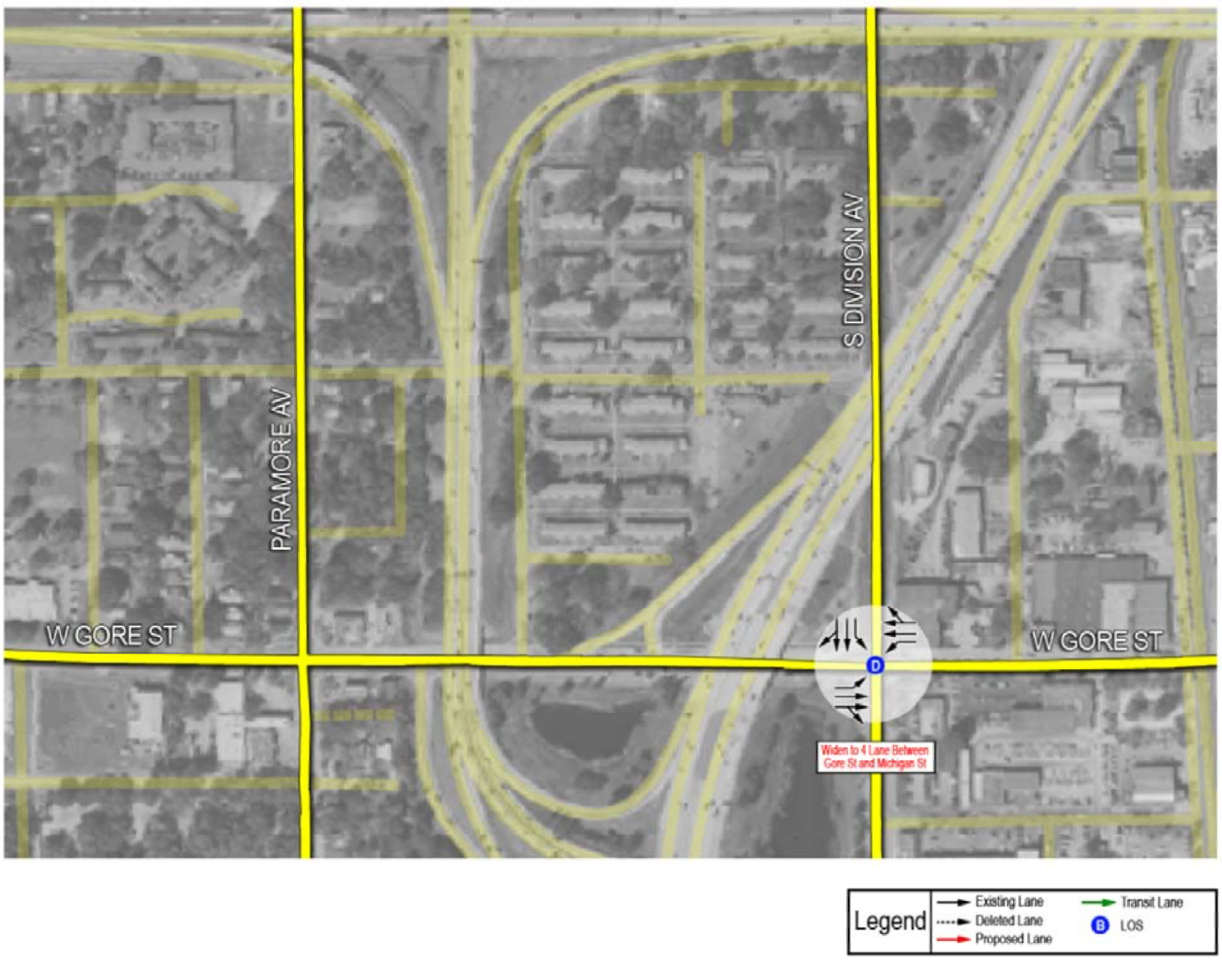


Figure 7-8
Year 2015 Downtown Orlando Proposed Improvements

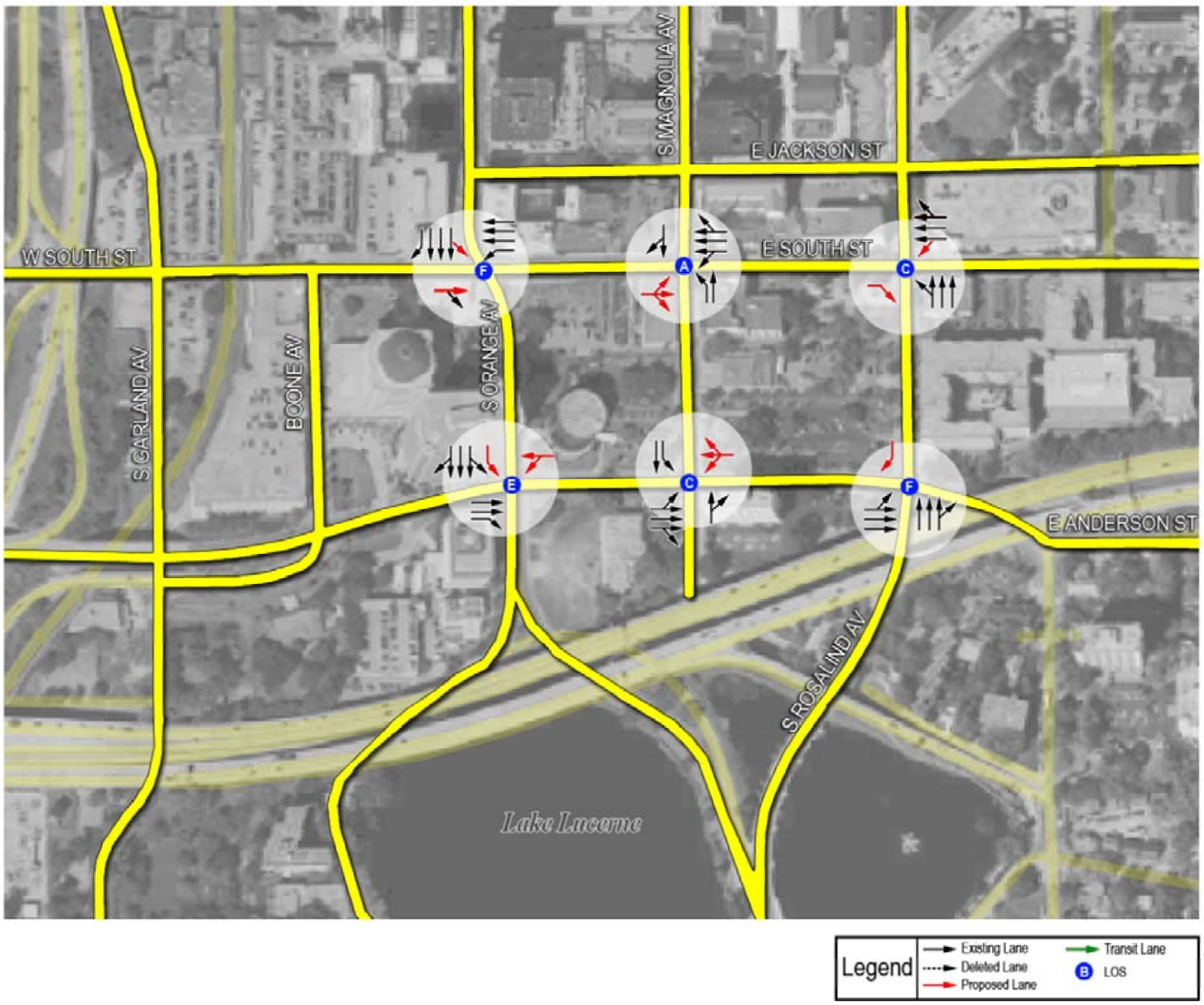
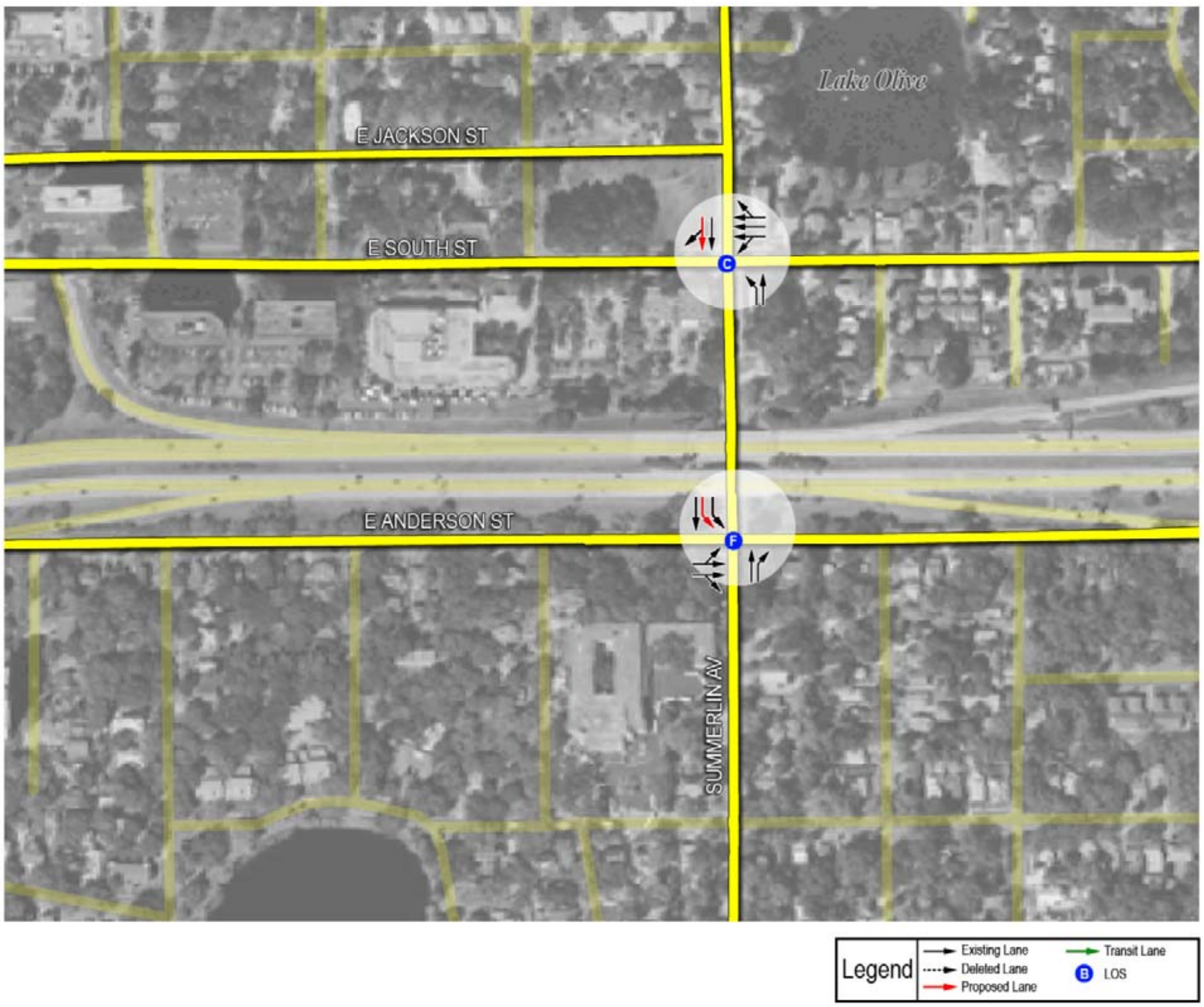


Figure 7-9
Year 2015 Downtown Orlando Proposed Improvements



7.8 Roadway Network Alternatives Evaluation

METROPLAN ORLANDO's adopted 2025 OUATS travel demand model was used to test the feasibility of several other potential roadway improvements in the Downtown area. The adopted 2025 model (no-build) was used as the basis of comparison for the resulting traffic volumes and level of service (LOS) of three network alternatives. The network improvements for each of the alternatives are shown on **Figures 7-10** through **7-13**. A daily LOS analysis was performed for the resulting traffic volumes of the three alternatives, as well as the no-build base condition. **Table 7-2** provides a summary of the laneage, daily volumes, and LOS for the base condition and 3 alternatives. Detailed LOS tables of each alternative are included in **Appendix 7-A**.

Network Improvements

Alternative A incorporates a number of two-way street conversion projects, several new roadway connections, and a reduction of one travel lane on Orange Avenue. Alternative B includes the same network changes as Alternative A, but changes the Orange Avenue section between Garland Avenue and SR 50 to two-way traffic flow. Alternative C includes the same changes as Alternative B, but adds a second lane to the Hughey Avenue Extension at Ivanhoe Boulevard to encourage more traffic to use it as an alternative to Orange Avenue to access Downtown.

All three alternatives include a northern extension of Hughey Avenue, which is effectively a conversion of the existing westbound ramp of Interstate 4 between Ivanhoe Boulevard and SR 50 into a collector-distributor roadway. This roadway becomes important to help draw a portion of the traffic destined for Downtown or passing through Downtown off of Orange Avenue, so that the Orange Avenue corridor may be converted into the primary focal street in Downtown for pedestrian, bicycle, and transit use, with less focus on moving vehicles. However, to encourage this shift in traffic away from Orange Avenue, other improvements were assumed in the vicinity of the I-4 interchange at Ivanhoe Boulevard, as follows:

- Ivanhoe Boulevard was widened to accommodate two-directional traffic flow with two lanes in each direction between Legion Place and Magnolia Avenue – this change in conjunction with some modified roadway alignments and Orange Avenue being narrowed to one lane in each direction between Magnolia Avenue and Garland Avenue is intended to encourage a good portion of the Orange Avenue traffic to use Hughey Avenue.
- The southern segment of Ivanhoe Boulevard that runs between Magnolia Avenue and Legion Place (north of the Radisson Hotel) was modified to provide local access only (no through access)
- The existing connection between westbound and eastbound Ivanhoe Boulevard was relocated to accommodate one lane of traffic in each direction.
- Legion Place was converted from a two-lane one-way southbound road to a two-way road with one lane in each direction.

- Garland Avenue was also converted to a two-way road between Legion Place and Marks Street with two lanes in the northbound direction and one lane in the southbound direction.

- Although the northern extension of Hughey Avenue is assumed to be three lanes, the three lanes come from a blending of a two-lane I-4 off-ramp just south of Ivanhoe Boulevard, and one or more lanes that come from Ivanhoe Boulevard directly. In Alternatives 1 and 2, the roadway from Ivanhoe Boulevard was coded as a single lane. However, in Alternative 3, it was coded with two travel lanes to test whether this configuration would help to draw more traffic off of Orange Avenue.

The specific changes that were made to Orange Avenue were as follows:

- The segment between Magnolia Avenue and Garland Avenue was reduced from two lanes in each direction to one lane in each direction (Alternatives 1-3).

- The segment from Garland Avenue to SR 50 was reduced from four southbound lanes to three southbound lanes to accommodate an exclusive transit lane (Alternative 1). This section was also modified to include two lanes southbound and one lane northbound with an exclusive southbound transit lane (Alternatives 2-3).

- The section between SR 50 and Jefferson Street was reduced from four southbound lanes to three southbound lanes to accommodate an exclusive transit lane (Alternatives 1-3).

- The segment between Jefferson Street and South Street was reduced from three southbound lanes to two southbound lanes, also to accommodate an exclusive transit lane (Alternatives 1-3).

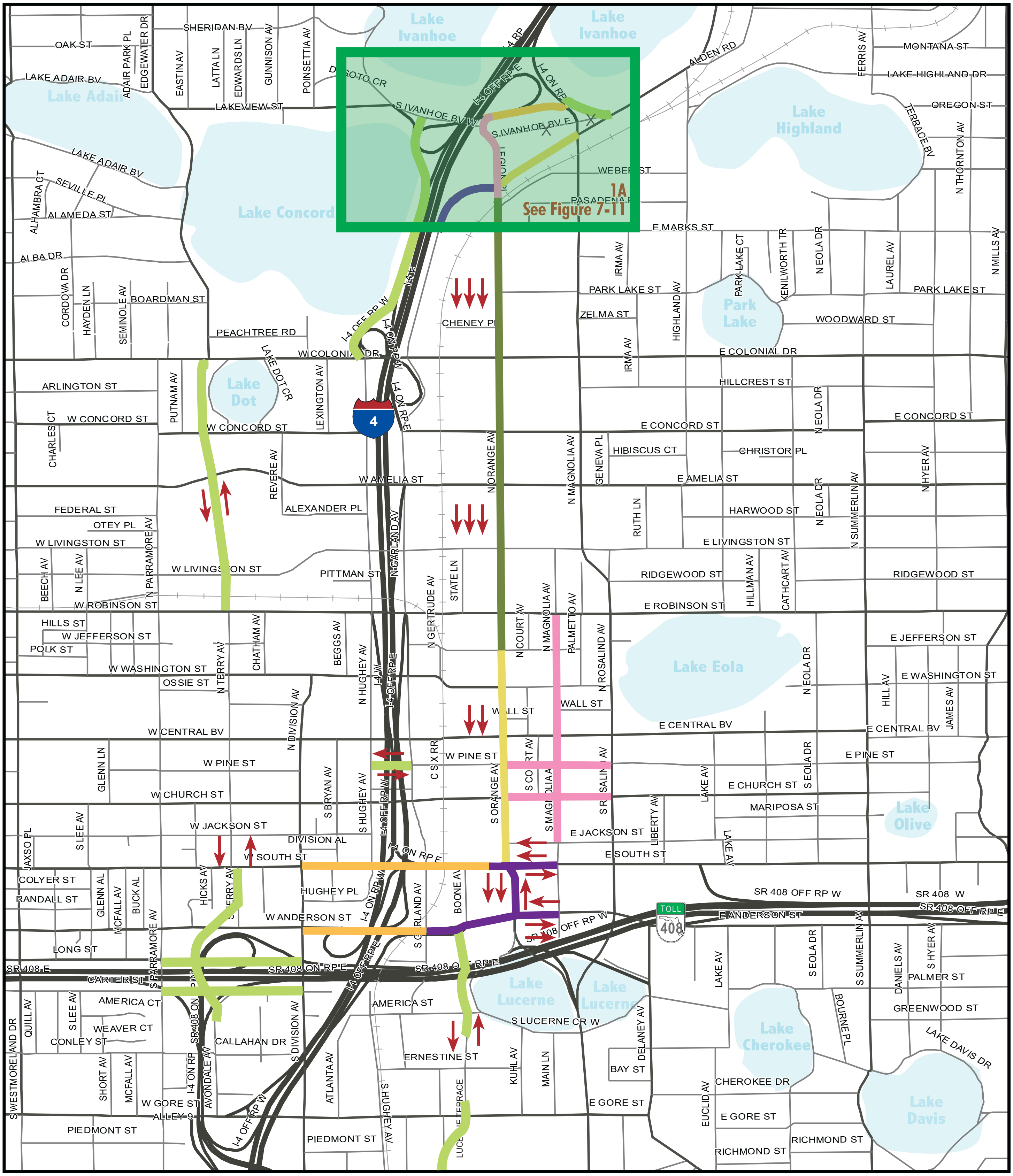
- The segment between South Street and Anderson Street was converted to two-directional flow, with two southbound lanes and one northbound lane (Alternatives 1-3).

In each of the three alternatives, a potential extension of Terry Avenue was included in the network that would provide additional north/south capacity on the west side of Interstate 4. This new roadway was evaluated as a two-lane, two-way roadway extending from the SR 50/Edgewater Drive intersection south to Carter Street using existing segments of Terry Avenue.

Magnolia Avenue between Livingston Street and Anderson Street was coded as a two-way two-lane roadway in all three alternatives. However, since the roadway network is also coded with the same configuration in the adopted OUATS model rather than the single vehicle lane northbound between Jackson Street and Robinson Street (the no-build base condition), no conclusions could be drawn on how a change to two-way traffic on Magnolia Avenue would impact traffic circulation.

Downtown Orlando Transportation Plan

Alternative 1 - Year 2025 Roadway Improvements



Legend:

- New Connection Roadway
- 2-way conversion (2 lanes each direction)
- 2-way conversion (1 lane each direction)
- 2-way conversion (3 lanes)
- Lane reduction (3 lanes)
- Lane reduction (2 lanes)
- X Through connection removed
- Roadway Geometry

HDR

Figure 7-10

Downtown Orlando Transportation Plan

Alternative 1 - Year 2025 Roadway Improvements

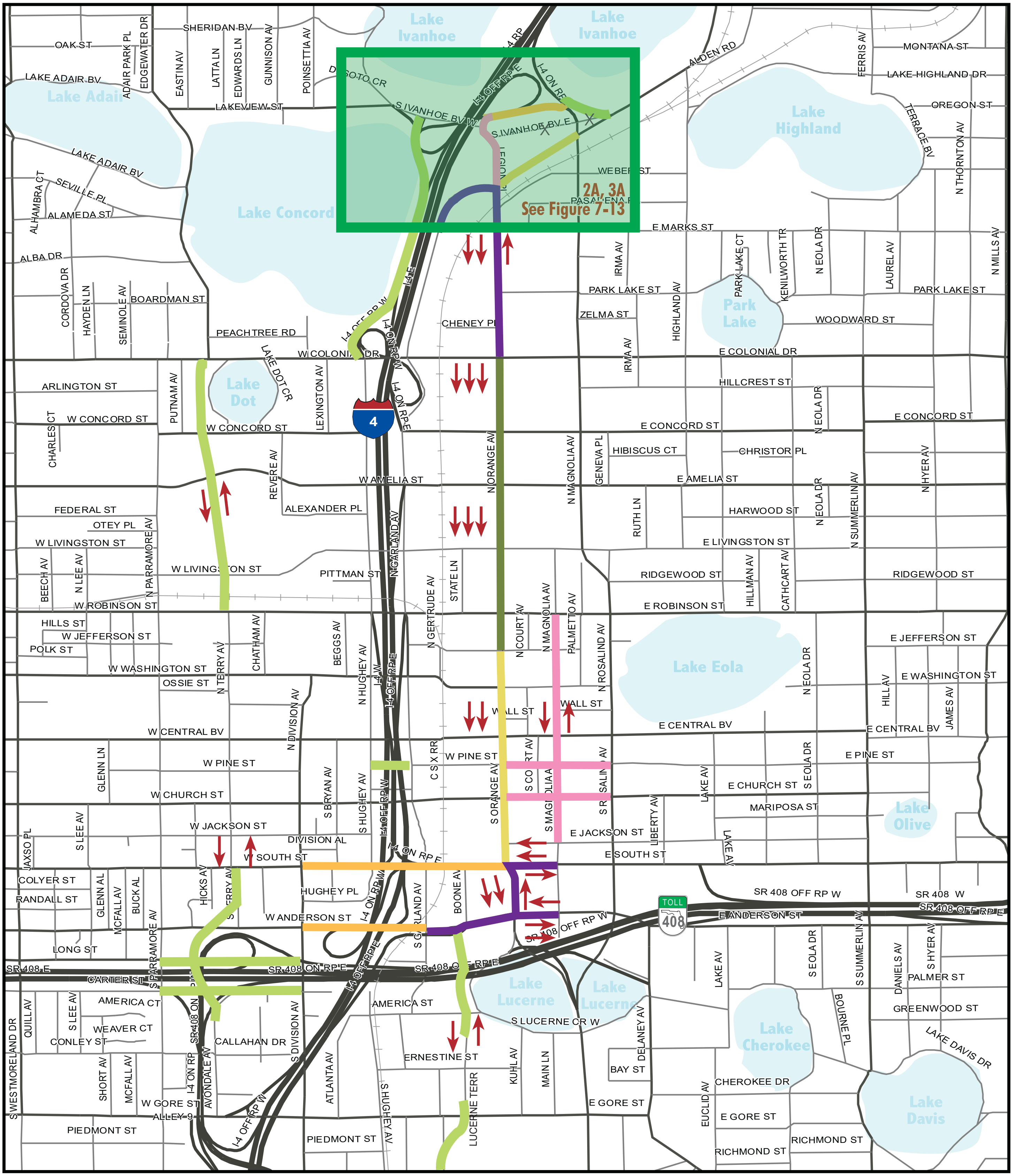
1A

Legend:

- New Connection Roadway
- 2-way conversion (2 lanes each direction)
- 2-way conversion (1 lane each direction)
- 2-way conversion (3 lanes)
- Lane reduction (3 lanes)
- Lane reduction (2 lanes)
- X Through connection removed
- Roadway Geometry

Downtown Orlando Transportation Plan

Alternative 2 & 3 - Year 2025 Roadway Improvements



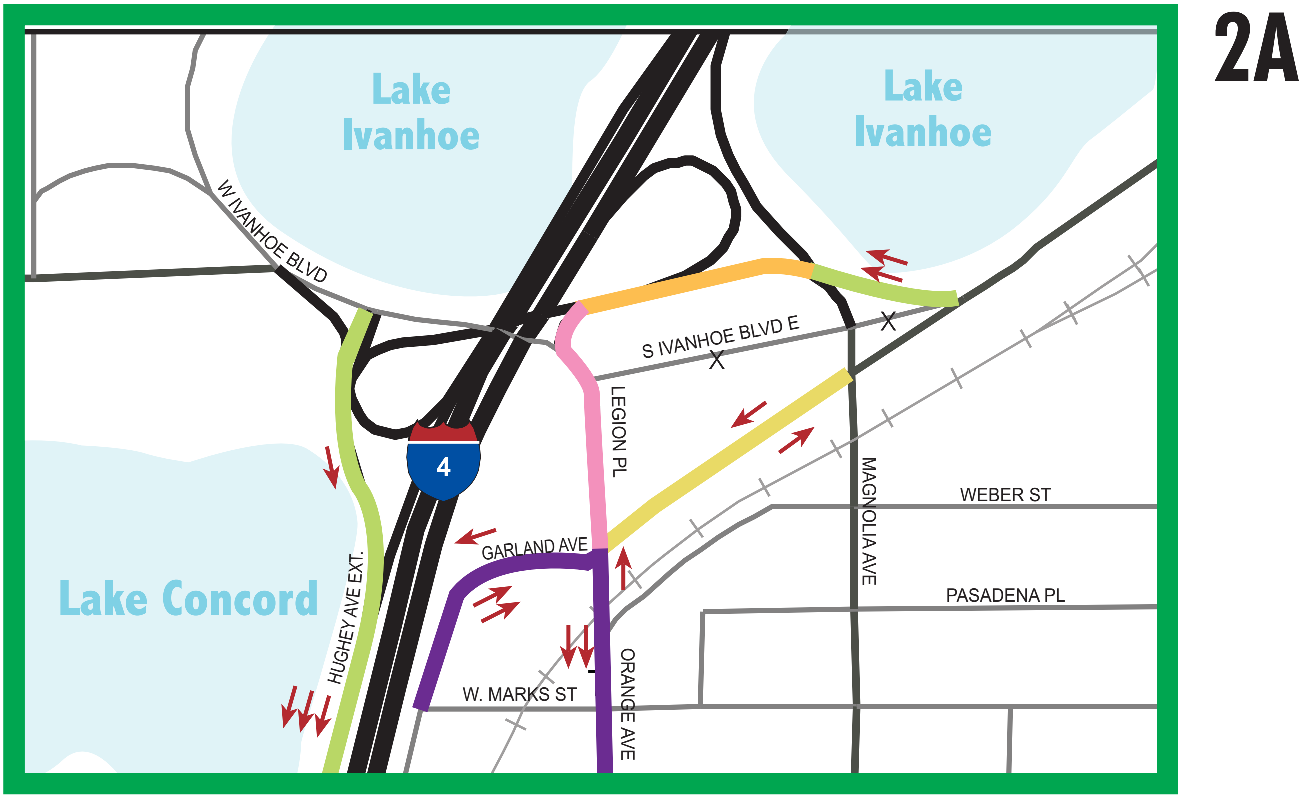
Legend:

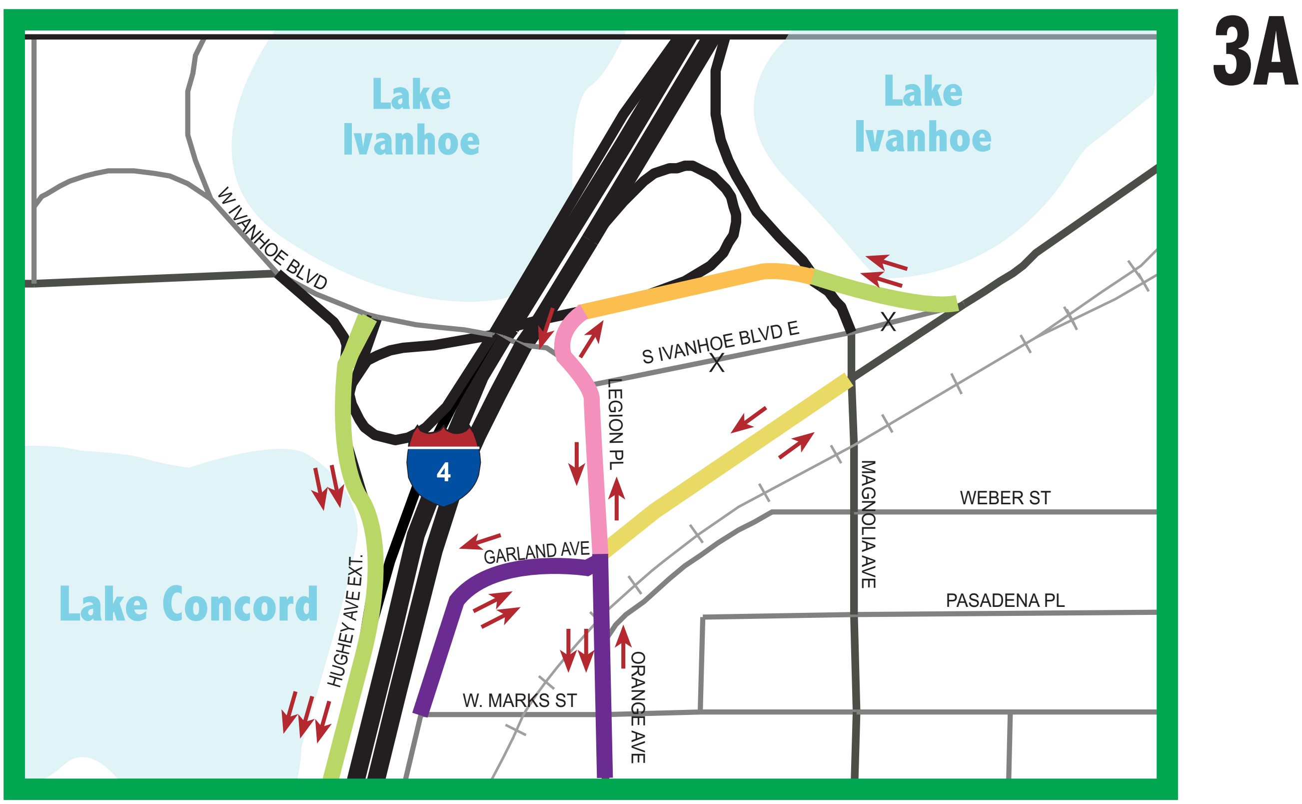
- New Connection Roadway
- 2-way conversion (2 lanes each direction)
- 2-way conversion (1 lane each direction)
- 2-way conversion (3 lanes)
- Lane reduction (3 lanes)
- Lane reduction (2 lanes)
- X Through connection removed
- Roadway Geometry

Figure 7-12

Downtown Orlando Transportation Plan

Alternatives 2 & 3 - Year 2025 Roadway Improvements





Legend:

- New Connection Roadway
- 2-way conversion (2 lanes each direction)
- 2-way conversion (1 lane each direction)
- 2-way conversion (3 lanes)
- Lane reduction (3 lanes)
- Lane reduction (2 lanes)
- X Through connection removed
- Roadway Geometry

Figure 7-13

HDR

Table 7-2 **(page 1 of 7)**
2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
US 441/Orange Blossom Trail																
Washington St. to Central Blvd	2	2	47,240	F	2	2	38,583	F	2	2	40,459	F	2	2	42,716	F
Central Blvd to Church St	2	2	43,462	F	2	2	36,335	F	2	2	38,990	F	2	2	37,923	F
Church St to South St	2	2	37,717	F	2	2	32,190	E	2	2	28,083	D	2	2	31,093	E
South St to Anderson St	2	2	40,549	F	2	2	32,325	E	2	2	36,412	F	2	2	35,242	F
Anderson St to Long St	2	2	43,912	F	2	2	36,165	F	2	2	36,678	F	2	2	38,496	F
Long St to Carter St	2	2	45,172	F	2	2	35,438	F	2	2	37,257	F	2	2	42,871	F
Westmoreland Drive																
SR 50 to W. Amelia St	1	1	21,151	F	1	1	21,291	F	1	1	21,202	F	1	1	22,166	F
W. Amelia St to W. Robinson St	1	1	21,591	F	1	1	20,831	F	1	1	19,498	F	1	1	22,060	F
W. Robinson St. to W. Washington St.	1	1	24,606	F	1	1	22,621	F	1	1	22,571	F	1	1	26,651	F
W. Washington St. W. Central Blvd	1	1	20,228	F	1	1	19,915	F	1	1	20,500	F	1	1	20,150	F
W. Central Blvd to W. Church St.	1	1	21,292	F	1	1	20,373	F	1	1	19,587	F	1	1	21,393	F
W. Church St. to W. South St.	2	2	26,515	D	2	2	25,603	D	2	2	23,228	D	2	2	23,495	D
W. South St. to W. Anderson St.	2	2	29,073	D	2	2	31,962	F	2	2	21,558	D	2	2	29,074	D
W. Anderson St. to Long St	2	2	27,952	D	2	2	30,610	E	2	2	22,103	D	2	2	29,013	D
Long St to Carter St	2	2	26,144	D	2	2	22,401	D	2	2	25,233	D	2	2	25,514	D

Table continues on the following 6 pages.

Table 7-2 **(page 2 of 7)**

2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
Parramore Avenue																
SR 50 to W. Amelia St	2	2	28,863	D	2	2	17,648	D	2	2	21,003	D	2	2	19,097	D
Amelia to W. Livingston St.	1	1	17,205	F	1	1	15,964	F	1	1	14,839	E	1	1	14,293	E
Livingston St. to W. Robinson St.	1	1	18,807	F	1	1	17,525	F	1	1	20,513	F	1	1	17,623	F
W. Robinson St. to W. Washington St.	1	1	19,434	F	1	1	16,652	F	1	1	19,383	F	1	1	16,813	F
W. Washington St. W. Central Blvd	1	1	13,605	D	1	1	13,491	D	1	1	15,470	F	1	1	14,765	E
W. Central Blvd to W. Church St.	1	1	13,385	D	1	1	14,721	E	1	1	15,188	F	1	1	12,951	D
W. Church St. to W. South St.	1	1	11,976	D	1	1	10,758	D	1	1	14,919	E	1	1	10,462	D
W. South St. to W. Anderson St.	1	1	12,128	D	1	1	10,905	D	1	1	17,240	F	1	1	10,921	D
W. Anderson St. to Long St	1	1	14,157	E	1	1	12,886	D	1	1	21,647	F	1	1	12,489	D
Long St to Carter St	1	1	13,368	D	1	1	15,325	F	1	1	17,634	F	1	1	14,661	E
Terry Avenue																
SR 50 to W. Amelia St	NA	NA	0	NA	1	1	16,388	F	1	1	14,663	E	1	1	14,316	E
Amelia to W. Livingston St.	NA	NA	0	NA	1	1	16,442	F	1	1	15,365	F	1	1	15,192	F
Livingston St. to W. Robinson St.	NA	NA	0	NA	1	1	16,442	F	1	1	15,365	F	1	1	15,192	F
W. Robinson St. to W. Washington St.	NA	NA	0	NA	1	1	22,297	F	1	1	17,843	F	1	1	17,724	F
W. Washington St. W. Central Blvd	NA	NA	0	NA	1	1	18,859	F	1	1	12,260	D	1	1	13,618	D
W. Central Blvd to W. Church St.	NA	NA	0	NA	1	1	13,491	D	1	1	12,913	D	1	1	12,813	D
W. Church St. to W. South St.	NA	NA	0	NA	1	1	13,071	D	1	1	13,160	D	1	1	14,147	E
W. South St. to W. Anderson St.	NA	NA	0	NA	1	1	10,198	D	1	1	10,332	D	1	1	9,371	D
W. Anderson St. to Long St	NA	NA	0	NA	1	1	12,266	D	1	1	12,574	D	1	1	12,244	D
Long St to Carter St	NA	NA	0	NA	1	1	6,556	D	1	1	4,924	C	1	1	6,449	D

Table 7-2 **(page 3 of 7)**
2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
Hughey Avenue																
S. Ivanhoe Blvd to SR 50	0	3	30,020	F	0	3	31,898	F	0	3	35,312	F	0	3	36,279	F
SR 50 to W. Amelia St	0	3	22,768	D	0	3	20,640	D	0	3	23,454	D	0	3	22,214	D
Amelia to W. Livingston St.	0	3	11,201	C	0	3	7,967	C	0	3	13,794	D	0	3	10,719	C
Livingston St. to W. Robinson St.	0	3	13,705	D	0	3	11,913	D	0	3	13,737	D	0	3	11,309	C
W. Robinson St. to W. Washington St.	0	3	13,845	D	0	3	7,711	C	0	3	9,944	C	0	3	8,806	C
W. Washington St. to W. Central Blvd	0	3	11,816	D	0	3	4,685	C	0	3	5,664	C	0	3	6,333	C
W. Central Blvd to W. Pine St	0	3	17,152	D	0	3	7,834	C	0	3	8,767	C	0	3	8,529	C
W. Pine St to W. Church St.	0	3	13,820	D	0	3	13,061	D	0	3	13,849	D	0	3	12,363	D
W. Church St. to W. South St.	1	2	13,811	D	1	2	18,162	D	1	2	19,458	D	1	2	18,029	D
W. South St. to W. Anderson St.	2	2	10,890	C	2	2	12,816	D	2	2	11,410	C	2	2	12,608	D
Orange Avenue (SR 527)																
N. Magnolia Ave to N. Garland Ave	2	2	29,075	D	1	1	19,576	F	1	1	19,272	F	1	1	18,660	F
E. Garland Ave to W. Marks St	0	4	24,683	D	0	3	21,777	D	1	2	29,349	F	1	2	27,824	F
E. Marks St to SR 50	0	4	25,858	D	0	3	24,530	D	1	2	33,826	F	1	2	35,059	F
SR 50 to E. Concord St	0	4	29,023	D	0	3	23,487	D	0	3	23,161	D	0	3	24,276	D
E. Concord St to E. Amelia St	0	4	29,023	D	0	3	23,430	D	0	3	22,770	D	0	3	23,956	D
E. Amelia St to E. Livingston St	0	4	26,663	D	0	3	20,744	D	0	3	21,165	D	0	3	20,210	D
E. Livingston St to E. Robinson St	0	4	27,907	D	0	3	21,194	D	0	3	22,062	D	0	3	22,443	D
E. Robinson St. to E. Jefferson St.	0	4	26,308	D	0	3	18,978	D	0	3	20,160	D	0	3	19,464	D
E. Jefferson St. E. Central Blvd	0	3	25,092	D	0	2	17,133	D	0	2	17,799	D	0	2	17,796	D
E. Central Blvd to E. Pine St	0	3	25,532	D	0	2	18,187	E	0	2	18,155	D	0	2	17,891	D
E. Pine to E. Church St	0	3	27,796	E	0	2	18,026	D	0	2	18,518	E	0	2	18,590	E
E. Church St to E. South St.	0	3	33,224	F	0	2	22,519	F	0	2	22,333	F	0	2	21,987	F
E. South St to E. Anderson St	0	3	30,805	F	1	2	29,264	F	1	2	29,396	F	1	2	28,424	F

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2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
S. Orange Avenue (SR 527)																
Orange/Rosalind to E. Lucerne Circle	2	2	47,261	F	2	2	43,959	F	2	2	41,113	F	2	2	42,694	F
E. Lucerne Circle to E. Gore St	2	2	40,534	F	2	2	37,972	F	2	2	37,838	F	2	2	36,250	F
Magnolia Avenue																
N. Orange Ave. to E. Marks St.	3	0	29,763	F	3	0	28,544	E	3	0	24,696	D	3	0	28,606	F
E. Marks St to SR 50	3	0	27,324	D	3	0	27,152	D	3	0	23,697	D	3	0	24,732	D
SR 50 to E. Concord St	3	0	28,085	E	3	0	27,600	E	3	0	27,855	E	3	0	28,645	F
Concord St to E. Amelia St	3	0	26,885	D	3	0	26,107	D	3	0	25,270	D	3	0	25,980	D
E. Amelia St to E. Livingston St	3	0	27,382	D	3	0	25,483	D	3	0	25,515	D	3	0	27,158	D
E. Livingston St to E. Robinson St	3	0	23,530	D	3	0	21,721	D	3	0	22,787	D	3	0	23,049	D
Livingston St to Robinson St	1	1	8,524	D	1	1	7,967	D	1	1	9,163	D	1	1	9,130	D
Robinson St to Washington St	1	1	13,556	D	1	1	13,523	D	1	1	12,522	D	1	1	13,848	E
Washington St to Central Blvd	1	1	11,578	D	1	1	11,788	D	1	1	10,930	D	1	1	11,912	D
Central Blvd to Pine St	1	1	12,926	D	1	1	16,185	F	1	1	15,675	F	1	1	16,087	F
Pine St to Church St	1	1	15,446	F	1	1	13,888	E	1	1	15,047	F	1	1	14,851	E
Church St to Jackson St	1	1	8,423	D	1	1	8,402	D	1	1	9,766	D	1	1	9,660	D
Jackson St to South St	1	1	20,743	F	1	1	20,291	F	1	1	21,193	F	1	1	20,502	F
South St to Anderson St	1	1	16,927	F	1	1	15,025	F	1	1	29,259	F	1	1	16,177	F
Rosalind Avenue																
E. Robinson St to E. Washington St	3	0	26,981	D	3	0	25,372	D	3	0	25,349	D	3	0	25,095	D
E. Washington St to E. Central Blvd	3	0	27,190	D	3	0	24,510	D	3	0	22,652	D	3	0	24,985	D
E Central Blvd to E Pine St	3	0	30,288	F	3	0	26,722	D	3	0	24,052	D	3	0	26,522	D
E Pine St to E Church St	3	0	26,040	D	3	0	26,172	D	3	0	24,882	D	3	0	27,991	E
E Church St to E South St	3	0	20,193	D	3	0	30,908	F	3	0	28,856	F	3	0	32,240	F
E South St to E Anderson St	3	0	19,411	D	3	0	15,371	D	3	0	15,618	D	3	0	17,535	D

Table 7-2 **(page 5 of 7)**

2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
Lucerne Terrace																
W America St to Gore St	NA	NA	0	A	1	1	13,277	D	1	1	14,510	E	1	1	13,590	D
Anderson Street																
US 441/Orange Blossom Trail to Westmoreland Dr	2	0	12,194	D	2	0	11,357	D	2	0	12,227	D	2	0	11,766	D
Westmoreland Dr to Parramore Ave	2	0	14,298	D	2	0	11,778	D	2	0	13,258	D	2	0	12,890	D
Parramore Ave to Terry Ave	2	0	15,157	D	2	0	14,510	D	2	0	17,768	D	2	0	14,875	D
Terry Ave to Division Ave	2	0	16,017	D	2	0	14,878	D	2	0	17,239	D	2	0	15,112	D
Division Ave to Hughey Ave	2	0	12,862	D	2	2	26,019	D	2	2	23,743	D	2	2	24,261	D
Hughey Ave to Garland Ave	2	0	24,671	F	2	2	22,088	D	2	2	22,504	D	2	2	22,768	D
Garland Ave to Orange Ave	3	0	25,594	D	2	1	22,543	E	2	1	22,666	E	2	1	24,370	F
Orange Ave to Magnolia Ave	3	0	26,144	D	2	1	27,030	F	2	1	26,855	F	2	1	29,357	F
Magnolia Ave to Rosalind Ave	3	0	29,052	F	3	0	23,841	D	3	0	24,496	D	3	0	27,415	D
Rosalind Ave to Delaney Ave	3	0	26,344	D	3	0	22,777	D	3	0	24,691	D	3	0	25,295	D
Delaney Ave to Summerlin Ave	2	0	14,791	D	2	0	14,616	D	2	0	16,037	D	2	0	16,037	D
South Street																
US 441/Orange Blossom Trail to Westmoreland Dr	0	3	13,896	D	0	3	14,341	D	0	3	14,442	D	0	3	16,051	D
Westmoreland Dr to Parramore Ave	0	3	17,592	D	0	3	19,539	D	0	3	17,169	D	0	3	19,633	D
Parramore Ave to Terry Ave	0	3	20,178	D	0	3	20,560	D	0	3	21,896	D	0	3	20,574	D
Terry Ave to Division Ave	0	3	16,468	D	0	3	17,327	D	0	3	18,660	D	0	3	18,756	D
Division Ave to Hughey Ave	0	2	16,468	D	2	2	19,677	D	2	2	21,078	D	2	2	19,211	D
Hughey Ave to Garland Ave	0	2	27,914	F	2	2	35,361	F	2	2	37,964	F	2	2	34,499	F
Garland Ave to Orange Ave	0	3	23,683	D	2	2	34,171	F	2	2	34,675	F	2	2	33,253	F
Orange Ave to Magnolia Ave	0	3	35,353	F	1	2	21,706	D	1	2	21,742	D	1	2	21,195	D
Magnolia Ave to Rosalind Ave	0	3	23,860	D	0	3	15,190	D	0	3	15,690	D	0	3	16,315	D
Rosalind Ave to Summerlin Ave	0	3	29,360	F	0	3	30,728	F	0	3	28,926	F	0	3	31,021	F

Table 7-2 **(page 6 of 7)**

2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
Church Street																
US 441/Orange Blossom Trail to Westmoreland Dr	2	1	18,196	D	2	1	17,784	D	2	1	16,203	D	2	1	16,536	D
Westmoreland Dr to Parramore Ave	2	1	18,700	D	2	1	22,253	E	2	1	19,070	D	2	1	19,835	D
Parramore Ave to Terry Ave	2	1	17,710	D	2	1	17,332	D	2	1	18,182	D	2	1	16,312	D
Terry Ave to Division Ave	2	2	16,492	D	2	2	17,366	C	2	2	17,621	C	2	2	16,341	D
Division Ave to Hughey Ave	2	1	16,492	D	2	1	16,324	D	2	1	18,015	D	2	1	16,745	D
Hughey Ave to Garland Ave	3	0	22,796	D	2	2	22,184	D	2	2	23,687	D	2	2	22,915	D
Garland Ave to Orange Ave	2	0	14,029	D	1	1	20,422	F	1	1	21,265	F	1	1	20,876	F
Orange Ave to Magnolia Ave	2	0	12,659	D	1	1	19,249	F	1	1	19,403	F	1	1	19,733	F
Magnolia Ave to Rosalind Ave	2	0	7,312	C	1	1	13,798	E	1	1	13,840	E	1	1	12,536	D
Rosalind Ave to Summerlin Ave	1	1	11,254	D	1	1	11,267	D	1	1	11,966	D	1	1	11,775	D
Central Boulevard																
US 441/Orange Blossom Trail to Westmoreland Dr	1	2	15,701	D	1	2	14,824	D	1	2	15,379	D	1	2	16,155	D
Westmoreland Dr to Parramore Ave	1	2	17,891	D	1	2	17,496	D	1	2	18,828	D	1	2	19,428	D
Parramore Ave to Terry Ave	1	2	18,343	D	1	2	19,609	D	1	2	16,281	D	1	2	16,470	D
Terry Ave to Division Ave	1	2	26,142	F	1	2	19,858	D	1	2	19,350	D	1	2	18,288	D
Division Ave to Hughey Ave	1	2	26,142	F	1	2	20,469	D	1	2	20,649	D	1	2	22,529	E
Hughey Ave to Garland Ave	1	2	24,936	F	1	2	19,687	D	1	2	20,049	D	1	2	21,335	D
Garland Ave to Orange Ave	1	1	17,760	F	1	1	16,203	F	1	1	16,988	F	1	1	17,240	F
Orange Ave to Magnolia Ave	1	1	13,356	D	1	1	13,346	D	1	1	13,961	E	1	1	13,781	E
Magnolia Ave to Rosalind Ave	1	1	13,146	D	1	1	12,686	D	1	1	13,171	D	1	1	13,254	D
Rosalind Ave to Summerlin Ave	1	1	13,726	E	1	1	14,393	E	1	1	14,423	E	1	1	14,568	E
Robinson Street																
US 441/Orange Blossom Trail to Westmoreland Dr	1	1	13,775	E	1	1	13,684	D	1	1	14,707	E	1	1	13,054	D
Westmoreland Dr to Parramore Ave	1	1	15,427	F	1	1	15,011	F	1	1	13,647	D	1	1	14,585	E
Parramore Ave to Terry Ave	2	2	16,854	D	2	2	12,756	D	2	2	14,500	D	2	2	18,323	D

Table 7-2 **(page 7 of 7)**
2025 Daily Level of Service Analysis—Summary of Network Alternatives Analysis

Roadway Segments	BASE				ALTERNATIVE 1				ALTERNATIVE 2				ALTERNATIVE 3			
	Number of Lanes				Number of Lanes				Number of Lanes				Number of Lanes			
	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS	NB/ EB	SB/ WB	2025 AADT	2025 LOS
Robinson Street (continued)																
Terry Ave to Hughey Ave	2	2	16,010	D	2	2	18,743	D	2	2	18,955	D	2	2	18,057	D
Hughey Ave to Garland Ave	1	1	18,813	F	1	1	19,468	F	1	1	19,316	F	1	1	20,217	F
Garland Ave to Orange Ave	2	2	30,097	D	2	2	28,031	D	2	2	28,603	D	2	2	30,094	D
Orange Ave to Magnolia Ave	2	2	28,434	D	2	2	27,671	D	2	2	26,115	D	2	2	27,978	D
Magnolia Ave to Rosalind Ave	2	2	27,941	D	2	2	24,954	D	2	2	25,529	D	2	2	27,050	D
Rosalind Ave to Summerlin Ave	2	2	31,222	E	2	2	31,426	E	2	2	31,640	E	2	2	33,210	F
Amelia Street																
US 441/Orange Blossom Trail to Westmoreland Dr	2	2	24,291	D	2	2	21,449	D	2	2	25,474	D	2	2	23,642	D
Westmoreland Dr to Parramore Ave	2	2	34,192	F	2	2	30,562	E	2	2	32,211	F	2	2	29,552	D
Parramore Ave to Terry Ave	2	2	29,089	D	2	2	20,130	D	2	2	23,670	D	2	2	23,470	D
Terry Ave to Hughey Ave	2	2	32,910	F	2	2	28,830	D	2	2	30,706	E	2	2	31,291	E
Hughey Ave to Garland Ave	2	2	33,123	F	2	2	28,666	D	2	2	28,687	D	2	2	30,096	D
Garland Ave to Orange Ave	2	2	28,774	D	2	2	25,266	D	2	2	28,137	D	2	2	30,029	D
Orange Ave to Magnolia Ave	2	2	23,819	D	2	2	21,905	D	2	2	26,272	D	2	2	23,047	D
Magnolia Ave to N Highland Ave	1	1	18,618	F	1	1	17,084	F	1	1	21,113	F	1	1	18,284	F
N Highland Ave to Summerlin Ave	1	1	20,996	F	1	1	15,794	F	1	1	19,793	F	1	1	18,245	F
SR 50																
US 441/Orange Blossom Trail to Westmoreland Dr	2	3	56,537	F	2	3	55,716	F	2	3	57,097	F	2	3	50,608	F
Westmoreland Dr to Parramore Ave	2	3	48,554	F	2	3	45,850	F	2	3	46,964	F	2	3	45,113	F
Parramore Ave to Terry Ave	2	3	55,000	F	2	3	45,421	F	2	3	48,475	F	2	3	44,659	F
Terry Ave to Hughey Ave	2	3	49,560	F	2	3	48,540	F	2	3	49,863	F	2	3	46,511	F
Hughey Ave to Garland Ave	2	3	53,374	F	2	3	45,626	F	2	3	48,565	F	2	3	46,893	F
Garland Ave to Orange Ave	2	3	40,195	E	2	3	43,056	F	2	3	47,159	F	2	3	43,138	F
Orange Ave to Magnolia Ave	2	3	40,053	E	2	3	38,730	E	2	3	41,527	F	2	3	38,511	E
Magnolia Ave to N Highland Ave	2	3	47,754	F	2	3	42,373	F	2	3	46,546	F	2	3	42,603	F
N Highland Ave to Summerlin Ave	2	3	41,638	F	2	3	38,787	E	2	3	42,209	F	2	3	38,356	E
Ivanhoe Blvd																
Legion Pl to N. Magnolia Ave	0	2	9,655	D	2	2	12,031	C	2	2	12,582	D	2	2	12,582	D

Other network changes included the following:

- ❖ Anderson Street was converted to a two-way roadway between Division Avenue and Magnolia Avenue in all three alternatives with two lanes in each direction from Division Avenue to Garland Avenue, and two eastbound lanes and one westbound lane from Garland Avenue to Magnolia Avenue.
- ❖ South Street was also converted to two-way in all three alternatives between Division Avenue and Magnolia Avenue. Between Division Avenue and Orange Avenue there were two lanes in each direction, and between Orange Avenue and Magnolia Avenue there was one eastbound lane and two westbound lanes.
- ❖ Church Street was also converted to a two-way street in all three of the alternatives. It had two lanes in each direction between Hughey Avenue and Garland Avenue and one lane in each direction between Garland Avenue and Rosalind Avenue.
- ❖ Pine Street was coded as a two-lane two-directional roadway between Hughey Avenue and Rosalind Avenue in each of the three alternatives, including an extension of the existing roadway between Garland Avenue and to Hughey Avenue.
- ❖ In all three alternatives, Carter and Long Streets were extended between Parramore Avenue to Division Avenue.
- ❖ All three alternatives included a roadway extension/connection of Lucerne Terrace between Anderson Street and Gore Street. This extension would provide another north/south connection to downtown from the south side of SR 408.

Traffic Impacts

Orange Avenue

Reducing North Orange Avenue between Magnolia Avenue and Garland Avenue (near Ivanhoe) to one lane in each direction reduced the traffic volumes by approximately 10,000 vehicles per day in all three alternatives compared to the base network. However, this change also reduced the LOS from D in the base network to LOS F in the three alternatives. In Alternative 1, LOS D was maintained on the segments between Garland Avenue and Jefferson Street with the number of lanes reduced from four to three. In Alternatives 2 and 3, the segment of Orange Avenue between Garland Avenue and SR 50 (with 2 lanes southbound and 1 lane northbound) operated at LOS F, compared to LOS D in the base network and Alternative 1. As is the case in Alternative 1, Alternatives 2 and 3 also maintained LOS D on Orange Avenue between SR 50 and Jefferson Street. All three alternatives maintained an acceptable LOS (E or better) between Jefferson Street and Church Street even with just two southbound lanes. However, the segments between Church Street and Anderson Street operate at LOS F in all of the models including the base condition.

Based on these results, the primary improvements that look feasible are reducing Orange Avenue to three southbound lanes between Garland Avenue and Jefferson Street, and reducing to two southbound lanes between Jefferson Street and Church Street. Based on this preliminary analysis, converting the northern section of Orange Avenue to two-way traffic and reducing the section between Garland Avenue and Magnolia Avenue to two lanes will result in increased congestion. If it is strongly desired to convert this roadway to two-way traffic flow, a poorer LOS may be acceptable given the City's transportation priorities in the Downtown. It is imperative that other complimentary improvements also be implemented along with the proposed Orange Avenue modifications to provide parallel capacity on other facilities, such as the Hughey Avenue Extension.

Ivanhoe Boulevard/Hughey Avenue Extension

With Ivanhoe Boulevard, along with its connection to the Hughey Avenue Extension, configured to try to capture more traffic from Orange Avenue, the road carried approximately 3,000 more vehicles per day in the alternatives compared to the base network – a positive observation.

With Orange Avenue narrowed to three lanes north of Jefferson Street (Alternative 1), Hughey Avenue between Ivanhoe Boulevard and SR 50 had an increase in traffic volumes of approximately 2,000 vehicles per day. The volumes increased by over 5,000 vehicles per day in Alternatives 2 and 3, with the conversion of Orange Avenue north of SR 50 to two-way traffic flow. However, the three-lane segment of Hughey Avenue operated at LOS F in all four networks, primarily due to the high volume of traffic exiting from I-4. The magnitude of traffic from I-4 could be a hindrance to encouraging traffic destined for Downtown to use Hughey Avenue rather than Orange Avenue. However, the reconfiguration of the roadways in this area has merit, as even minor shifts in traffic will give more flexibility with the typical section on Orange Avenue and more efficient use of its existing right-of-way.

It is interesting to note that the three-lane section of Hughey Avenue between Robinson Street and Pine Street remains under-utilized in the three alternatives, which all show volumes of less than 10,000 vehicles per day. This section of roadway could potentially be better utilized through a comprehensive signage and way-finding system that relies more heavily on the Hughey Avenue/Garland Avenue corridor adjacent to I-4 to provide for north-south traffic movements before motorists are dispersed to east-west side streets at appropriate points to reach their destination; this would help relieve congestion on other north-south roads such as Orange Avenue.

Terry Avenue Extension

The complete through connection of Terry Avenue provides an important link in the Downtown roadway grid, additional north-south capacity on the west side of I-4, and direct linkages to other roadways such as Edgewater Drive. The new connector roadway is forecasted to carry approximately 15,000 vehicles per day near SR 50, and approximately 5,000 to 12,000 vehicles per day near SR 408 (LOS D). However, the model results show that this new connection is not anticipated to increase traffic volumes on Edgewater Drive north of SR 50. Additionally, traffic volumes were reduced on some of the nearby north-south roadways such as Orange Blossom Trail, Westmoreland Drive, and Parramore Avenue. In all three model alternatives, traffic volumes decreased on all of the study segments of Orange Blossom Trail; however, roadway LOS only improved between Church Street and South Street. Traffic volumes also decreased on many segments of Parramore Avenue, although LOS improvements were minimal. In

Alternative 2, there was a decrease in traffic volumes on Westmoreland Drive between South Street and Long Street of over 4,500 vehicles although it remained at LOS D.

This road improvement also has a positive result on the segment of SR 50 between Parramore Avenue and Edgewater Drive with traffic volumes reduced by over 6,000 vehicles per day in Alternative 2 and over 9,000 vehicles per day in Alternatives 1 and 3; this is due primarily to providing a direct connection to Edgewater Drive, rather than an indirect one via Parramore Avenue which required motorists to use SR 50 for a short stretch.

Overall, the improvement will provide better system-wide connectivity and more direct routing, which in turn will reduce traffic volumes on many nearby facilities.

South Street & Anderson Street

The sections of Anderson Street converted to two-way traffic did not see dramatic changes in volume, with the exception of the segment between Division Avenue and Hughey Avenue, which doubled its traffic volumes. Although the LOS improved between Hughey Avenue and Garland Avenue from F to D, it declined between Garland Avenue and Magnolia Avenue from D to E and F. The section from Magnolia Avenue to Rosalind Avenue did have its volume reduced enough to improve from LOS F to D in each alternative.

With the conversion of portions of South Street to two-way traffic in the alternatives, there was a significant increase in traffic volumes of over 7,000 vehicles per day on the segment between Hughey Avenue and Orange Avenue in all three alternatives; however, these segments are all projected to operate at LOS F. On the segments between Orange Avenue and Rosalind Avenue there was a significant decrease in traffic volumes of 7,000 to 11,000 vehicles per day and the segment from Orange Avenue to Magnolia Avenue, which is projected to improve from LOS F to D in all three alternatives.

These improvements, which are being included with the I-4 improvements, will make getting to and from the interstate easier, and will help improve the navigation of Downtown by providing for simpler movements rather than the existing more complex and restricting one-way flows. However, the trade off is that some segments will operate more poorly.

Church Street

Traffic volumes increased by over 5,000 vehicles on Church Street in all three alternatives between Garland Avenue and Rosalind Avenue. In this area, Church Street operated at LOS E or F in all three alternatives compared to LOS C or D in the base network.

The Church Street two-way street conversion also had an effect on the segment of Rosalind Avenue between Church Street and South Street, which experienced an increase in daily traffic volumes in all three alternatives of 8,000 to 12,000 vehicles. The corresponding LOS decreased from D in the base condition to F in each alternative.

Despite the decrease in LOS performance, the two-way street conversions on Church Street and Pine Street provide more flexibility in access to many Downtown properties, and again, simplify rather than complicate Downtown trip routing.

Lucerne Terrance Extension

The Lucerne Terrace Extension is projected to carry over 13,000 vehicles per day in all three alternatives. It is forecasted to operate at LOS D in Alternatives 1 and 3 and LOS E in Alternative 2. The volume of traffic projected on this roadway proves the worth of this important connection, which will also provide parallel north-south capacity to Orange Avenue and help improve connections between the core CBD and the ORHS campus. This facility may also serve as a key link for one of the Downtown transit circulator routes.

7.9 Downtown Traffic Circulation

There are numerous possibilities for modifications of the traffic circulation within Downtown Orlando. One concept is to simplify travel and circulation. A primary means to achieve this goal is through conversion of one-way streets to two-way streets and thereby implement more natural traffic patterns that allow motorists to drive more intuitively within Downtown, without having to divert their desired paths because of prohibited traffic movements or directions.

Core Central Business District

Building upon the modeling and level of service analysis described in the previous section, **Figures 7-14** and **7-15** present two alternatives for traffic laneage and circulation in one of the key areas of Downtown, the core central business district (CBD) between Central Boulevard on the north, Anderson Street on the south, Garland Avenue on the west, and Rosalind Avenue on the east. This includes the area around the proposed Performing Arts Center.

In Alternative A shown in **Figure 7-14**, Magnolia Avenue remains open between South Street and Anderson Street after the completion of the Performing Arts Center. Other key elements of Alternative A include the following:

- Exclusive transit lanes run south on Magnolia Avenue and north (contraflow) on Orange Avenue, which allows for two-way traffic on Magnolia Avenue. This arrangement supports the future conversion to LRT or similar fixed guideway mode.
- Magnolia Avenue is extended south of Anderson to provide a connection to Orange Avenue and West Lucerne Circle for both transit and vehicle traffic .
- Anderson Street, South Street, Church Street, and Pine Street are all converted to two-way traffic flow.

Figure 7-15 shows the Alternative B concept in which the block of Magnolia Avenue through the Performing Arts Center site between South Street and Anderson Street is closed to all through traffic. Other elements of Alternative B include the following:

- ❖ This alternative restricts the potential for converting several streets to two-way traffic flow. As such, the existing exclusive LYMMO lanes are used for the transit circulator north of the Performing Arts Center. Exclusive transit lanes are provided on Orange Avenue in both directions between South Street and West Lucerne Circle to allow the transit circulator destined for the ORHS campus to turn left from South Street. The right-of-way needed for the exclusive transit lanes between South Street and Anderson Street would come from the Performing Arts Center block. A new exclusive left turn transit phase is needed at the South Street/ Orange Avenue intersection to allow the circulator to continue southbound on Orange Avenue from South Street; this reduces the vehicle capacity and increases the stopped delay at this critical intersection.
- ❖ Because the existing LYMMO lane on Church Street is maintained for use by the transit circulator, both Church Street and Pine Street must remain one-way for the section between Orange Avenue and Rosalind Avenue. As a result, Church Street would provide one lane eastbound between Orange Avenue and Magnolia Avenue, and two lanes eastbound from Magnolia Avenue to Rosalind Avenue. Pine Street provides two lanes westbound between Rosalind Avenue and Orange Avenue.
- ❖ As a result of Magnolia Avenue being closed between South Street and Anderson Street, the eastern terminus of the contraflow traffic lane on Anderson Street is extended one block east to Rosalind Avenue. A southbound contraflow lane is also provided on Rosalind Avenue between South Street and Anderson Street to provide additional connectivity; the right-of-way width for this contraflow lane would be taken from Performing Arts Center block on the west side of Rosalind Avenue.

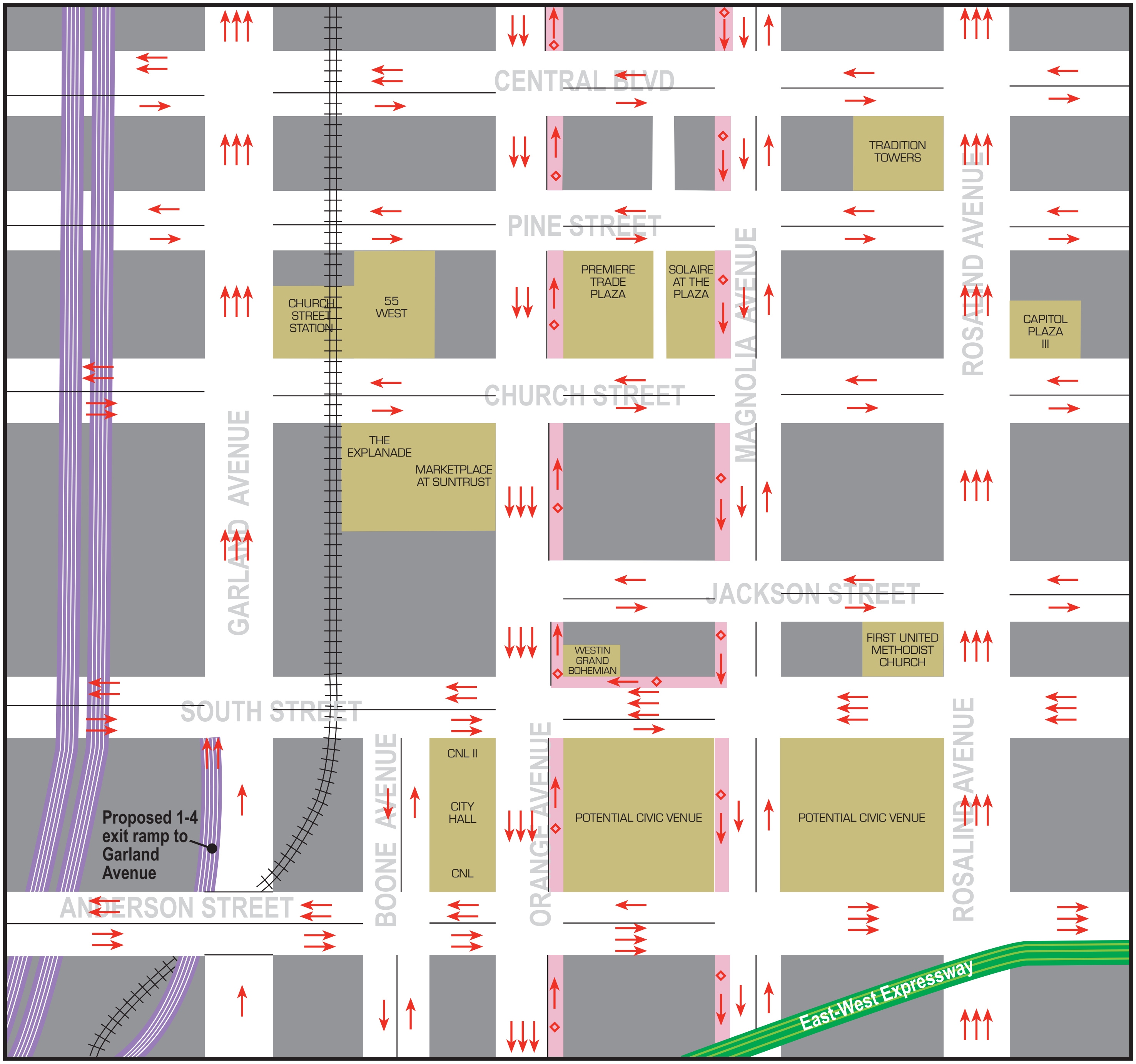
In evaluating the two alternatives, Alternative A is preferred to Alternative B because it provides for simpler traffic circulation due to its heavier reliance on two-way traffic streets, provides better connectivity, and accounts for significantly lower vehicle delay. In all scenarios evaluated, Magnolia Avenue must remain open to traffic in order to provide acceptable roadway and transit mobility.

Ivanhoe Boulevard Interchange Area

Figure 7-16 presents a potential configuration for traffic laneage and circulation in the immediate vicinity of the Ivanhoe Boulevard interchange at I-4. The objective of this proposed configuration is to help simplify the traffic circulation in this area, which can be confusing. The key elements presented in **Figure 7-16** include the following:

- ❖ South Ivanhoe Boulevard is used as the primary roadway through the interchange area rather than Lakeview Street, which is eliminated east of I-4. The traffic flow is two-way on this street west of Magnolia Avenue, with two lanes in each direction to the Hughey Avenue Extension, and one lane in each direction west of that point.

Downtown Orlando Transportation Plan
Downtown CBD Core Traffic Circulation
Alternative A
Magnolia Two-Way / Open between South & Anderson



Legend:

Vehicle Travel Lane

Exclusive Transit Lane

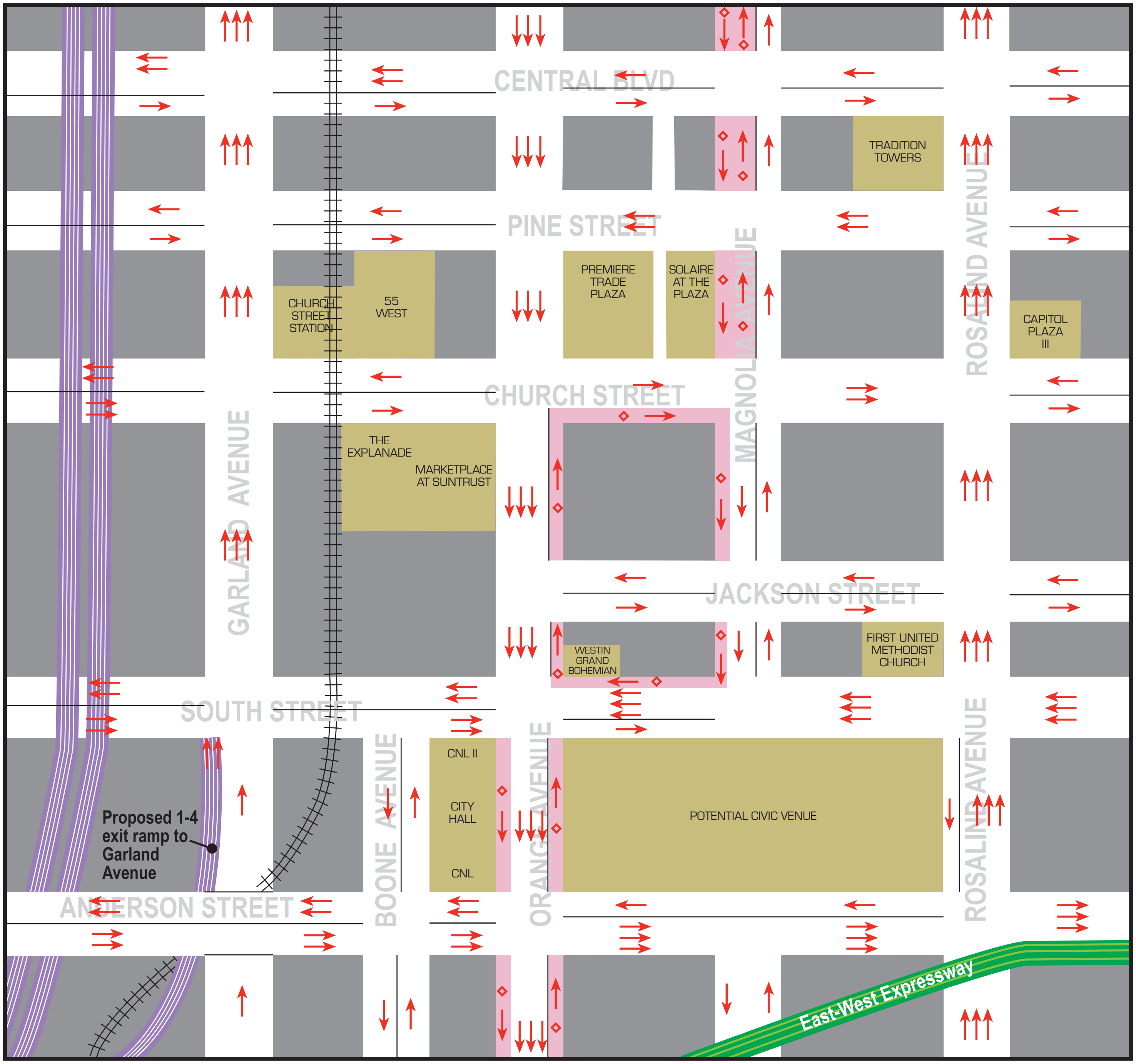
Figure 7-14

HDR

Downtown Orlando Transportation Plan

Downtown CBD Core Traffic Circulation
Alternative B

Magnolia One-way / Closed between South & Anderson



Legend:

Vehicle Travel Lane

Exclusive Transit Lane

Figure 7-15

Downtown Orlando Transportation Plan

Ivanhoe Blvd Interchange
Area Proposed Traffic Circulation

Legend:

- Vehicle Travel Lane
- Exclusive Transit Lane
- Roadway/Ramp Removed

Figure 7-16

HDR

- As part of the ultimate design for I-4, the Ivanhoe interchange will be modified to an urban three-quadrant diamond. The eastbound on ramp is maintained in the same location as today. The westbound HOV off ramp aligns with Legion Place. The westbound general use off ramp intersects Ivanhoe Boulevard just west of I-4 and continues south of Ivanhoe Boulevard as the Hughey Avenue Extension with two lanes. A third lane is added to the Hughey Avenue Extension with another I-4 off ramp between Ivanhoe Boulevard and SR 50.
- Legion Place is converted to two-way traffic flow with one lane in each direction.
- Orange Avenue has one travel lane in each direction between Garland Avenue and Magnolia Avenue. South of Garland Avenue, Orange Avenue has two southbound lanes and one northbound lane.
- Magnolia Avenue has two northbound lanes and one southbound lane south of Ivanhoe Boulevard.
- An exclusive transit lane is provided northbound on Magnolia Avenue, turning west and then south on Orange Avenue.

This simplified configuration also allows for the capture of more space along Lake Ivanhoe, potentially for expanded park space.

Key Roadway Typical Section Options

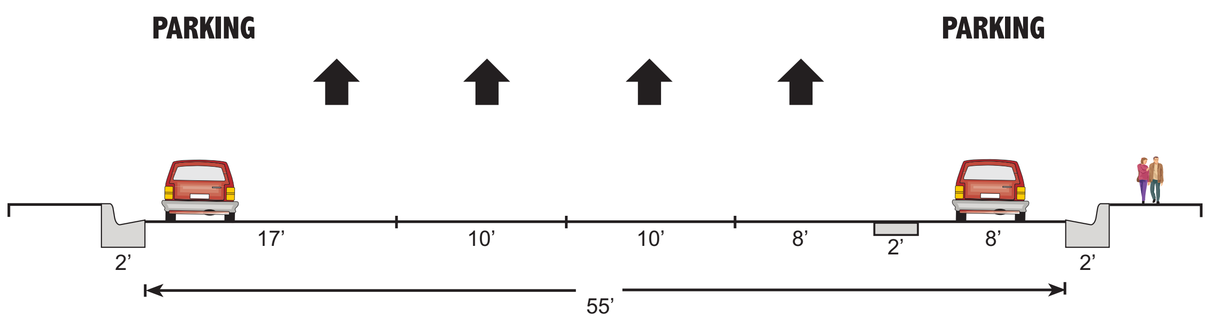
Two of the most important roadways in Downtown Orlando are the Orange Avenue and Rosalind Avenue/Magnolia Avenue corridors. While these roadways serve today as primary arterials carrying both Downtown and through traffic, both corridors have sections with enough width to consider making changes to the typical section to help serve other modes of travel in addition to the automobile. **Figure 7-17** and **7-18** present options for changes to the typical sections on Orange Avenue and Magnolia Avenue, respectively.

As shown in **Figure 7-17**, Orange Avenue between Garland Avenue and SR 50 currently has 4 travel lanes and on-street parking on both sides of the street within 55 feet of pavement. Option A includes removing one travel lane and on-street parking on one side of the street to add an exclusive bus lane and a bicycle lane. Option B uses the same section, but incorporates two southbound lanes and one northbound contraflow lane, rather than three southbound lanes. **Figure 7-18** shows that Magnolia Avenue south of SR 50 has three northbound lanes, a bicycle lane, and on-street parking on both sides of the street within 52.5 feet of pavement. Although the striped bicycle lane does not currently continue north of SR 50, the dimensions of Magnolia Avenue from curb to curb are the same north to Orange Avenue. As shown, Option A provides an exclusive bus lane by removing on-street parking from one side of the street and narrowing the travel lanes. Option B removes parking on both sides of the street in order to provide the bus lane and wider sidewalks, which are desirable since Magnolia Avenue has been designated as a primary pedestrian corridor; the existing 6.5 foot sidewalks in this option would be widened to 10 feet on both sides of the street; although this is more narrow than the desired 15-foot sidewalks for a primary pedestrian corridor, it is unlikely that they can be expanded further due to the heavy traffic loadings on Magnolia Avenue.

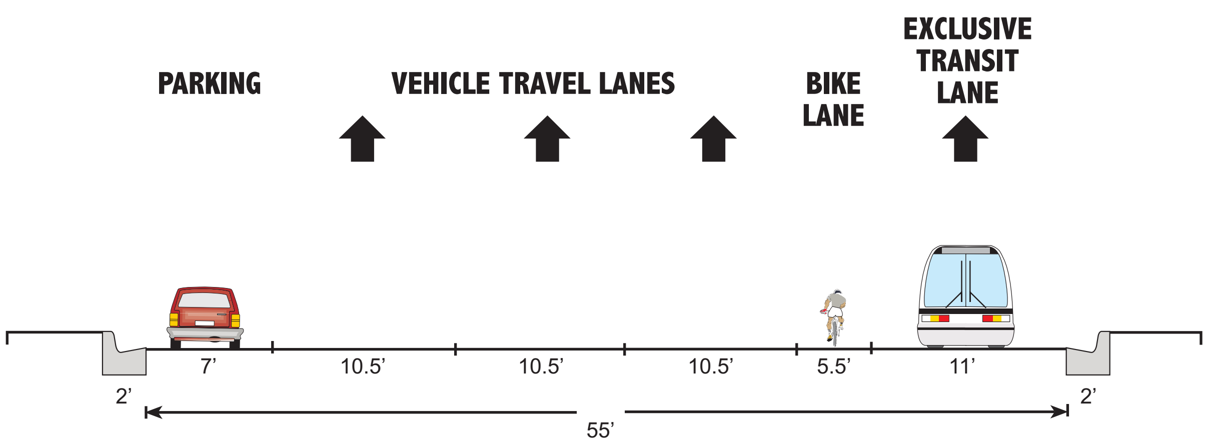
Typical Section Options

Orange Avenue, Garland Avenue to SR 50

Existing



Option A



Option B

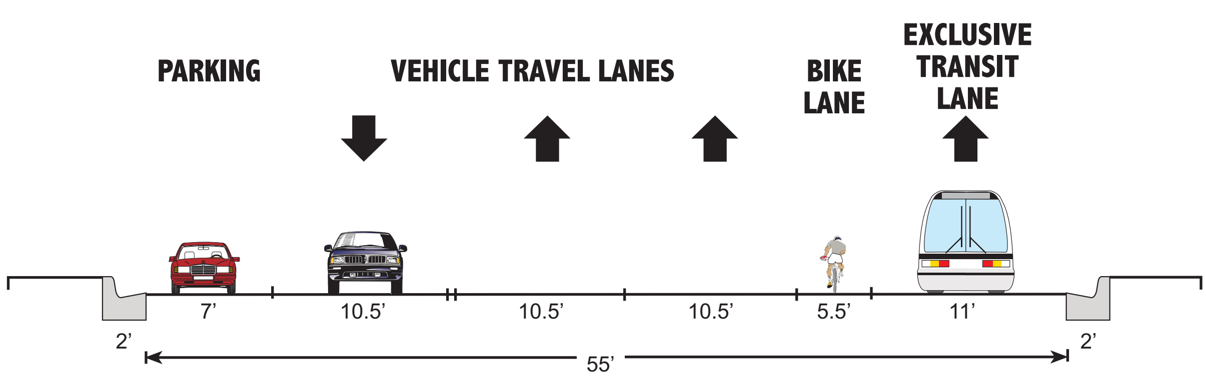


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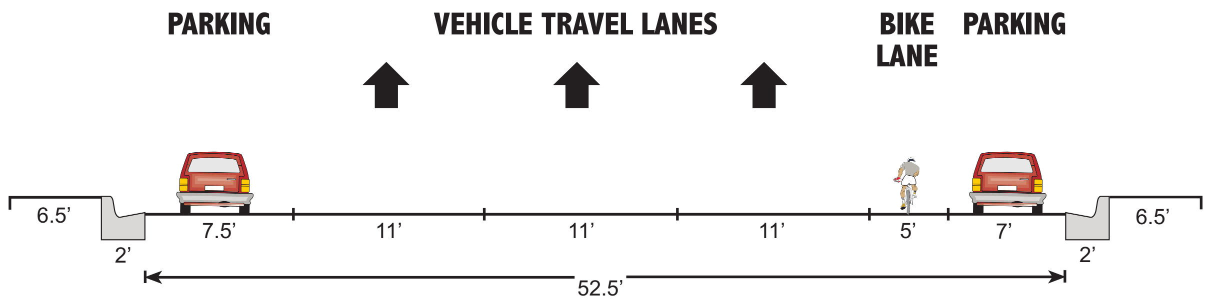
Figure 7-17

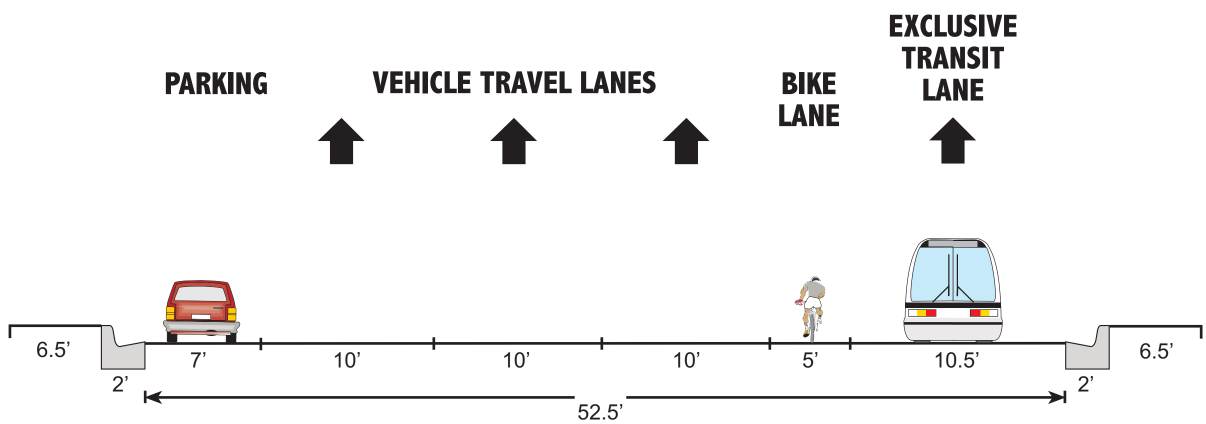
Typical Section Options

Magnolia Avenue, South of SR 50

Existing



Option A



Option B

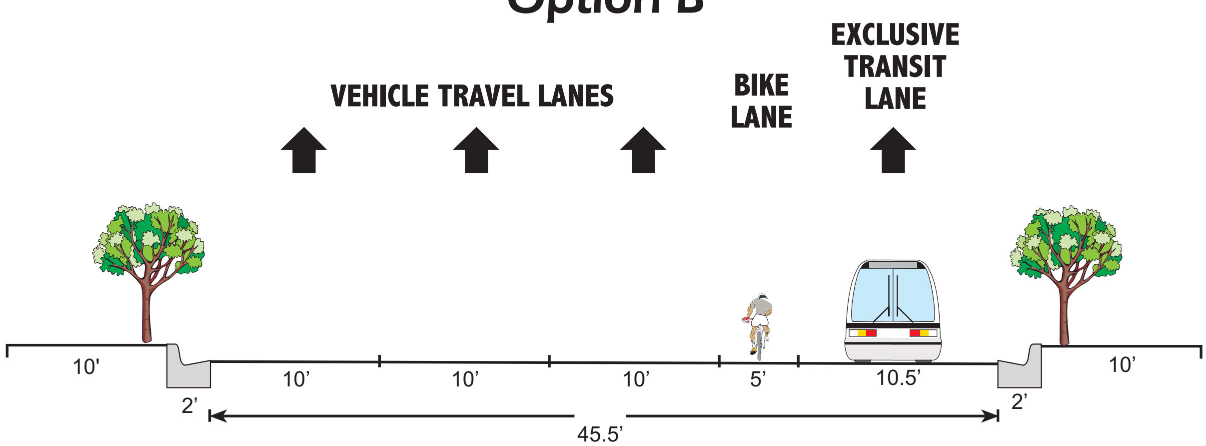


Figure 7-18

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Section 8

Parking Plan

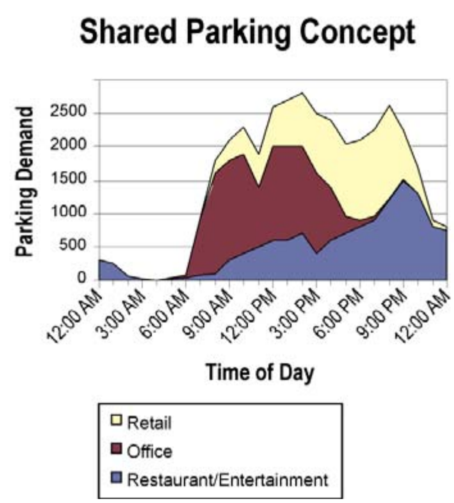
Parking

Many community stakeholders perceive the Downtown parking experience as one characterized by limited supply and high cost, while others believe that parking, like growth needs to be carefully managed. Most agree however that an unrestrained supply of low-cost parking encourages a development pattern that inadvertently increases downtown congestion, while discouraging transit patronage and pedestrian activity.

The parking element of the Downtown Orlando Transportation Plan is marked by the following three fundamental ideals:

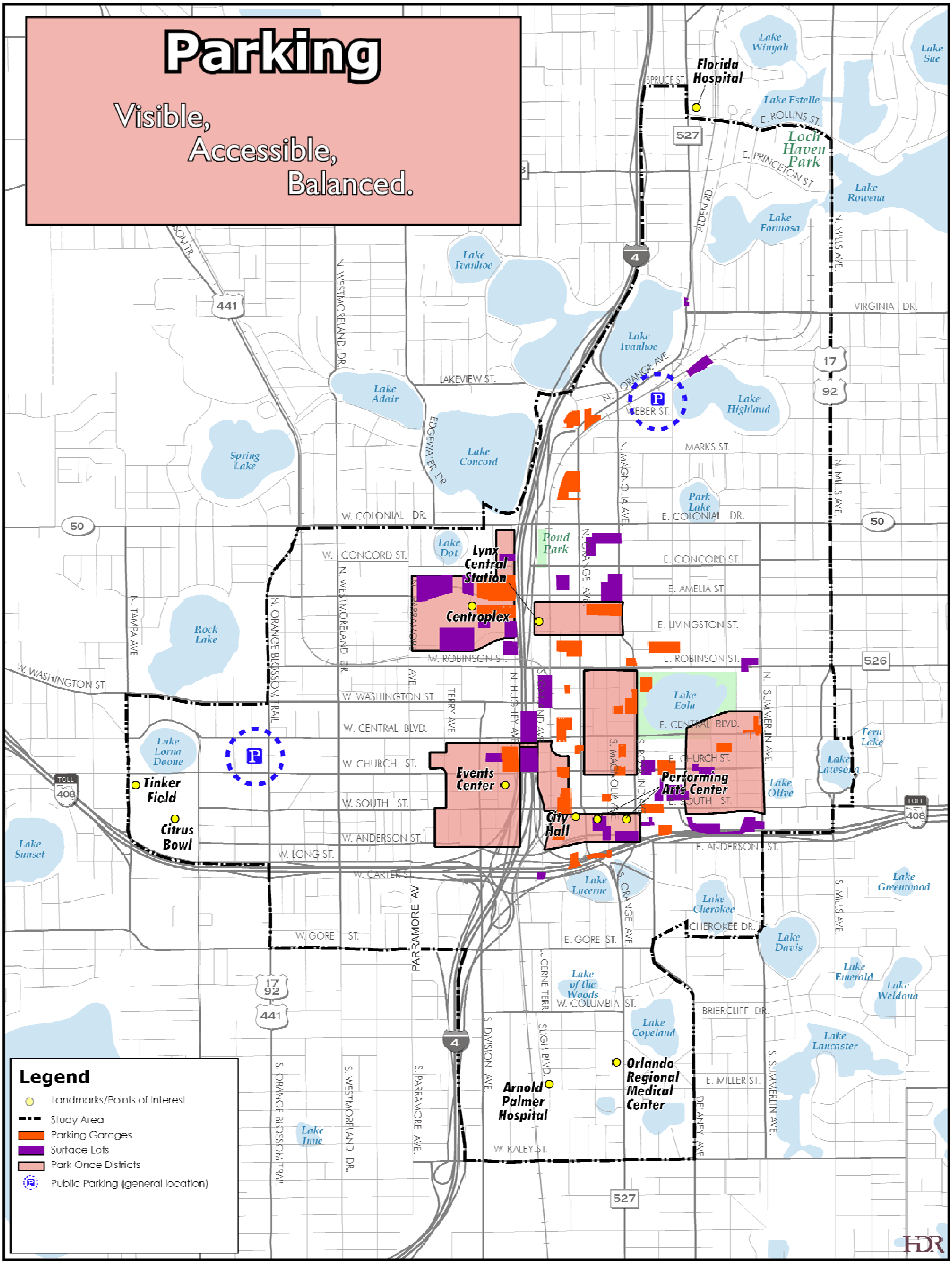
- Smart management of future parking supply and demand.
- Increasing transit patronage and pedestrian activity by managing total supply in specific "park once" activity districts.
- Addressing variable demand through modified land development regulations and incentives that encourage shared parking between complimentary land uses.

Continue to encourage low impact modes by increasing supply for two-wheel vehicles.



The land uses associated with a 24-hour urban setting can be easily integrated without multiple parking garages diminishing the pedestrian realm.

Advanced Parking Management Systems communicate a unified message of convenient short-term parking and "real time" information on availability.


Parking
Visible,
Accessible,
Balanced.
Legend
Landmarks/Points of Interest
Study Area
Parking Garages
Surface Lots
Park Once Districts
Public Parking (general location)
Florida Hospital
Lynx Central Station
Centroplex
Events Center
Tinker Field
Citrus Bowl
City Hall
Performing Arts Center
Arnold Palmer Hospital
Orlando Regional Medical Center
Loch Haven Park
Pond Park
Lake Winyah
Lake Sue
Lake Estelle
Lake Rowena
Lake Formosa
Lake Ivanhoe
Lake Adair
Lake Concord
Lake Highland
Spring Lake
Park Lake
Lake Dot
Rock Lake
Lake Eola
Lake Lorna Doone
Fern Lake
Lake Lawsona
Lake Olive
Lake Sunset
Lake Lucerne
Lake Cherokee
Lake Greenwood
Lake Davis
Lake Emerald
Lake Weldona
Lake of the Woods
Lake Copeland
Lake Lancaster
Lake Jane
E. ROLLINS ST.
E. PRINCETON ST.
SPRUCE ST.
ALDEN RD.
N. MILLS AVE.
VIRGINIA DR.
LAKEVIEW ST.
N. ORANGE AVE.
WEBER ST.
MARKS ST.
N. MAGNOLIA AVE.
EDGEWATER DR.
N. WESTMORELAND DR.
W. COLONIAL DR.
E. COLONIAL DR.
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
E. LIVINGSTON ST.
W. ROBINSON ST.
E. ROBINSON ST.
N. TAMPA AVE.
N. ORANGE BLOSSOM TRAIL
W. WASHINGTON ST.
W. CENTRAL BLVD.
E. CENTRAL BLVD.
W. CHURCH ST.
E. CHURCH ST.
W. SOUTH ST.
W. ANDERSON ST.
E. ANDERSON ST.
W. LONG ST.
W. CARTER ST.
TERRY AVE.
N. HUGHEY AVE.
S. MAGNOLIA AVE.
N. SUMMERLIN AVE.
S. ORANGE AVE.
PARRAMORE AV
W. GORE ST.
E. GORE ST.
CHEROKEE DR.
S. MILLS AVE.
W. COLUMBIA ST.
BRIERCLIFF DR.
S. DIVISION AVE.
E. MILLER ST.
S. SUMMERLIN AVE.
S. ORANGE BLOSSOM TRAIL
S. WESTMORELAND DR.
S. PARRAMORE AVE.
DELANEY AVE.
W. KALEY ST.
441
527
4
17
92
50
526
408
TOLL
HDR

8.1 Hallmarks of the Parking Plan

Creation of a sustainable parking management strategy for Downtown Orlando requires examination of multiple and often conflicting community perceptions. Some community stakeholders perceive the Downtown parking experience as one characterized by limited supply and high cost, while others believe that parking, like growth needs to be carefully managed. Most stakeholders agree however that an unrestrained supply of low-cost downtown parking encourages a development activities that inadvertently increase downtown congestion, while discouraging transit patronage and pedestrian activity.

The parking section of the Downtown Orlando Transportation Plan is marked by three basic elements, or "Hallmarks:"

- ❖ *Hallmark 1:* Smart Management of Future Parking Supply and Demand
- ❖ *Hallmark 2*: Increase Transit Patronage and Pedestrian Activity by Managing Total Supply in Specific "Park Once" Activity Districts.
- ❖ *Hallmark 3*: Address Variable Demand Through Modified Land Development Regulations and Incentives That Encourage Shared Parking Between Complimentary Land Uses.

8.2 Supply of Downtown Parking

Downtown commerce competes with suburban activity centers where the available supply of parking is almost always readily visible to the customer in the form of rows of empty parking spaces often only occupied during peak times of the year. It is important that Downtown Orlando recognize such perceptions in order to compete on equal footing with suburban-area activity centers. While the supply of downtown parking is currently adequate to serve existing uses existing and future supply must be efficiently managed to encourage transit use and pedestrian activity between downtown employment, shopping, entertainment and residential centers.

Currently, there are approximately 21,000 structured and 750 on-street parking spaces located in the downtown core. **Figure 8-1** shows the location and distribution of Downtown Orlando's existing parking supply. It should be noted that unlike other sections of the Downtown Transportation Plan, the study area used for the parking supply and demand analysis is smaller than the study area for other sections. This study area matches that used for the inventory section of the City of Orlando Downtown Parking Study completed in January 2006 by Walker Parking Consultants and is bounded by Princeton Street on the north, Gore Street on the south, Westmoreland Drive on the west and Summerlin Avenue on the east. A detailed inventory of parking currently available in this study area is summarized **Table 8-1**.

Table 8-1
Downtown Orlando Existing Parking Supply

Facility Type	No. Spaces
On-Street	750
City Lots	3,581
City Garages	6,222
Private Garages	11,304
2005 SUPPLY	**21,857**

Source: Walker Downtown Parking Study; Jan., 2006

There is some concern for the state of future supply brought about by I-4 reconstruction which could impact approximately 850 surface spaces (Lots 9 and 10) currently located underneath the interstate. Surface-level, short-term, metered sparking spaces are of limited supply downtown. The metered spaces at these lots are primarily being used for patrons of evening entertainment uses. Currently 250 spaces in Lot 10 are leased for long-term use. With a current $40.00 monthly rate, these and the leaseable spaces at the Centroplex account for the most affordable monthly lease rates in the Parking Division's downtown inventory. As Lot 10 spaces become no longer available, additional allocations should be made available in the Centroplex garages as well as through private providers.

A detailed parking inventory for the downtown core is shown in **Table 8-2.**

Figure 8-1
Downtown Orlando Existing Parking System

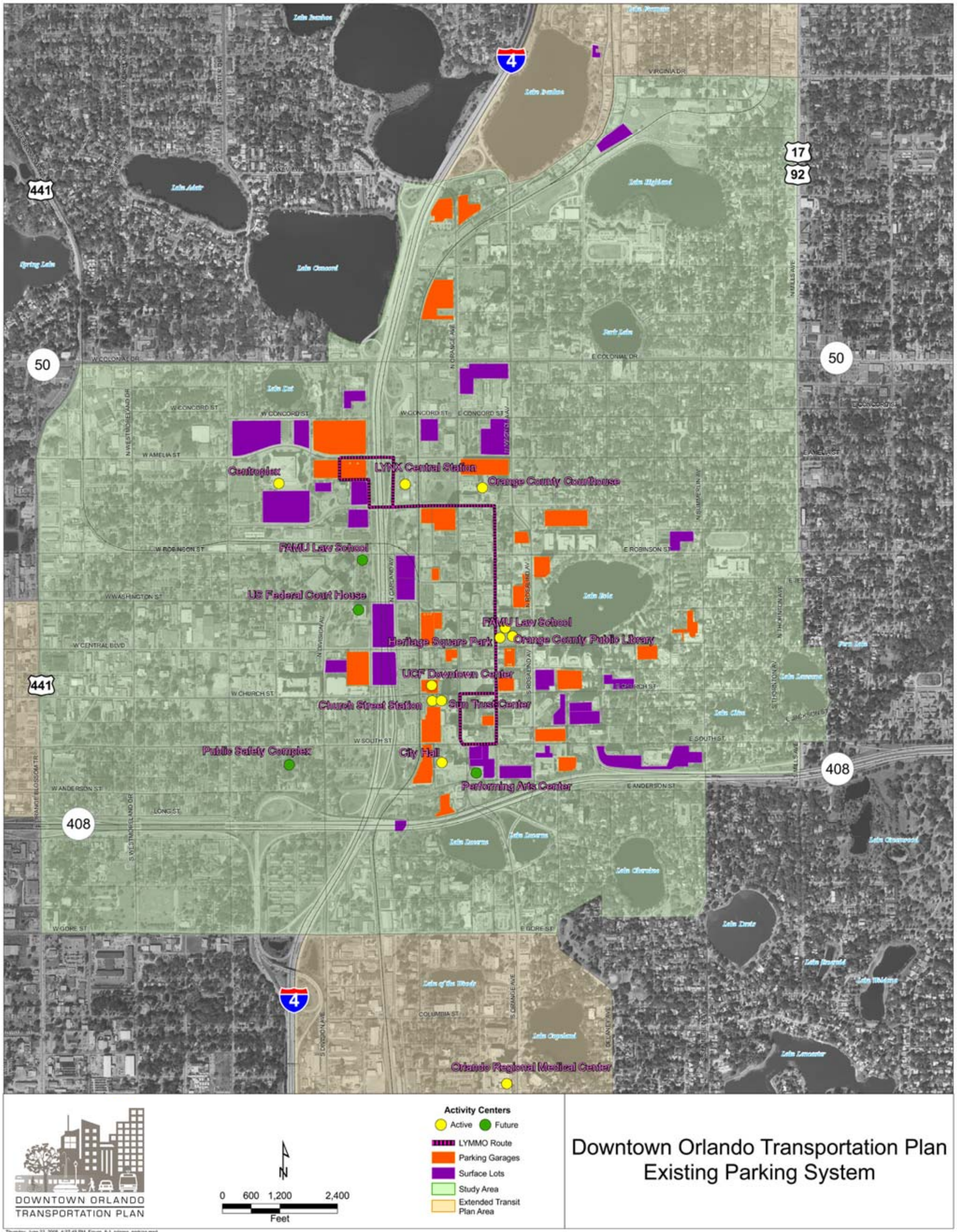


Table 8-2

Downtown Orlando Detailed Inventory of Current Parking Supply

PRIVATE GARAGES	ADDRESS	SPACE COUNT
Thornton Park Garage & Offices	22 N Summerlin Av	360
Parkside by Post Properties	13 N Osceola Av	420
Capital Plaza Parking Garage	302 E Pine St	1460
Wachovia Tower Parking Garage	20 N Orange Av	495
Signature Plaza Garage	77 E Jackson St	505
Citrus Center	255 S Orange Av	648
Lincoln Plaza	300 S Orange Av	485
Gateway Center	1000 Legion Pl	600
One Orlando Center	800 N Magnolia Av	1300
Eola Park Center	20 E Robinson St	425
Hughes Square/City View	1 Hughes Way	1000
Bank of America Center	390 N Orange Av	900
SunTrust Center	200 S orange Av	1434
Landmarks	225-315 E Robinson St	1300
AmSouth Bank	111 N Orange Av	530
City Commons Garage	420 Boone Av	2200
Sunshine Garage	41 W Jefferson St	400
2 S Orange Garage	2 S Orange	167
Magnolia Pl	137 E Church St	320
PUBLIC GARAGES	**ADDRESS**	**SPACE COUNT**
Central Blvd Garage	53 W Central Bv	605
Washington St Garage	50 W Washington St	502
Administration Center Garage	300 Liberty St	860
Library Garage	112 E Central Bv	582
Church St Garage*	150 S Hughey Av	1056
Market Garage**	60 W Pine St	380
Courthouse Garage	400 E Amelia Av	1501
Centroplex I	400 W Amelia Av	603
Centroplex II	355 Alexander Pl	513
PUBLIC SURFACE PARKING LOTS		**Total Public Garage**
City Hall Visitor's Lot	401 S Orange Av	85
Lot 2	113 N Magnolia Av	172
Lot 4	78 W Central Bv	70
Lot 6***	61 W Washington St	182
Lot 9	57 S Hughey Av	382
Lot 10	81 N Hughey Av	491
Robinson St Lot	301 N Hughey Av	29
Garland Av Lot	109 W Pine St	127
EVENT PARKING		**Total Public Lots**
Arena Lots	Centroplex	2,043
Citrus Bowl Lots	Florida Citrus Bowl	5,850

* OPD parking included, not 100% accessible to public.
** Garage taken out in July. When back online in 2007 will have 480 spaces.
*** Will become a 1,100 space public garage

8.3 Future Potential Demand Analysis

Future, unconstrained potential demand for additional downtown parking capacity was estimated assuming that the current ratio of parking to development remains constant. Existing parking supply rations are shown in **Table 8-3** below.

Table 8-3
2005 Existing Parking Supply Ratios

Facility Type	No. Spaces	MF Homes + Hotels (Spaces/D.U.)	Non-Residential (Spaces/ KSF)
City Garages	6,222	0.5054	1.8813
Private Garages	11,304	0.9183	3.4180
2005 Existing Supply Ratio	17,526	1.4237	5.2993

Residential and non-residential growth for this plan's 2012 interim and 2025 horizon year was calculated using data from adopted Metroplan Orlando population and employment projections and long-range projects provided by the City of Orlando Economic Development Department. Anticipated interim and horizon year incremental growth are summarized in **Table 8-4**.

Table 8-4
Downtown Orlando Incremental Future Growth Projections

	Multi-Family Homes	Non-Residential
Increment	(Units)	1,000 sq.ft.
2005-2012	5,826	3,307,212
2005-2025	16,646	9,449,177

Source: City of Orlando/Metroplan Orlando

With the information contained in the above tables, it is possible to estimate potential future parking demand if current automobile use, transit service, land use mix, parking availability, accessibility, cost and policies were all to remain unchanged.

Table 8-5 illustrates that if future downtown parking supply is managed same as historically, the amount of potential future demand would represent approximately 20 million square feet of parking or almost 40 percent of the total projected 2025 built environment. Needless to say, this scenario would preclude most, if not all of the Downtown Orlando Outlook plan's Guiding Principles.

Table 8-5
Unmanaged Potential Future Parking Demand

Interim 2012			
Facility Type	No. Spaces	MF Homes + Hotels (D.U.)	Non-Residential (Spaces/KSF)
City Garages	9,167	2,945	6,222
Private Garages	16,654	5,350	11,304
2005-2012 Interim Demand	25,821	8,295	17,526
Horizon 2025			
City Garages	26,191	8,414	17,777
Private Garages	47,583	15,286	32,297
2005-2025 Demand	73,774	23,699	50,074

Downtown Orlando is rapidly evolving into a dynamic 24-hour destination city with recent injections of much-needed modern high-density housing along with a burgeoning arts and entertainment culture. As more people move downtown, there will be significantly less demand for parking at retail, entertainment, and employment destinations. Parking supply will still have to be carefully managed in order reduce the possibility of gridlock congestion by encouraging pedestrian activity and transit use.

8.4 Smart Management of Future Parking Supply and Demand

A sustainable parking strategy for Downtown Orlando must balance both supply and demand. Like many urban centers, Downtown Orlando sometimes must overcome community parking perceptions of scarce availability and high-prices. This section offers several popular strategies for achieving this balance.

Managing Supply in the Downtown Core

Land development regulations adopted to support the Downtown Orlando Transportation Plan should maximize existing parking supply through integration of complimentary mixed land uses, shared parking facilities, and transit-supportive development at and near current and future premium transit stops.

Availability of short-term parking in the Downtown area varies according to time of day and location. The *effective supply* of available parking spaces is the total supply adjusted to account for turn-over of persons moving in and out of parking spaces. Improving customer perceptions of parking availability is an important and largely overlooked tool for allocating effective supply to short-term customers. Improving these perceptions can be addressed through the following strategies to improve utilization of short-term parking:

- ❖ Pricing and regulatory policies that prioritize short-term parking in the commercial core and incentivize long-term parking near outlying premium transit service (Centroplex, Florida Hospital, OUC/Weber Street, City View, etc.)
- ❖ Expansion of the Parking Division's "Park Smart" brand identity towards a parking information program that integrates advanced parking information technology, to improve traffic flow by directing motorists to available short-term parking spaces near retail activity centers and premium transit stops.
- ❖ Maximize short-term use of on-street parking through increased enforcement and design options to improve supply and efficiency.
- ❖ Encourage implementation of shared parking solutions into the development approval process.
- ❖ Continued encouragement of transit patronage and pedestrian activity through establishing appropriate maximum parking standards in selected "Park Once" districts.
- ❖ Increase physical capacity of existing parking facilities by increasing the supply of spaces for two-wheeled vehicles.

Improve Community Perceptions of Limited Supply Through "Park Smart" Branded Wayfinding and Advanced Parking Information Systems

Variable message signs currently proposed to be located throughout the downtown at major gateways should provide parking availability as well as traffic information so that motorists are quickly informed as to the amount, availability, and cost of parking at nearby facilities. "Intelligent" signage of this type at these locations will reduce downtown congestion by directing motorists to the closest parking facilities, and avoiding the need for random and circuitous searches through downtown streets. Lastly, implementation of this strategy will help to improve inaccurate community perceptions of limited downtown parking, thereby improving the competitive advantage of downtown commerce versus competing suburban activity centers.

Increasing the capacity of existing off and on-street parking facilities by creating capacity for two-wheeled vehicles.

8.5 Increase Transit Patronage and Pedestrian Activity by Managing Total Supply in Specific "Park Once" Districts

"Park-once" districts located throughout the downtown area provide visitors with the opportunity to patronize retail, entertainment, and special event centers *via* pedestrian-friendly sidewalks and fixed-guideway transit service without moving their vehicle. Pedestrian-scale, context-appropriate pathways should be reinforced between uses within each of these districts.

Parking demand in the Downtown core can be reduced through continued encouragement of favorably priced outlying sites for long-term parkers, strategically-located fare-free transit zones, and pedestrian enhancements to improve access to and from such facilities.

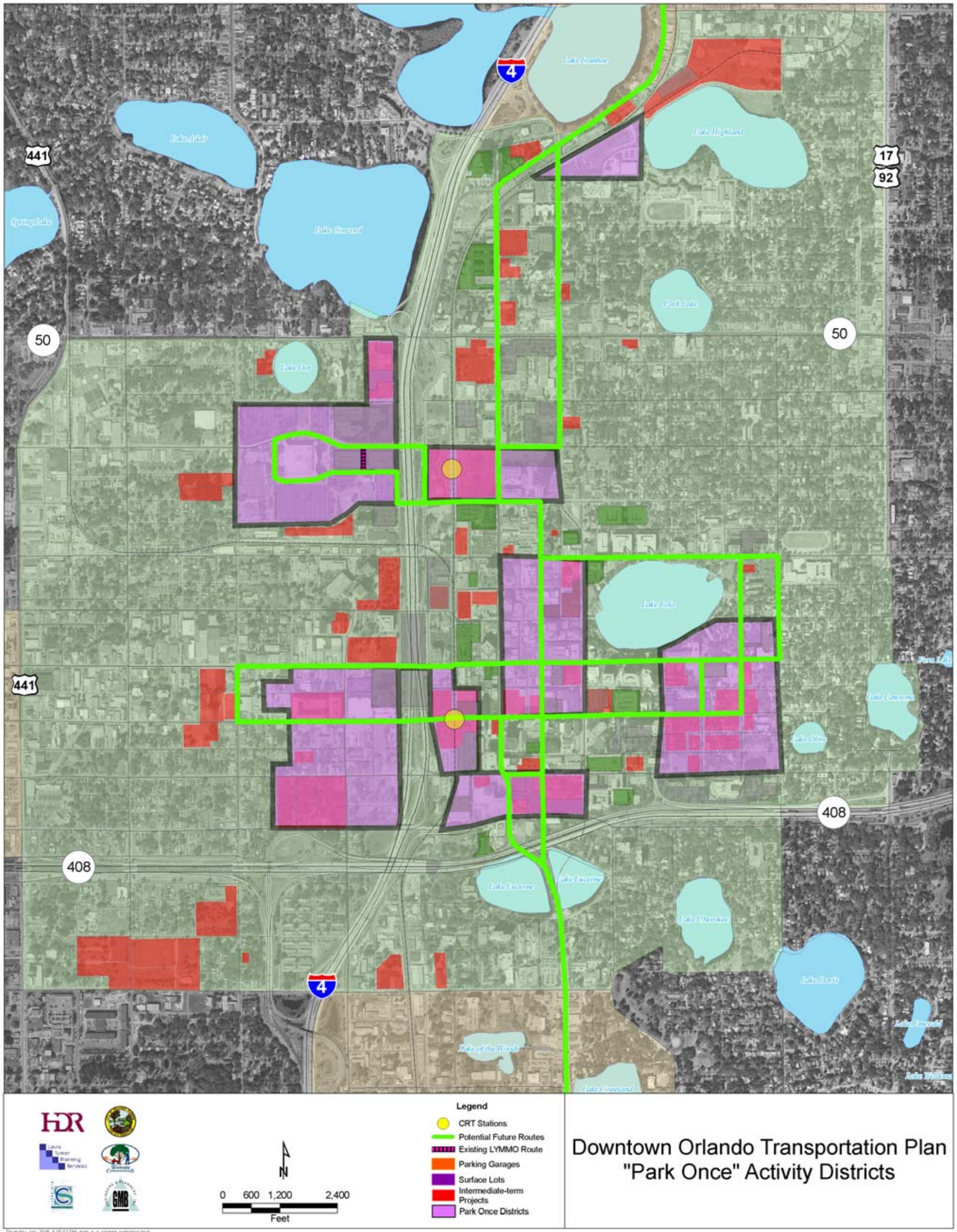
The Park-Once activity districts depicted on **Figure 8-2** are located and sized in a manner to maximize pedestrian trip making opportunities associated with a single parking instance. Each district either currently or is anticipated to contain an integrated mix of land uses connected through a network of pedestrian friendly streets that reduce traffic congestion. This pattern provides opportunities for sharing of parking facilities among complimentary land uses (i.e. restaurant/entertainment with commercial uses and/or retail with offices uses). "One size fits all" parking standards for the entire downtown should not apply to these specific areas within the downtown core. Instead, district-wide parking caps should be established in order better manage congestion and foster pedestrian activity within each district.

Travel Demand Incentives to Reduce Overall Demand

Travel Demand Management (TDM) incentives encourage alternative travel modes though: reduced parking pricing for car and van poolers, preferred location for HOV parking, variable pricing, parking cash-out programs, development approval incentives for developers agreeing to implement TDM programs, and increased capacity for compact cars, bicycles and motor bikes.

Many cities are successfully managing downtown demand by encouraging the use of readily available alternatives to the typical commute by single-occupant vehicle. Such demand reduction polices may include: employer transit contributions, parking cash-out programs to minimize "free" or subsidized parking for employees, flexible work schedules, and free or reduced parking fees and preferred locations for car and van pool vehicles. While policies of these types are almost always initiated by local government, their success depends upon strong commitment and partnership with the local business community.

Figure 8-2
Downtown Orlando "Park Once" Activity Districts



8.6 Shared Parking Between Complimentary Land Uses To Address Variable Demand Through Modified Land Development Regulations & Incentives That Encourage

Shared parking is a simple concept that recognizes the fact that different land uses attract customers, workers, and visitors at different times throughout the day. Downtown developers benefit not only from lower construction costs, but also from maximizing the benefits of Downtown Orlando's emerging mixed-use character where workers and visitors park together in shared facilities thereby reducing reliance on connections to scattered facilities, creating more space for high-value pedestrian-oriented uses. Shared parking strategies include:

- Limiting reserved parking for individuals and groups;
- Encouraging parking requirements that take into account the peak-demand land uses in the surrounding area and encourage common parking facilities to be located near one another; and
- Developing special event parking strategies that foster retail/entertainment commerce by maximizing the time spent downtown while out of an automobile.
- Delineating specific on-street street parking districts for evening and weekend use.

Shared parking concepts not only addresses variable demand but also helps to balance the costs and supply of parking with other downtown goals by promoting large and small scale integrated mixed use environments. Minimum parking requirements for single uses are often too financially burdensome for many developers. The incorporation of maximum standards and shared parking provisions into Downtown Orlando land development regulations will encourage sustained integrated mixed-use development through lower construc-tion costs. Through shared parking, the land uses associated with a 24-hour urban setting are easily integrated without multiple parking garages diminishing the pedestrian realm and urban fabric. The chart below demon-strates how multiple complimentary uses can utilize less total parking spaces than if each use were required to supply its own exclusive parking at minimum standards.

Variable Demand During Special Events and Construction Projects

Special events like street festivals, professional sports events and performing arts shows are critical magnets that make Downtown Orlando a unique destination unlike any other Central Florida activity center. The strategies contained in the Downtown Orlando Transportation are intended to leverage these events towards creating an improved, 24-hour urban environment. Therefore, future event parking plans should recognize each event's ability to put "feet on sidewalks" and increase storefront commerce.

Variable Demand During Special Events and Construction Projects

Variable demand associated with construction projects can seriously negatively impact downtown retail performance and neighborhood character. City staff should continue to diligently address these impacts of construction-related parking demand by requiring specific parking management plans in every new project's maintenance of traffic plan.

8.7 Downtown Orlando Recommended Phased Parking Management Program

A phased parking management program for Downtown Orlando is outlined in **Table 8-6.**

Table 8-6

Phased Parking Management Plan Implementation

Phase I	Years 1-2	Delineate park-once activity districts. Calculate appropriate parking caps and maximum standards within each identified district. Price and convert to short-term most the convenient spaces in each district. Expand off-peak, on-street parking areas to South and Robinson Streets. Expand capacity by through 1:100 conversions to motorcycle/scooter spaces at select locations. Expand City's Park Smart brand through integration of advanced parking information system into downtown ITS infrastructure.
Phase II	Years 3-4	Review policy effectiveness of Phase I implementation. Install bicycle storage facilities at strategic locations. Facilitate shared parking arrangements between providers with excess supply.
Phase III	Implement only if peak-period occupancy exceeds 95 percent	Address neighborhood spillover. Increase premium transit headways and service. Reprice supply in park-once activity districts. Convert more long-term spaces to short-term. Expand fare free transit areas. Increase support for TDM trip reduction program. Establish peak-hour shuttle service from O-Rena and Citrus Bowl lots.

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Section 9

Travel Demand & System Management

9.1 Travel Demand Management

Overburdened transportation systems have a dramatic effect on economic development, the environment, and the quality of life for everyone who depends on them. Transportation Demand Management (TDM) offers planners another tool to reduce the consequences of development like increased traffic congestion and air pollution, while encouraging development in other locations with reduced amounts of traffic gridlock.

A general term for various strategies that increase transportation system efficiency, TDM or Mobility Management changes travel behavior. TDM helps individuals and communities meet their transport needs in the most efficient way, thus reducing total vehicle traffic.

TDM prioritizes travel based on the value and cost of each trip, giving higher value trips and lower cost modes priority over lower value, higher cost travel, when doing so increases overall system efficiency. Through emphasis of the movement of people and goods, rather than motor vehicles, Mobility Management gives priority to public transit, ridesharing and non-motorized travel in congested urban conditions.

Programs of Transportation Demand Management may affect travel frequency, mode, destination or timing and are implemented through varying means; such as, rideshare matching, transit improvements, bicycle and pedestrian facility improvements, parking management and promotion of alternative modes. These can provide significant financial savings to governments, businesses and consumers, as well as environmental benefits.

A comprehensive TDM Program that includes a variety of complementary TDM strategies usually helps achieve most transportation improvement objectives while providing flexible solutions. For example, TDM can reduce congestion problems during Special Events, road construction or emergencies. It may allow new development in areas where road and parking capacity is constrained, it can help protect particularly sensitive environments, and it can provide access to groups with special mobility needs.

Benefits to local government include improved air quality, reduced peak period traffic congestion, livable communities, economic development, and reduced energy consumption. Benefits to business and developers could include reduction in transportation impact fees, less land used for parking facilities, and an increase in development density. These benefits translate to reduced commuting costs and less wasted time.

Most strategies use positive incentives, giving consumers more travel options or opportunities to save money. Motorists that continue driving are no worse off, and those who reduce their driving must be better off or they would not change their travel habits. Other strategies such as flex-time and rider-sharing could mitigate some effects of congestion.

Utilizing TDM strategies alleviates traffic congestion, promotes alternative transportation, and encourages a multi-modal environment benefiting the community and creating a better quality of life. **Table 9-1** lists many of the different strategies.

Table 9-1
TDM Strategies

Alternative Work Schedules	Alternative Modes	Parking Management	Road Pricing	Transit	Land Use Zoning & Management	Institutional
Staggered	Carpools	Preferential parking	Preferential	Employer sponsored	Higher densities	Trip reduction ordinances (TRO's)
Flex-time	Vanpools	Parking pricing	HOV lanes	Employer subsidized	Transit Oriented Development (TOD)	Transportation Management Associations (TMA's)
Four-day week		Parking ratios	Congestion pricing		Mixed-use development	
Telecommuting		Park-n-rides			Growth management	
					Street Reclaiming	

Through the Growth Management Plan, the Development Review Impact and Development Order process, the City of Orlando practices many of these above TDM tactics; as well as, requiring them to be incorporated into new development.

The various strategies include encouraging telecommuting, 50% fare discount for employees on bus passes, bicycle parking, ridesharing, shower facilities, transit shelter construction, bikeway construction, transit bays, preferential parking for carpool or vanpool employees, compressed work weeks, flexible or staggered work hours. LYNX provides ridematching, ridesharing, and vanpools; all with a guaranteed ride home program, in addition to fixed route service and developing Park-n-Ride locations.

Program examples in other cities with innovative TDM strategies such as:

Bikestations

With existing locations in many cities including Chicago, Seattle, and several in California, Bikestation is a not-for-profit organization that assists urban communities to plan, develop, and operate bike-transit centers and related infrastructure to enable bicycling to be an integral part of the transportation system. A typical Bikestation provides secure bicycle parking, shared-use bicycle rentals, access to public transportation, convenient operating hours, staff, and information to plan commute trips. Some Bikestation locations offer bicycle repairs, bicycle and commute sales & accessories, rental bikes for local and tourist needs, restrooms/showers/changing rooms, bicycle and personal lockers, and access to environmentally clean vehicle sharing.

Transportation Options

Portland, Oregon

This innovative program to customize individual transportation options to get more people on their feet, bikes and on the bus realized an 8.6% reduction in drive alone car trips and a 46.7% increase in environmentally friendly trips in one area of Portland with 20,000 households and 50,000 people.

Every household received an order form so they could pick just the information they wanted and needed about walking, bicycling, riding transit, carpooling, car sharing and safety information for older drivers. Transportation Options prepared each households' customized package of information and incentives and delivered it all by bicycle. Five thousand two hundred households (26 %) either requested biking, walking, transit or other information or went on a bike ride, walk or attended a class.

Car Sharing

Car sharing services provide organized short-term (hourly or daily) vehicle access at key activity centers, such as transit, neighborhoods, and employment centers. Members of a car sharing organization, for instance, pick-up and return vehicles at shared-use lots (e.g., transit stations, neighborhood lots, and employment centers). Fees are based on travel distance and time, and typically cover maintenance, insurance, registration, and fuel. Car sharing is common in Europe (particularly in Germany and Switzerland) and is rapidly spreading among North American cities. Such arrangements are intended to substitute or complement private automobile ownership.

The dominant shared-use vehicle model is urban neighborhood car sharing in settings with strong transit networks (i.e., urban metropolitan areas). However, several other models have been tested and are currently being implemented, including employer-based car sharing, links to transit, and home-based car sharing at apartment complexes or housing developments.

Car sharing has created a range of documented societal benefits, including:

- ❖ More careful consideration of the necessity, duration, and distance of automobile trips, resulting in decreased vehicle use and ownership.
- ❖ Greater consideration given to alternative modes, resulting in increased transit ridership, biking, and walking.
- ❖ Cost savings to individuals and employers.
- ❖ Energy savings and air quality benefits.

Reduced parking demand at participating transit stations, member employer sites, and residential locations.

Due to its many potential benefits, carsharing appears to be gaining in popularity, as demonstrated by increasing North

American membership.

As of December 2005, seventeen U.S. carsharing programs claimed 91,955 members sharing 1,737 vehicles, and 13,576 members shared 672 vehicles among 11 carsharing organizations in Canada.

Recommendations

Write into Land Development Code existing GMP Policy.

Create a Transportation Management Association created with downtown employer participation and administered through LYNX or Metroplan Orlando to increase awareness of existing TDM programs of downtown employers. Could promote a downtown “Get Around Pass” to allow user access to LYNX, LYMMO, Bike Station, CRT, LRT, and/or Car Sharing. One account could be used for all services for convenience. The membership account could be paid for by downtown employers; one pass per full time permanent employee, as an employee benefit.

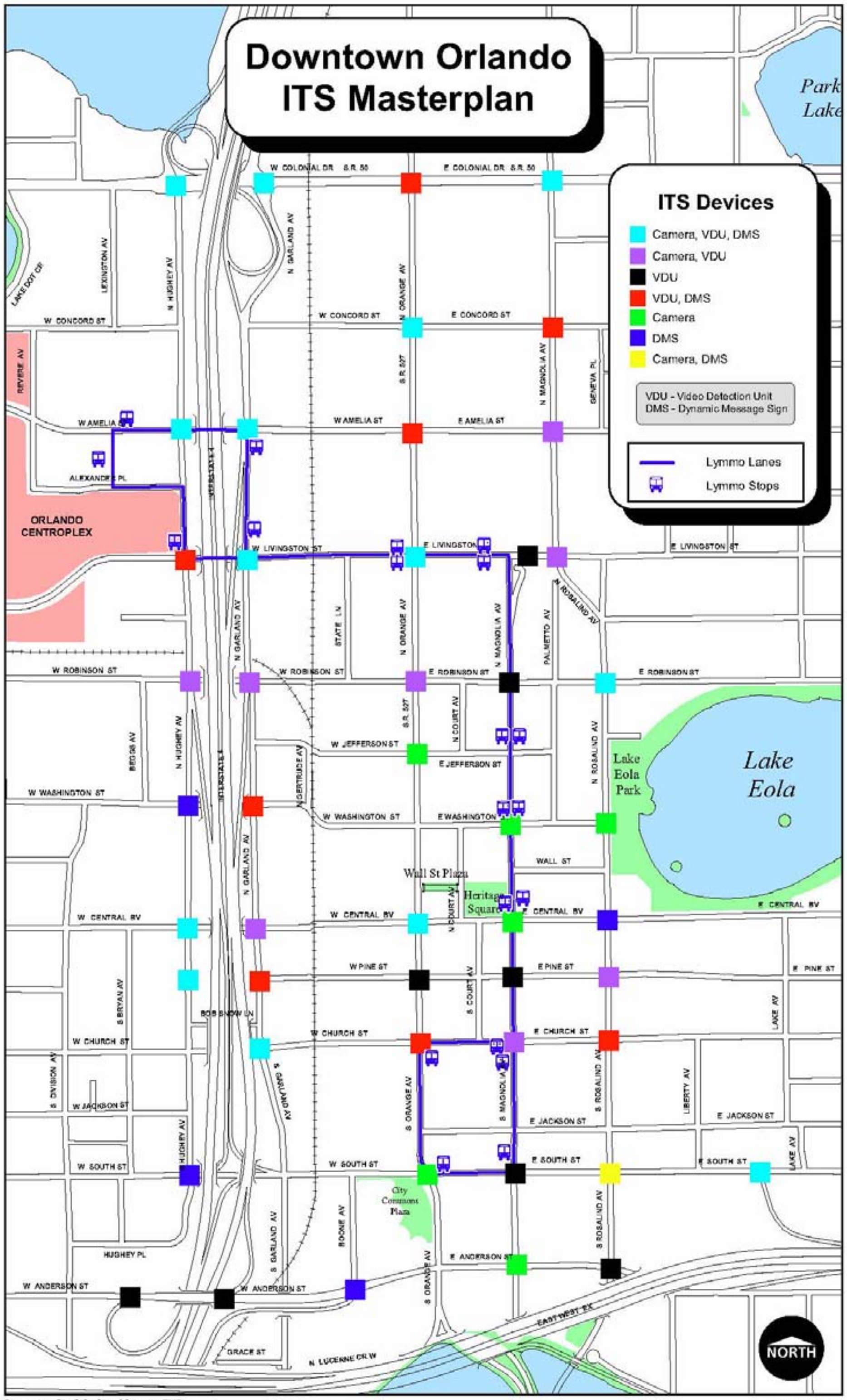
Transportation Demand Management can support economic development by increasing productivity, reducing external costs and shifting consumer expenditures toward goods that provide greater employment and business activity, thus allowing public policy decisions to more effectively support long-term transportation and land use objectives.

9.2 Intelligent Transportation Systems

Intelligent Transportation Systems (ITS) refers to the use of technology to make our transportation system safer and more efficient. This technology includes computer hardware and software, sensors and monitors, telecommunications devices, display devices, and data warehousing. Through ITS, the entire transportation system can be better managed with better information provided on alternatives. ITS has a number of applications that are relevant to the downtown transportation system including providing information to travelers, making transit faster and more convenient, managing traffic movements safely and efficiently, parking management and information, and incident detection, response, and management.

As shown in **Figure 9-1**, the City of Orlando has created an ITS Plan for Downtown Orlando which includes the use of cameras, video detection units (VDU) and dynamic message signs (DMS). It is recommended that this ITS plan be reviewed for consistency with the recommendations of this Downtown Transportation Plan. It may be desirable to modify or add specific ITS elements to the plan in order to make maximize the efficiency of the downtown transportation system.

Figure 9-1
Downtown Orlando ITS Master Plan



Section 10

Plan Evaluation

10.1 Introduction

This section provides a summary evaluation of the project identified in the earlier sections. Because the modes and projects compete for space within existing right-of-way, it is necessary to identify where conflicts will occur, and prioritize which modes should be accommodated to accomplish the goals of the study and complete the vision for Downtown. In addition, the cost of the project and the ease of construction should be used to help prioritize how the projects might be implemented. Near-term (Phase 1: 1 to 5 years), Mid-term (Phase 2: 5 to 10 years) and Long-term (Phase 3: 10 to 20 years) projects are rated into a 20 year phasing plan and are discussed at the end of this section.

10.2 Conflict Evaluation

One of the key challenges in implementing a complete transportation system within Downtown Orlando is balancing the needs of the various elements and travel modes within the right-of-way. Space should be allocated to maximize the efficiency of the system and provide choice among transportation options. However, there are often multiple elements that are in competition for the available space, including the following:

- Vehicle traffic (maintaining existing number of lanes or increasing the number of through or turning lanes)
- Transit (exclusive transit lanes and stations/stops)
- Bicycles (bicycle lanes)
- Pedestrians (wider sidewalks)
- On-street parking (maintaining or adding parallel parking spaces, or adding angled parking)
- Freight (loading zones or larger corner radii to accommodate the turning movements of large trucks)

Historically, great emphasis has been placed on the movement of vehicles with much less attention paid to the needs of other modes within the City. As Downtown continues to develop, the feasibility of the automobile as a primary means of mobility will gradually diminish. In many cases, there is insufficient space available to make roadway infrastructure improvements that will result in increased vehicle capacity in Downtown. Therefore, the City should proactively cultivate a mindset among its various departments and staff, and among its residents and merchants, that achieving greater balance between mobility options and providing the needed balance is in the best interest of all concerned. As such, it may be necessary to make sacrifices in vehicle accommodation and level of service while providing better facilities and service for other modes, particularly when continuing to accommodate improvements for vehicles may make using other modes more difficult or uncomfortable.

Regardless of which element is given priority in a corridor where there are conflicts, there will be tradeoffs in accommodating the other elements. **Table 10-1** provides a list of transportation projects and includes key discussion points about the projects, including conflicts that have been identified between the various elements, as well as preliminary planning-level estimated construction costs.

Table 10-1 (page 1 of 7)

Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
Roadway-Related Projects					
Alden Rd/Weber St					
Florida Hospital	Magnolia Ave	New/realigned corridor	Potential realignment of Alden Rd via Philadephia Ave corridor to cross Virginia Dr; corridor would contain transit and avoid crossing CSX rail line		$50,000,000
Amelia St					
Parramore Ave	Hughey Ave	Bike lanes	Existing 4-lane divided section is not wide enough to add bike lanes	Vehicle traffic, transit	$3,700,000
at Garland Ave		Add WB right turn lane	Begin WB right turn storage at RR tracks (property owned by FDOT)		$410,000
Orange Blossom Tr	Westmoreland Dr	Road diet - reduce to 3 lane section	Allows inclusion of bike lanes on corridor and exclusive left turn lanes at intersections; extends existing bike lanes that end at Westmoreland Dr	Vehicle traffic	$300,000
Anderson St					
Orange Blossom Tr	Rosalind Ave	Conversion to two-way traffic	Project already planned for two-way conversion of Anderson St between Division Ave and Magnolia Ave; potential extension of this conversion on the west to Orange Blossom Tr and on the east to Rosalind Ave; conversion west of Division Ave may be negatively impacted by event traffic from Arena/Centroplex exiting Downtown to the SR 408 interchange at Orange Blossom Tr, but additional SR 408 interchange ramps at Division Ave may mitigate this impact		$2,000,000
Carter St					
Parramore Ave	Division Ave	Extend roadway	2 lanes EB with bike lanes		$4,000,000
Church St					
Orange Ave	Rosalind Ave	Convert to two-way traffic flow	Simplifies Downtown traffic circulation; exclusive Lymmo lane not needed on Church St if moved to Orange Ave	Transit	$1,500,000
Division Ave					
South St	Gore St	Streetscape	Make Division Ave corridor into a primary access route into and within Downtown		$500,000

Table 10-1 (page 2 of 7)
Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
Division Ave					
Gore St	Kaley St	Widen to 4 lanes and streetscape	Capture NB traffic into Downtown from I-4 via Division Ave at Kaley St exit; make Division Ave corridor into a primary access route into Downtown		$9,500,000
at SR 408		New interchange ramps	Ramps via Carter and Long Streets to provide access to/from the west on SR 408, provides another access point into and out of Downtown		$17,000,000
Gore St					
at Orange Ave		Add NB left turn lane or NB thru lane	Existing intersection can accommodate another lane (NB left or NB thru) by tightening the outside NB & SB lane widths and eliminating a short stretch of on-street parking on the west side of the road, south of Orange Ave	On-street parking	$200,000
Rio Grande Ave	Delaney Ave	Road diet - reduce to 3 lane section	Allows inclusion of bike lanes on corridor and exclusive left turn lanes at intersections (Gore St is identified as a primary bicycle corridor)	Vehicle traffic	$3,700,000
Hughey Avenue Extension					
Ivanhoe Blvd	SR 50	Construct new 2 lane roadway	Provides an alternative to using Orange Avenue for southbound traffic entering Downtown		$7,000,000
Ivanhoe Blvd					
Hughey Ave Ext	Magnolia Ave	Widen to 4 lanes and convert to two-way traffic flow	Component of a set of improvements to simplify Ivanhoe Blvd interchange area and de-emphasize Orange Ave as a through route in Downtown		$6,500,000
Lakeview St					
Legion Pl	Magnolia Ave	Eliminate roadway	Simplifies Ivanhoe Blvd Interchange area and provides additional lakefront area potentially for expanded park space		$1,000,000
Legion Pl					
Ivanhoe Blvd	Orange Ave	Convert to a two-lane two-way facility	Simplifies Ivanhoe Blvd Interchange area; align with I-4 WB HOV off ramp		$170,000

Table 10-1 (page 3 of 7)
Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
Long St					
Parramore Ave	Terry Ave	Extend roadway	2 lanes WB with bike lanes; likely cannot extend east of Terry Ave to Division Ave due to I-4/SR 408 interchange ramps		$1,800,000
Lucerne Terr					
Anderson St	Columbia St	Extend/realign roadway	Extension aligns with Lucerne Cir at Anderson St; intended to provide a continuous through connection west of Orange Ave which may serve as a transit corridor; potential extension further south to tie to SoDo project		$36,000,000
Magnolia Ave					
Orange Ave	Amelia St	Exclusive SB transit lane, bike lane	Would have to drop on-street parking on west side of road to accommodate exclusive transit and bike lanes; corridor is designated as a primary pedestrian corridor, but in many areas the sidewalks are narrow (e.g., 6.5 feet wide south of SR 50, and located at back of curb)	On-street parking, pedestrians	$7,500,000
Orange Ave	Amelia St	SB contraflow travel lane	Single SB lane on Magnolia Ave (along with 2 NB lanes) would be paired with single NB lane on Orange Avenue for same project limits; two-way flow simplifies motorist navigation	NB vehicle traffic, pedestrians	$7,900,000
at SR 50		Exclusive SB transit lane; exclusive NB left turn lane	Insufficient space today to add an exclusive transit lane - can accommodate 4 total vehicle lanes, exclusive transit lane, and bike lane by taking approx. 3 feet on west side (Orlando Sentinel parking lot); could eliminate exclusive NB right turn lane in favor of exclusive NB left turn lane	Vehicle traffic, transit, pedestrians	$410,000
at Livingston St		Allow NB right turns	NB right turns would be allowed (currently prohibited) if EB left turning traffic at Robinson-Rosalind is re-routed to Robinson-Magnolia		$400,000
South St	N. Lucerne Cir	Exclusive SB transit lane	Roadway may close with development of Performing Arts Center; leave transit corridor open		$3,400,000
Robinson St	South St	Option A: Bicycle boulevard	Close existing single NB lane to vehicle traffic and use instead for two-way bicycle only traffic	Vehicle traffic	$1,300,000

Table 10-1 (page 4 of 7)

Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
Magnolia Ave					
Robinson St	South St	Option B: Convert NB traffic lane to SB traffic lane	SB traffic lane would provide a shared fa-cilitiy for bikes as a pair with NB bike lane on Rosalind		$1,100,000
Robinson St	South St	Option C: Convert to two-way traffic flow	Relocate one direction of exclusive transit lanes to Orange Ave	Transit	$4,000,000
Orange Ave					
Garland Ave	Livingston St	Exclusive NB transit lane, bike lane	Would have to drop on-street parking on east side of road to accommodate exclusive transit and bike lanes; could be paired with two-way flow on Orange (2 lanes SB, 1 lane NB) or with SB flow only (3 lanes)	On-street parking	$7,400,000
Garland Ave	Amelia St	NB contraflow travel lane	Single NB lane on Orange Ave (along with 2 SB lanes) would be paired with single SB lane on Magnolia Ave for same project limits; two-way flow simplifies motorist navigation	SB vehicle traffic	$7,000,000
Amelia Ave	Church St	Exclusive NB transit lane	NB transit lane would reduce Orange Ave to two travel lanes between Jefferson St and Church St	Vehicle traffic, on-street park-ing	$6,000,000
South St	Lucerne Cir	NB contraflow tran-sit lane	Single NB transit lane on Orange Ave re-placing on-street parking or with ROW from Performing Arts Center block	SB vehicle traffic, on-street park-ing	$1,800,000
Magnolia Ave	Garland Ave	Reduce to 2 lanes (two-way traffic flow)	Simplifies Ivanhoe Blvd Interchange area, and de-emphasizes Orange Ave as through road in Downtown; potential to add WB exclusive transit lane	Vehicle traffic	$1,300,000
Pine St					
Hughey Ave	Garland Ave	Extend roadway	Extend roadway for better connectivity		$ 840,000
Orange Ave	Rosalind Ave	Convert to one-way westbound traffic flow	In conjuction with opening of Premier Trade Plaza and 55 West developments		$ 400,000
Garland Ave	Orange Ave	Signal Preemption and convert to two-way	Signal preemption would allow access out of 55 West parking garage in case of emergency during train crossing		$300,000

Table 10-1 (page 5 of 7)
Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
Pine St					
Orange Ave	Rosalind Ave	Convert to two-way traffic flow	Conversion between Orange and Rosalind would eliminate potential for freight loading zones, but would simplify Downtown traffic circulation	Freight	$400,000
Robinson St					
at Rosalind Ave		Prohibit EB left turns	Move EB left turn movement to Magnolia Ave (in conjunction with allowing NB rights from Magnolia Ave onto Livingston St); this improvement may not solve the congestion problem, but may just move it further to the west		$25,000
Garland Ave	Summerlin Ave	Modify minor side streets as right-in, right-out only	To eliminate left turns on Robinson Street; applies to State Ln, Palmetto Ave, Broadway Ave, Hillman Ave, Cathcart Ave - alternate east-west access for these streets is available via Livingston St		$26,000
Rosalind Ave					
South St	Anderson St	Create single SB traffic lane	Improves Downtown traffic circulation with other two-way street conversions, especially if Magnolia Ave is closed to through vehicle traffic at the Performing Arts Center		$420,000
Sligh Blvd/Miller St					
Columbia St	Orange Ave	Bike lanes	Streets are wide enough to accommodate bike lanes; any transit circulators would operate in mixed traffic		$6,000
South St					
at Orange Ave		Double WB left turn lane	Requires split signal phasing with two-way flow	Pedestrians	$50,000
at Orange Ave		Pedestrian overpass	Heavy pedestrian crossing movement on the south leg, will be compounded with Performing Arts Center; overpass may limit conflicts with WBL turns, but may be under-used by pedes-trians		$6,000,000

Table 10-1 (page 6 of 7)
Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
South St					
Orange Blossom Tr	Rosalind Ave	Conversion to two-way traffic	Project already planned for two-way conversion of South St between Division Ave and Magnolia Ave; potential extension of this conversion on the west to Orange Blossom Tr and on the east to Rosalind Ave; conversion west of Division Ave may be negatively impacted by event traffic from Arena/Centroplex exiting Downtown to the SR 408 interchange at Orange Blossom Tr, but additional SR 408 interchange ramps at Division Ave may mitigate this impact		$2,000,000
SR 50					
Orange Ave	Magnolia Ave	Double WB left turn lane at Orange and double EB left turn lane at Magnolia	Roadway has enough space for one additional lane by removing on-street parking on both sides of street (parking on each side is 6.5 feet wide); split left turn lane storage midway between intersections	On-street parking	$380,000
at Orange Blossom Tr		Single Point Urban Interchange	One lane NB and SB Orange Blossom Tr flies over intersection to relive congestion		$45,000,000
Summerlin Ave					
at Anderson St		Double SB left turn lane	Already planned		$25,000
Terry Ave					
SR 50	Robinson St	Extend existing 2 lane road	Provides another complete north-south roadway on the west side of I-4 and improved network connectivity; provides a direct connection to Edgewater Drive		$9,500,000
South St	Gore St	Realign and extend existing 2 lane road	Provides better connectivity on the west side and additional north-south road capacity		$7,800,000

Table 10-1 (page 7 of 7)
Summary of Potential Improvements, Conflict Identification, and Preliminary Project Cost (2006)

From	To	Project	Discussion	Conflicts	Preliminary Project Cost Estimate
Other Projects					
		Citrus Bowl Parking Garage	Potential joint-use development and commuter/venue support parking (1,500 spaces). Location for transit maintenance and operation facility.		$45,000,000
		Uptown Parking Garage	Potential joint-use development and commuter parking (1,000 spaces).		$30,000,000
		Citrus Bowl - Thornton Park Transit Circulator Loop	East-west streetcar circulator supporting redevelopment of Church & Central corridors, supporting venue parking, and integrates with Commuter Rail		$60,000,000 — $115,000,000
		Downtown-Uptown Transit Circulator Loop	North-south BRT circulator running NB on Orange Ave & SB on Magnolia Ave between Weber St and South St (option to run in existing two-way Lymmo lanes on Magnolia Ave)		$24,000,000
		Florida Hospital-ORHS Transit Circulator Loop	Extension of Downtown-Uptown circulator along Alden Rd corridor to Florida Hospital and south along Lucerne Terr to ORHS campus		$22,000,000
		Orlando Urban Trail	Multi-use trail serving as central bicycle corridor into and through Downtown		$2,200,000
		ITS 10-Year Master Plan	Includes surveillance detection and dynamic messaging for improved traffic circulation, wayfinding, and parking		$6,000,000
		Primary & Secondary Pedestrian Street Enhancements	Provides for streetscape, street furniture, and pedestrian amenities for those roadways not along transit corridors or in areas with anticipated redevelopment		$20,000,000
		Commuter Rail Stations	Four planned commuter rail stations within the study area; includes platforms, concessions, and support uses		$10,000,000
TOTAL PRELIMINARY TRANSPORTATION PLAN COST					$542,000,000

10.3 Project Evaluation Process

The projects were individually reviewed for cost, complexity, relevance to other City initiatives (such as Community Venues) and projects being undertaken by other agencies such as the I-4 Improvements and SR 408 Widening. For the purposes of the plan, it is generally recommended that each project should be categorized as Phase 1 (near-term 1-5 years), Phase 2 (mid-term 5-10 years) and Phase 3 (long-term 10-20 years). This categorization provides for a general flow of project interdependencies and coordination with other transportation needs and provides a development schedule for when projects are needed. As development occurs, each project should be reviewed for early deployment or modification to respond to the specific needs of development growth and/or updated agency plans.

Evaluation of Major Project Scheduling

Figure 10-1 presents a summary of the major proposed projects by phase, including the significant roadway projects, such as new roadway connections, two-way street conversions, road widening projects, transit circulators, and public parking garage locations.

The primary considerations for the Phase 1 scheduled projects include:

- ❖ Projects that support or will be impacted by the Community Venues.
- ❖ Projects that support or will be impacted by the SR 408 or I-4 widening.
- ❖ Low cost system management projects that produce a high level of benefit (intersection improvements).

The primary considerations for the Phase 2 scheduled projects include:

- ❖ Projects with funding and design complexity requiring additional lead time for implementation.
- ❖ Projects tied to redeveloping areas that are only beginning to redevelop or have not yet begun to redevelop.

The primary considerations for the Phase 3 scheduled projects include:

- ❖ Projects requiring major reconstruction and having high estimated cost.
- ❖ Projects tied to a potential redevelopment corridor.
- ❖ Projects that are regional in scope and have multi-jurisdictional benefit.
- ❖ Projects that are interrelated or a component of another Phase 3 project.

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10.4 Key Projects

Phase 1

1. Citrus Bowl-Thornton Park Loop – fixed route transit circulator running c-clockwise on Central Boulevard and Church Street.
2. Pine Street Extension – Garland to Hughey.
3. South Street* – two-way from Terry Avenue to Rosalind Avenue.
4. Anderson Street*- two-way from Terry Avenue to Magnolia Avenue.
5. Carter Street and Long Street Extension – extend Carter Street to Division Avenue and Long Street to Terry Avenue as one-way pairs.
6. Citrus Bowl Garage –general location for remote public parking, joint use development, multi-modal operations center.
7. Orlando Urban Trail – multi-use recreation trail connects from Dinky Line Trail to Parramore Avenue.
8. Commuter Rail *– 55-mile service from DeLand to Poinciana with four planned stops within Study Area.

Phase 2

9. Downtown-Uptown Loop – fixed route transit circulator running clockwise northbound on inside lanes Orange Ave. and southbound on Magnolia Ave. from Weber St. to South St.
10. Terry Avenue Extension – Realign and improve existing roadway from Colonial Drive to Gore Street.
11. Freight Village – general location for centralized freight receiving and distribution.
12. ITS Wayfinding and Smart Parking- dynamic variable message signs direct drivers from entry points to available parking spaces in real-time (not shown on map).
13. Potential Two-way Conversions – Reduces circulation time, improves access and accommodates other improvements.

    a. Pine Street - Rosalind to Orange

    b. Church Street- Orange to Rosalind.

    c. Orange Ave. – SR 50 to Ivanhoe Boulevard

    d. Magnolia Avenue-Livingston to Anderson

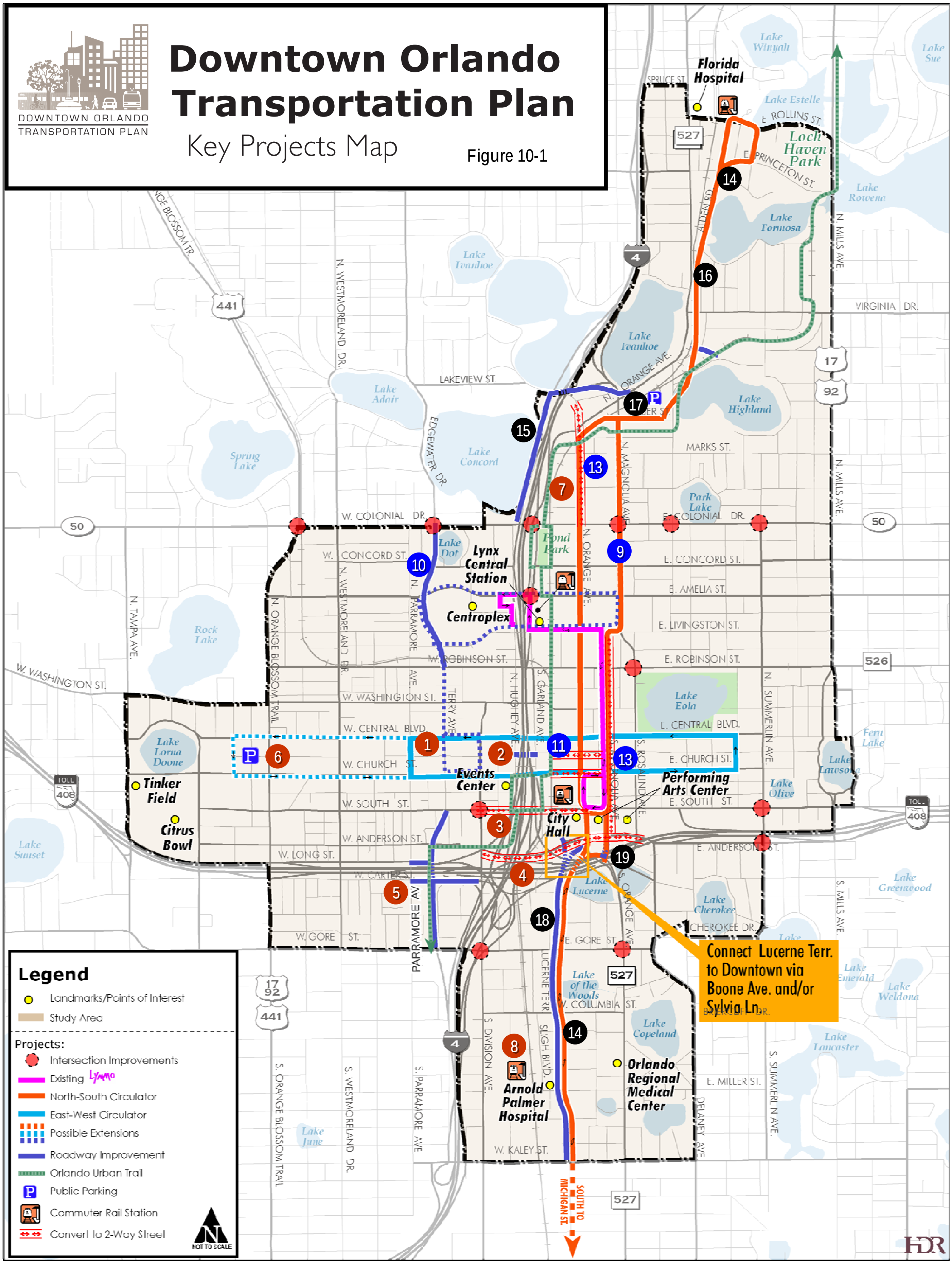
Phase 3

14. Florida Hospital-ORHS Loop – fixed route transit interlined with Downtown-Uptown Loop. Extends to north on *Alden Road* corridor, and to south along *Lucerne Terrace Corridor*. Also serves Commuter Rail.
15. Hughey Avenue Extension – improve direct access to Hughey Avenue southbound from I-4, Orange Avenue and Ivanhoe Blvd.
16. Alden Road Corridor – Realign and improve existing roadway from Princeton Street to Weber Street as premium transit corridor.
17. Uptown Garage – general location for remote public parking, joint use development multi-modal center.
18. Lucerne Terrace Extension – Realign and improve existing roadway from SR 408 to Michigan St. as premium transit corridor.
19. Magnolia Avenue Extension – Extend south from Anderson Street to Orange Avenue following existing alignment beneath SR 408.

All Phases

20. Primary & Secondary Pedestrian Corridors – all developed roadways within ¼ mile walk of transit corridors complete with wide sidewalks, shade trees, awnings, building transparency, aesthetics and safety enhancements (not shown on map).
21. Spot Intersection Improvements – turn lane, geometric and signalization improvements at 13 critical intersections (red dots).

**Projects Currently planned by FDOT.*

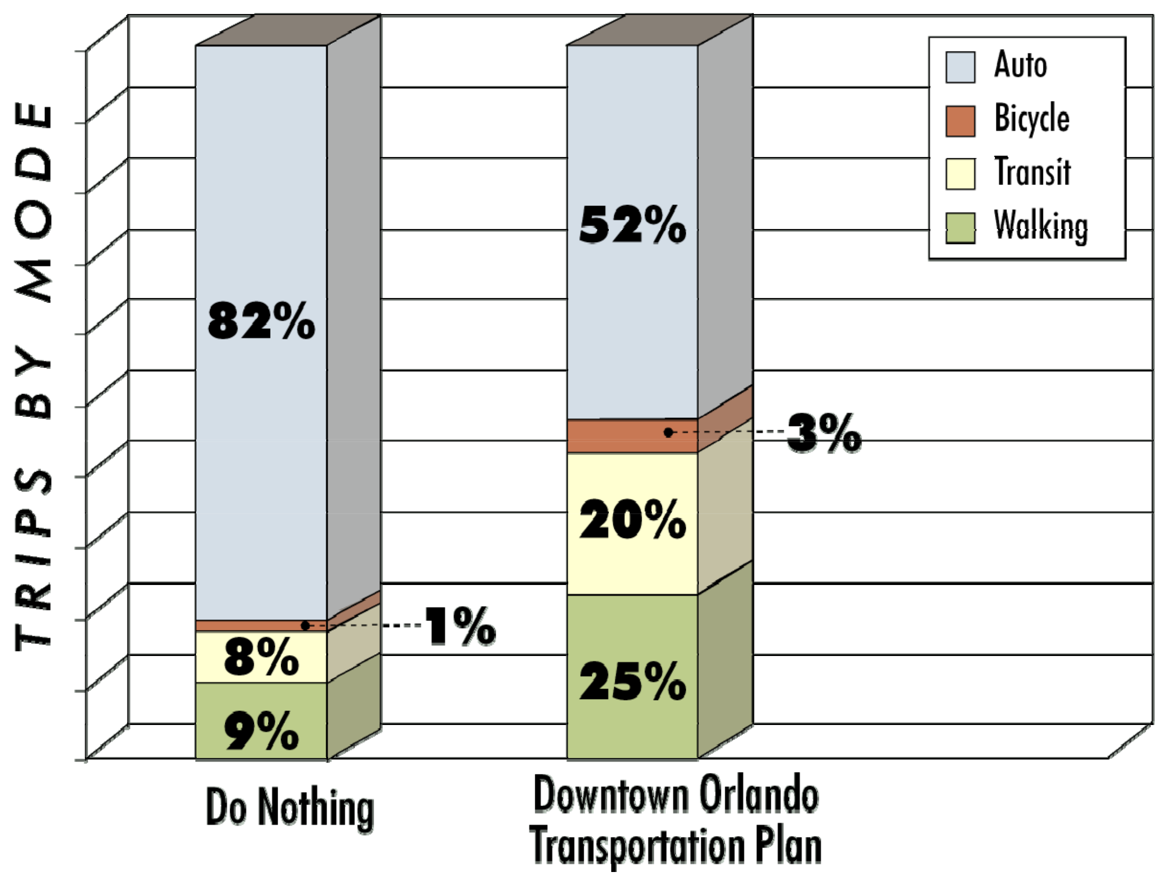


Downtown Orlando Transportation Plan
Key Projects Map
Figure 10-1
DOWNTOWN ORLANDO TRANSPORTATION PLAN
Florida Hospital
Lynx Central Station
Centroplex
Events Center
Tinker Field
Citrus Bowl
City Hall
Performing Arts Center
Arnold Palmer Hospital
Orlando Regional Medical Center
Loch Haven Park
Lake Eola
Lake Ivanhoe
Lake Highland
Lake Concord
Lake Adair
Lake Dot
Lake Lorna Doone
Lake Lucerne
Lake Cherokee
Lake of the Woods
Lake Copeland
Lake Formosa
Lake Estelle
Lake Winyah
Lake Sue
Lake Rowena
Spring Lake
Rock Lake
Lake Sunset
Park Lake
Pond Park
Lake Lawsona
Lake Olive
Fern Lake
Lake Greenwood
Lake Emerald
Lake Weldona
Lake Lancaster
Lake June
E. ROLLINS ST.
E. PRINCETON ST.
VIRGINIA DR.
LAKEVIEW ST.
MARKS ST.
W. COLONIAL DR.
E. COLONIAL DR.
W. CONCORD ST.
E. CONCORD ST.
E. AMELIA ST.
E. LIVINGSTON ST.
W. ROBINSON ST.
E. ROBINSON ST.
W. WASHINGTON ST.
W. CENTRAL BLVD.
E. CENTRAL BLVD.
W. CHURCH ST.
E. CHURCH ST.
W. SOUTH ST.
E. SOUTH ST.
W. ANDERSON ST.
E. ANDERSON ST.
W. LONG ST.
W. CARTER ST.
W. GORE ST.
E. GORE ST.
W. COLUMBIA ST.
CHEROKEE DR.
E. MILLER ST.
W. KALEY ST.
N. ORANGE AVE.
N. MAGNOLIA AVE.
N. MILLS AVE.
N. WESTMORELAND DR.
N. PARRAMORE AVE.
N. HUGHEY AVE.
S. GARLAND AVE.
S. ROSALIND AVE.
N. SUMMERLIN AVE.
S. SUMMERLIN AVE.
N. ORANGE BLOSSOM TRAIL
S. ORANGE BLOSSOM TRAIL
S. WESTMORELAND DR.
S. PARRAMORE AVE.
S. DIVISION AVE.
SLIGH BLVD.
LUCERNE TERR.
DELANEY AVE.
EDGEWATER DR.
TERRY AVE.
ALDEN RD.
N. TAMPA AVE.
W. WASHINGTON ST.
SOUTH TO MICHIGAN ST.
Connect Lucerne Terr. to Downtown via Boone Ave. and/or Sylvia Ln.
Legend
Landmarks/Points of Interest
Study Area
Projects:
Intersection Improvements
Existing Lymmo
North-South Circulator
East-West Circulator
Possible Extensions
Roadway Improvement
Orlando Urban Trail
Public Parking
Commuter Rail Station
Convert to 2-Way Street
NOT TO SCALE
HDR

10.5 The Impact on Downtown Mobility

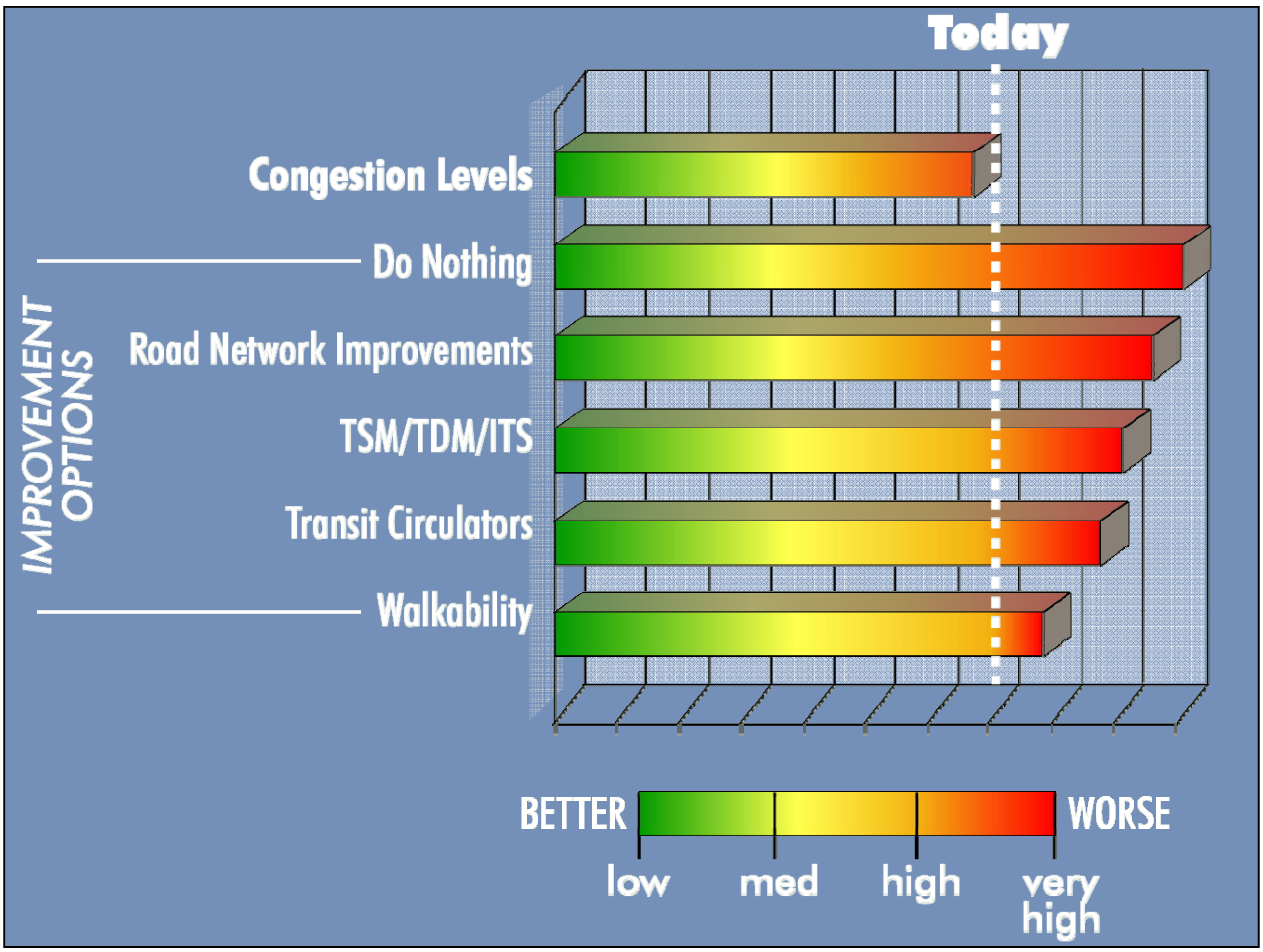
What would happen if the Downtown were to continue to grow as expected without significant changes to the way people get around. If residents, visitors and employees continue to travel to, from and within the Downtown as they do today we could expect automobile traffic volumes to increase more than 41% overall and internal trip making (trips beginning and ending Downtown) to increase by more than 75%. As stated earlier, the survey of current residents found that less than 10% of all primary trips made within the Downtown were made as pedestrians and that the majority were made by driving. The existing network of roadways within the study area cannot accommodate the current rate of growth and increased automobile usage within our current concept of service levels if we remain so dominated by automobile usage. The plan strives to bring a better balance among the modes by reinforcing livable community principles in creating walkable streets, accommodating bicycles on roads, trails and with bicycle parking, and by making transit convenient, attractive and accessible. The graph below in Figure 4 compares existing modal usage for trips made within the Downtown versus the modal usage expected to be achieved by the implementation of the Plan.

Figure 10-2
Existing (Do Nothing) Mode Split vs. Plan Mode Split Goals
For Primary Trips Made within the Downtown



The impact of the modal split goals of the plan, together with the improvement projects and strategies will result in improving traffic congestion on the Downtown roadway system. The bar charts shown in Figure 5 illustrate that current congestion on the Downtown roadway system is only just beginning to experience short periods of peak congestion. If no improvements were made, the "Do Nothing" alternative shows that roadway traffic congestion will extend to the highest levels of congestion. Reading down the chart, each successive bar shows a progressive calculation of roadway delay reductions that can be expected to result with the successful implementation of each incremental improvement option, compared to the "Do Nothing" alternative. As shown, all of the projects and strategies must work together as a comprehensive system to make a significant impact on roadway congestion.

Figure 10-3
The Incremental Impact of a Comprehensive Transportation Solution to Downtown Roadway Network Congestion



10.6 Next Steps

The Downtown Orlando Transportation Plan provides a framework to begin changing the way mobility is viewed and measured. The Plan is directed towards achieving the Downtown Vision of a transit rich, pedestrian friendly environment that will help shape and create exciting places and enhance value within the community. The City of Orlando is working towards sustainability as a direction for future growth and development. To become a sustainable city, it will require implementing policies and plans to provide guidance and incentives that will modify our current travel patterns and behaviors.

Sustainability is not a destination, but rather a direction. While moving in this direction with the plan, the City should consider these next important steps:

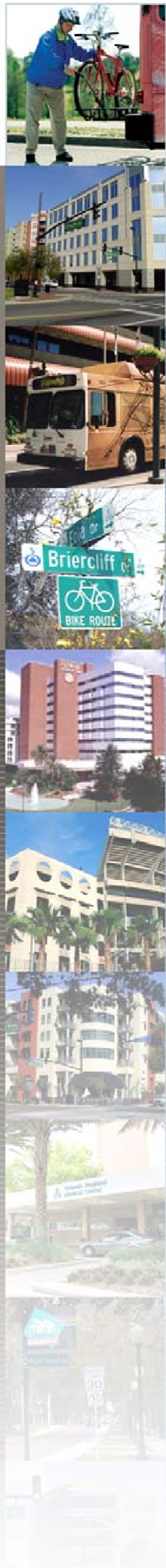
- **Adoption of the Downtown Transportation Plan Strategies.** The implementation strategies within each of the plan elements are a means to implement the Plan in a manner that is consistent with current City priorities and compatible with adopted plans and existing standards of the City and its transportation partners.

- **Project Phasing and Refinement.** The projects developed in the Plan are representative of the types of improvements and techniques that are consistent with livable community principles. The criteria presented for consideration in project prioritization should be amended, as necessary, to capitalize on opportunities for partnerships, early deployment or refinement to respond to the specific needs of development growth and/or updated agency plans. It is expected that this project list will continue to evolve as new and better information becomes available.

- **Funding.** Funding for the projects in the Plan has not been identified, however, many of the projects listed for completeness have been funded through various stages of project development, design or construction by the City or other agencies (such as Division Street widening), while others are only at the conceptual stage. A funding and financial plan should also explore potential new revenue sources and private participation as the plan is largely development driven.

- **Update the Downtown Outlook Plan.** The land use forecasts reflected in the 2000 Downtown Outlook Plan as well as the Downtown DRI were used to prepare future projections of traffic and travel patterns. The projects developed for the plan responds to this development forecast and creates new opportunities to strengthen the mix and intensity of uses in a transit oriented development pattern.

- **Pursuit of Top Priority Projects.** Top priority projects, such as the transit circulator expansion will require extensive coordination among local, state and federal agencies. Project pursuit activities may include feasibility study, Alternatives Analysis, Environmental Assessment, Environmental Impact Analysis, PD&E, MPO Long Range Transportation Plan Amendment, and Capital Improvement Plans.



Appendix

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Appendix provided on CD.

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Project Team