CHAPTER 4

TRANSPORTATION IMPACTS

4 TRANSPORTATION IMPACTS

This chapter begins by summarizing the existing and future baseline conditions of the transportation system and services in the CRT Study Corridor without the proposed CRT Full Build. It then describes and evaluates the impact of the CRT Full Build on the following components of this baseline; traffic and roadways, parking at and near the station sites, public transportation, freight transportation patterns and the St. John's River marine traffic. The analysis leads to the identification of locations with significant potential negative impacts for which solutions are proposed to eliminate or mitigate these impacts.

As indicated in the preface to this EA, in support of this CRT project, FDOT and the project sponsors have been negotiating freight traffic density and train operating patterns on the A-line with CSXT. A fundamental component of the negotiation is a Memorandum of Understanding (MOU) that eliminates freight traffic during the time of day when the proposed CRT service would operate through this Study Corridor.

A key measure in evaluating the addition of CRT service is the change in delay that occurs at railway grade crossings. As a result of the MOU, this analysis assumed that existing rail freight traffic volumes operating on the CSXT A-line in the 2025 No-Build will not continue to operate in the peak commuting hours on the line in the 2025 CRT Full Build. As previously stated, the CSXT has decided, as part of its Statewide Strategic Plan, to shift freight traffic to the S-line to the west of central Florida, and to designate the A-line for passenger traffic. This EA analysis is consistent with the CSXT initiated operational shift and policy direction.

4.1 Traffic and Roadways

This section summarizes the potential impacts the proposed project would have on traffic in the vicinity of project stations and at-grade crossings. The following elements are evaluated and summarized in this section:

- Station Areas and Intersections; and
- Roadway Impacts.

The project will have only limited impact on traffic operations at study roadways and intersections. The small number of locations that may be impacted by the project can be mitigated as discussed in Section 4.1.6.

4.1.1 Existing Traffic Conditions

Existing physical, operating, and safety conditions for the traffic roadway system in the CRT Study Corridor were evaluated, addressing the following elements:

- Roadway physical features
- Pedestrian and bicycle facilities
- Traffic data
- Crash history
- Intersection capacity analysis
- At-Grade crossing analysis

- Parking conditions

The results of the existing conditions evaluation were used to identify current problems and trends in the Study Corridor and as a basis for which to compare future conditions.

The following is a summary of the existing traffic, pedestrian, and bicycle facilities in the study area:

- A total of 30 at-grade crossings were evaluated among the 111 at-grade crossing along the rail line within the limits of the Study Corridor. The study roadways were selected for evaluation based on a ranking system to prioritize roadway locations according to the number of lanes and year 2000 Average Daily Traffic volume. The locations that experienced the highest traffic volumes in the Study Corridor were identified for study. Twenty-two of the grade crossings are classified as principal or minor arterials and eight are classified as collector roadways. Over 75 percent of the study at-grade rail crossings have four or more lanes with posted speed limits between 30 and 40 miles per hour.

- Sidewalks are provided at most grade crossings (22 of 30). No sidewalks were observed at the following rail crossing locations:

    - Gore Street
    - Amelia Street
    - SR 46A/25th Street
    - Carroll Street
    - Kaley Street
    - Poinciana Boulevard
    - Airport Road
    - Landstreet Road

- Only Horatio Street and North Orange Avenue in Orange County have designated bicycle lanes.

- LYNX and/or VOTRAN bus routes operate on most of the major roadways in the study corridor. These roadways include Interstate 4, SR 46, SR 436, SR 17/92, SR 441, Lake Mary Boulevard, Fairbanks Avenue, Amelia Street, Livingston Street, Columbia Street, Orange Avenue, US 192 and Main Street. Six of the 30 at-grade crossings were identified as locations where school buses have regular routes that cross the railroad tracks.

- Average annual daily traffic (AADT) data was collected on 30 roadway segments in the vicinity of the proposed CRT stations. AADT volumes ranged between 5,700 vehicles at Amelia Street in Orlando to nearly 55,000 vehicles at SR 436 in Seminole County. The average daily traffic volume for all study roadways is approximately 23,500 vehicles. Critical peak hours generally occur between 7:45 and 8:45 a.m. and 4:45 and 5:45 p.m.

- The 39 intersections at key locations along roadways providing access to the proposed CRT stations were evaluated. An accident data analysis was conducted at these 39 intersections and the 30 at-grade crossings. One third of the study intersections experienced at least five accidents per year for 3 consecutive years (15

total accidents) between 2002 and 2004. For the 646 crashes reported at 39 study intersections, 352 personal injuries were reported, and a total of four fatalities occurred within the 3-year period. Fourteen accidents were reported at study grade crossing locations with five involving fatalities.

- Vehicular delays and queuing were analyzed at study area grade crossings. Over 70 percent of the 30 locations studied currently experience peak hour queues of 20 or more vehicles during at least one peak period, due to existing freight and AMTRAK operations.

- All but nine of the 39 study intersections are located adjacent to roadways that cross existing rail lines. Twenty-one of the 39 intersections currently operate at Level of Service (LOS) D or better. The remaining 18 intersections currently experience LOS E/F conditions during peak hours. Most of the intersections with poor LOS are located in the vicinity of one or more at-grade rail crossings. Long freight trains that currently operate in the corridor contribute significantly to cumulative daily delay, which can be expected to decline if the number of through freight trains declines in the future.

The summary of existing conditions shows that there are several areas that currently operate deficiently and/or experience safety issues. Further information is provided in the Existing Roadway and Traffic Conditions Report, December 2005.

4.1.2 Traffic and Roadway Impact Analysis Approach and Methodology

This section summarizes the development of daily and peak hour traffic volumes that were used to analyze study roadways and intersections. Traffic volumes at project stations will be minimal as compared with traffic on adjacent roadways. It should be noted that the stations do not generate any new trips per se; instead, the transit improvements divert traffic that is already on the adjacent roadway network to the station parking to utilize the alternative mode of transportation.

The following train operating characteristics were used for the analysis of future 2025 No-Build and CRT Full Build peak hour conditions:

- One freight train in the a.m. and p.m. peak hours (No-Build);
- One Amtrak train in the a.m. and p.m. peak hours (No-Build and Build); and
- Four CRTs per direction (15-minute headways) in the a.m. and p.m. peak hours with stops at all stations (Full Build).

It should be noted that this is a worse case scenario. This is the maximum impact of the proposed system. These conditions were developed for the purpose of the EA.

The major roadway improvements assumed at the study grade crossings and study intersections for both the No-Build conditions traffic LOS analyses are summarized in Table 4-1. The development of future roadway and intersection turning movement volumes is discussed below.

This section describes the approach/methodology used to estimate future traffic volumes for the 2025 No-Build and CRT Full Build Alternative and presents the resulting roadway and intersection traffic volumes in the vicinity of the CRT route and stations.

Table 4-1: Future Roadway Improvements – No-Build

Location	Roadway(s)	Improvement
Grade Crossings		
Crossing #622060C	SR 46A/25th Street	SR 46A will widen to 4 lanes west of Old Lake Mary Road
Crossing #622061J	Airport Boulevard	Airport Boulevard widens to 4 lanes
Crossing #622072W	CR 427/Ronald Reagan Blvd (North)	CR 427 widens to 6 lanes
Crossing #622073D	SR 434/Sanlando Springs Blvd	SR 434 widens to 6 lanes
Crossing #622169T	Orlando Avenue	Orlando Avenue widens to 6 lanes
Crossing #622169T	Landstreet Road	Landstreet Road widens to 4 lanes west of Orange Avenue
Crossing #622412F	Oak Street	Oak Street Widens to 4 lanes
Intersections		
Church/Monroe	Monroe Road SR 46 to US 17/92	Widen to 5 lanes
School/Monroe	Monroe Road SR 46 to US 17/92	Widen to 5 lanes
Orange Blvd/Monroe	Monroe Road SR 46 to US 17/92	Widen to 5 lanes
Airport Blvd/SR 46A	Airport Boulevard US 17/92 to SR 46A	Widen to 4 lanes
Reagan Blvd/SR434 Sanlando	Ronald Reagan Boulevard	Widen to 6 lanes NB, SB, EB, WB
Reagan Blvd/Orange Ave	Ronald Reagan Boulevard	Widen to 6 lanes
Reagan Blvd/Palmetto Ave	Ronald Reagan Boulevard	Widen to 6 lanes
Regan Blvd/Church Ave	Ronald Reagan Boulevard	Widen to 6 lanes
Orange Ave/Wetherbee Rd	Orange Avenue	Widen to 6 lanes
Orange Ave/Fairway Woods B.	Orange Avenue	Widen to 6 lanes
Osceola Prkwy/Michigan Ave	Michigan Avenue	Widen to 5 lanes

Source: METROPLAN ORLANDO Community Connections: A Transportation Vision for the Next 25 Years, Tech Report No. 3, Approved March 28, 2003.

4.1.3 Roadway and Intersection Turning Movement Analysis

The future traffic volumes were developed from the regional model.[1] Station traffic volumes were separated into auto-park trips, auto kiss-and-ride trips, bus, and walk modes for daily and a.m. peak hour trips. The following steps were used to adjust the raw model daily forecasts and develop peak hour volumes:

- Adjust trips at Altamonte and Winter Park Stations to reflect removal of intermediate station location;
- Adjust trips at Meadow Woods Station and adjacent Osceola Station due to high projected walk trips;
- Add bus trips;
- Develop p.m. peak hour station trips by reversing a.m. peak hour auto-park and kiss-and-ride station trips; and
- Assign a.m. and p.m. peak hour vehicle trips from the study roadway network and station trips (Build condition only) to proposed station access points.

[1] Regional model outputs used in traffic impact analysis provided by AECOM Consulting.

Table 4-2 summarizes the vehicle trips at each station during peak hours. Vehicle trips at stations would already be on the future roadway network and are not generated by the project. Rather, these vehicle trips, with implementation of a new alternative mode of transportation, would be redirected from the adjacent roadway network to the stations.

The proposed stations are generally classified as either "origin" or "destination" (or "walk access") stations. Origin stations are those locations where most CRT riders would originate their daily trip from, typically a commute trip. These are stations that are located outside the urban core of Orlando where riders would either walk, drive or use a feeder bus from their home to the CRT station to board a train for travel to work. Destination stations (Florida Hospital Station, LYNX Central Station, Church Street Station, ORMC/Amtrak Station, and to some extent, the Winter Park Station) are locations where CRT riders will alight to walk or connect with a bus to reach their place of employment or other destination. As shown in Table 4-2, station trips are generally higher for origin stations than for destination stations.

The Year 2025 CRT Full Build traffic volumes and turning movements at study intersections and stations are shown in Figure 4-1 through Figure 4-8. Added traffic as a result of the CRT Full Build ranges from a low of 15 trips in the p.m. peak hour at LYNX Central Station and a high of 416 p.m. trip at the Mead Woods Station.

In summary, the project will shift a small amount of traffic away from the future roadway network to "origin" commuter rail stations that provide parking. The level of project-related traffic is low compared with traffic on adjacent roadways. There will be very little project-related traffic at the four destination/walk access stations in the urban core of Orlando.

Table 4-2: 2025 Vehicle Trips at Stations in Peak Hours

	a.m. Peak Hour			p.m. Peak Hour		
Station	Ins	Outs	Total	Ins	Outs	Total
DeLand Amtrak Station	106	48	154	48	106	154
DeBary/Saxon Blvd. Extension Station	64	31	95	31	64	95
Sanford/SR 46 Station	65	35	100	35	65	100
Lake Mary Station	173	83	256	83	173	256
Longwood Station	116	54	170	54	116	170
Altamonte Springs Station	210	77	287	77	210	287
Winter Park/Park Avenue Station	138	55	193	55	138	193
Florida Hospital Station	38	18	56	18	38	56
LYNX Central Station	9	6	15	9	6	15
Church Street Station	10	7	17	10	7	17
Orlando Amtrak/ORMC Station	18	6	24	6	18	24
Sand Lake Road Station	275	97	372	97	275	372
Meadow Woods Station	154	262	416	262	154	416
Osceola Parkway Station	124	55	179	55	124	179
Kissimmee Amtrak Station	150	68	218	68	150	218
Poinciana Industrial Park Station	106	51	157	51	106	157

Source: Earth Tech Inc. and AECOM Consulting.

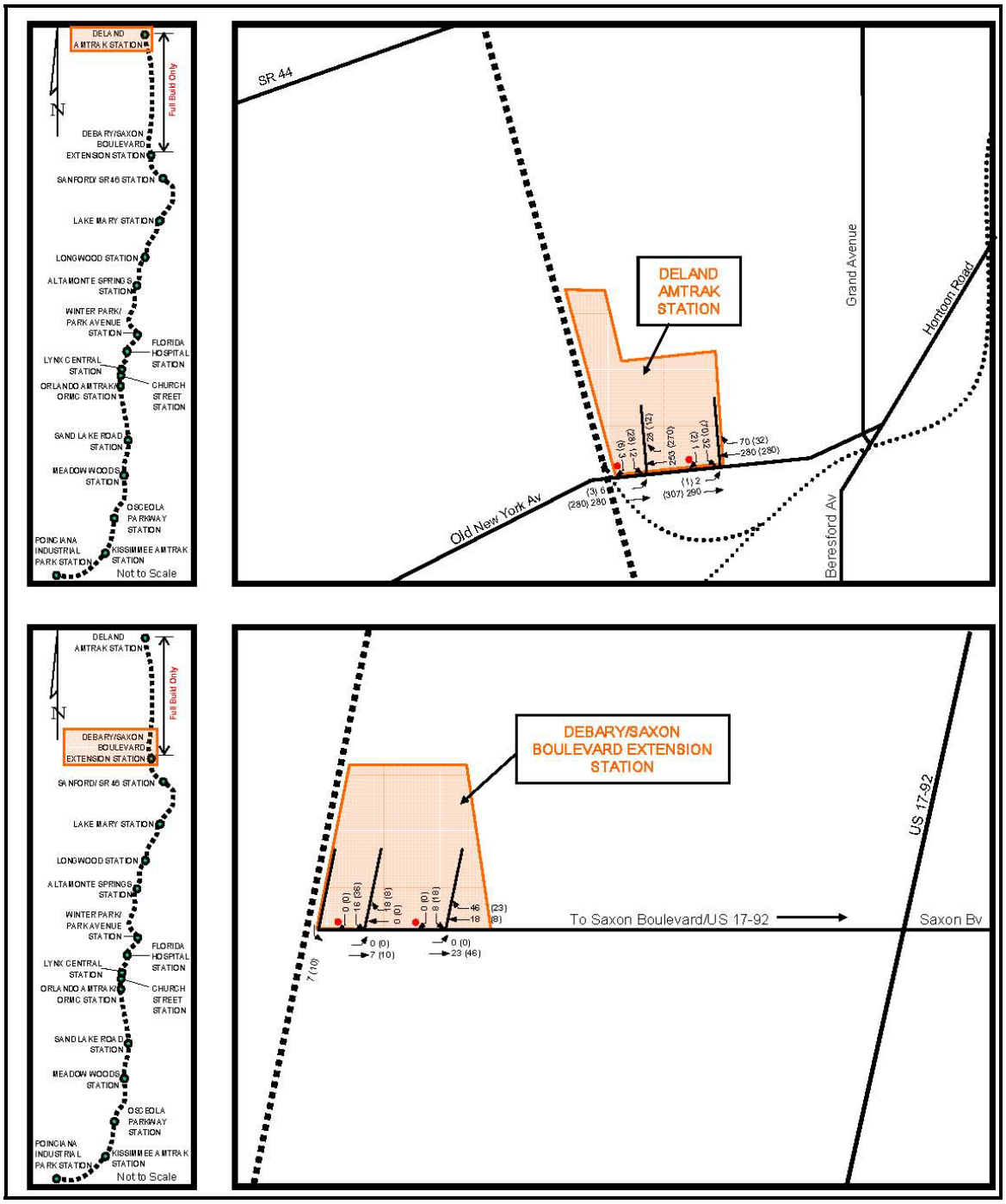

Figure 4-1 Station Turning Movement Volumes I – 2025 Full Build

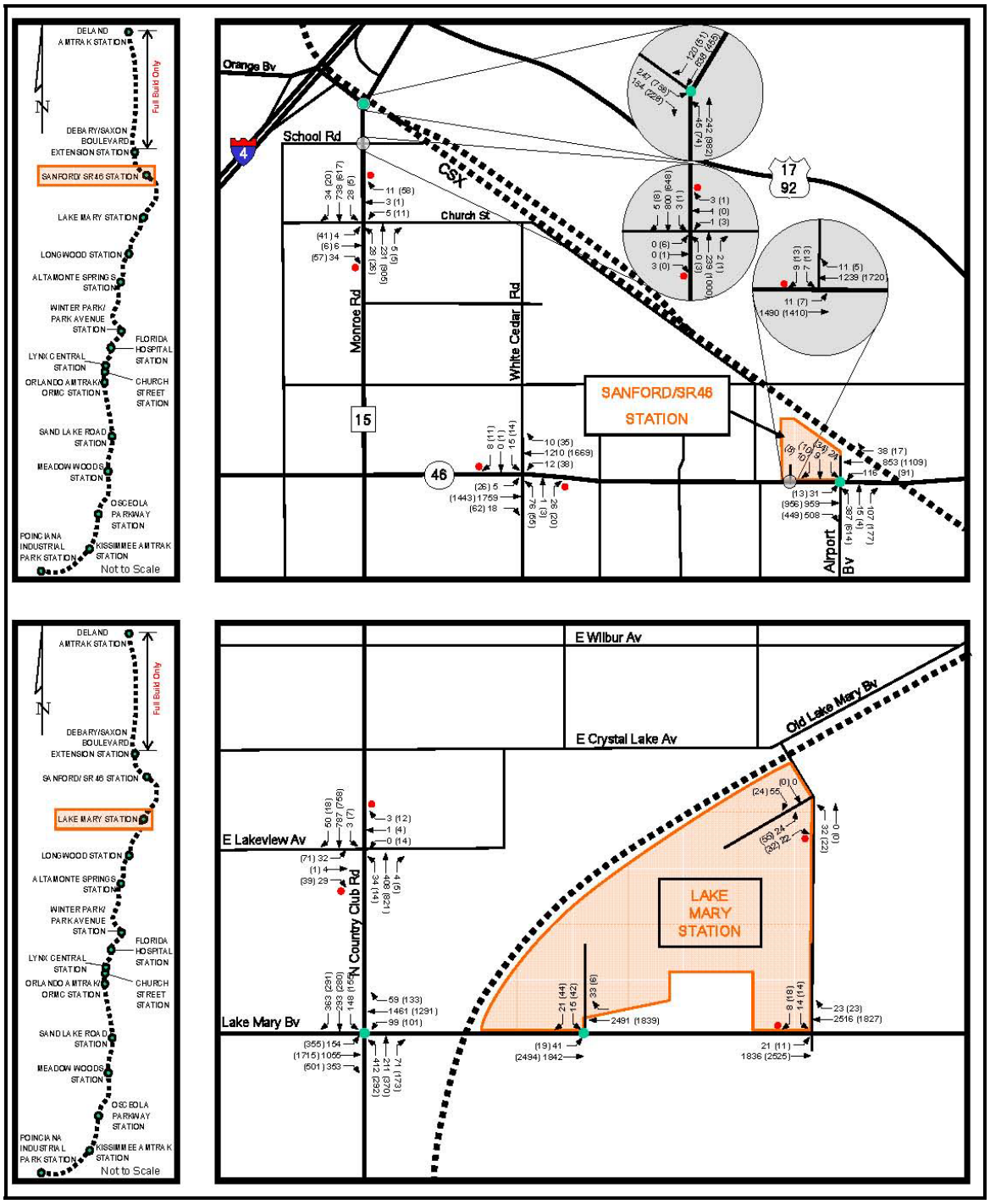

Figure 4-2 Station Turning Movement Volumes II – 2025 Full Build

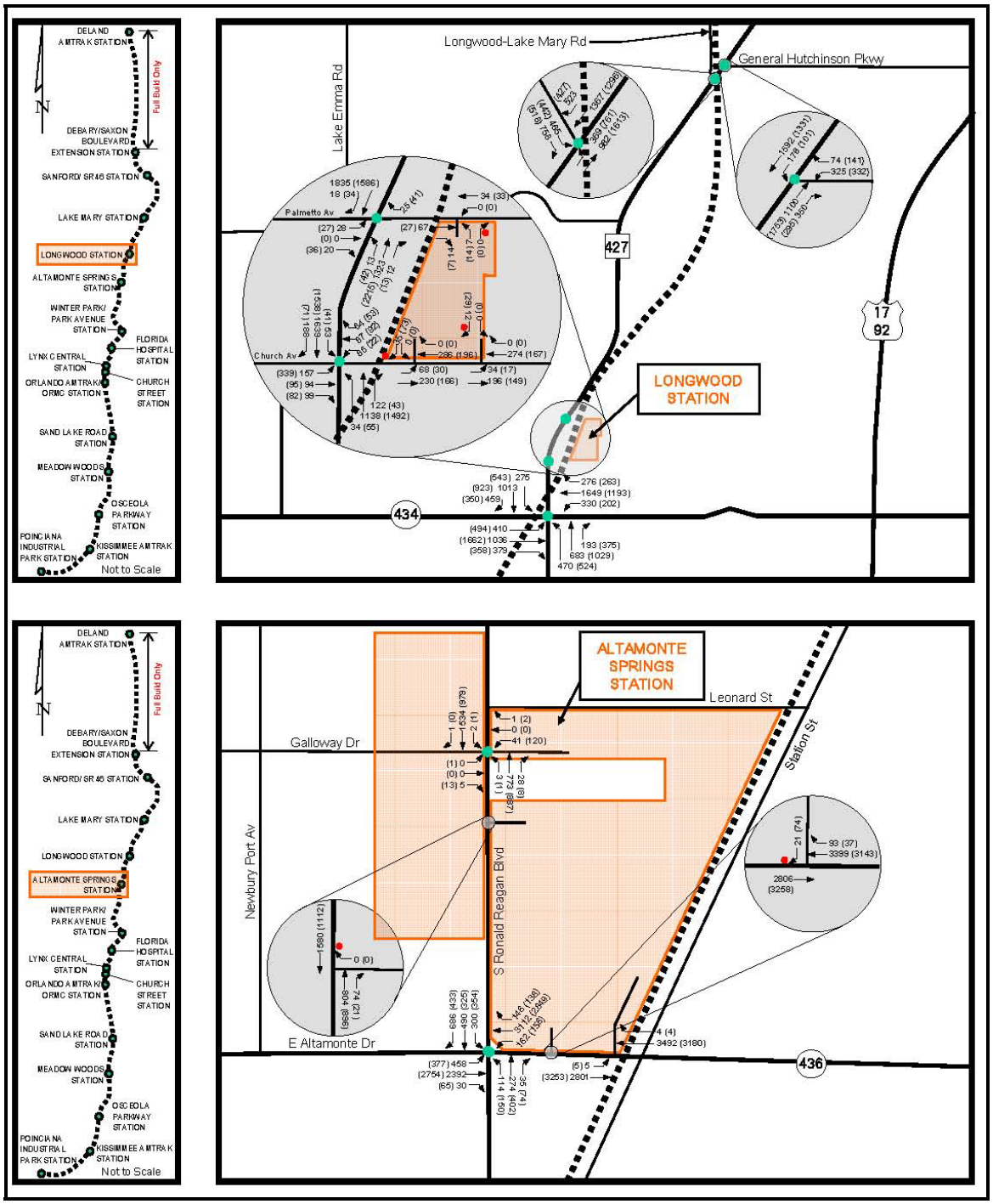

Figure 4-3 Station Turning Movement Volumes III – 2025 Full Build

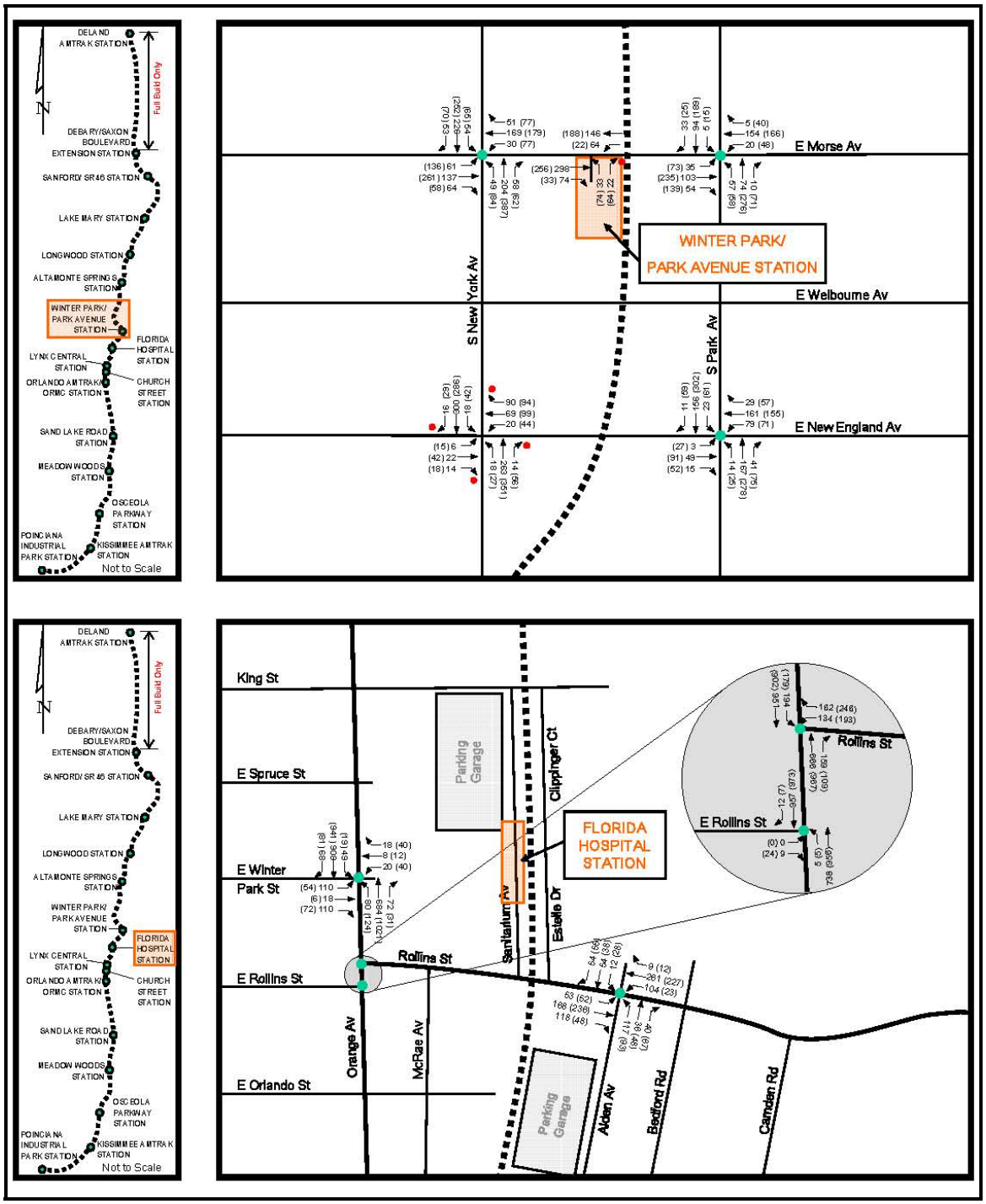

Figure 4-4 Station Turning Movement Volumes IV – 2025 Full Build

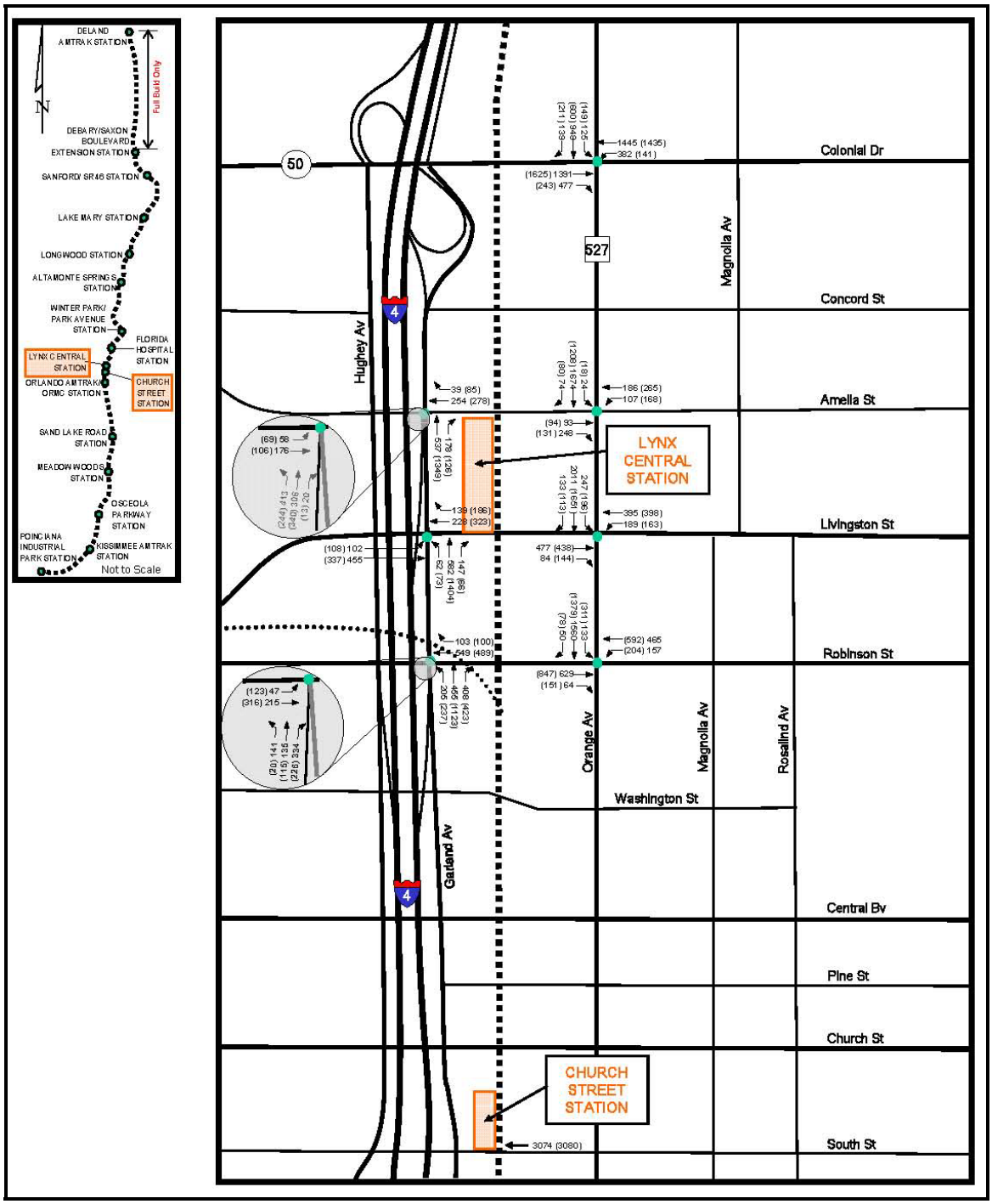

Figure 4-5 Station Turning Movement Volumes V – 2025 Full Build

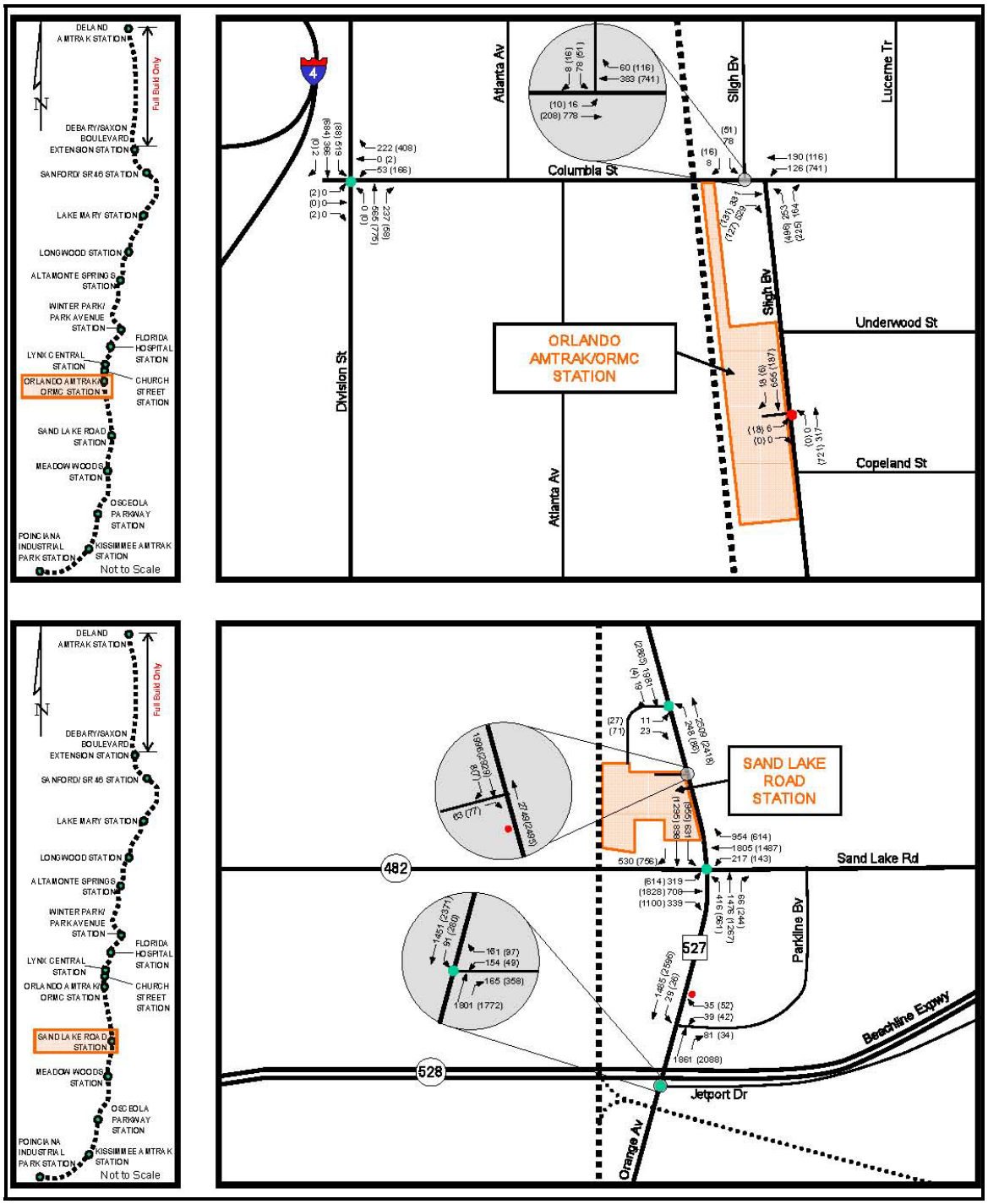

Figure 4-6 Station Turning Movement Volumes VI – 2025 Full Build

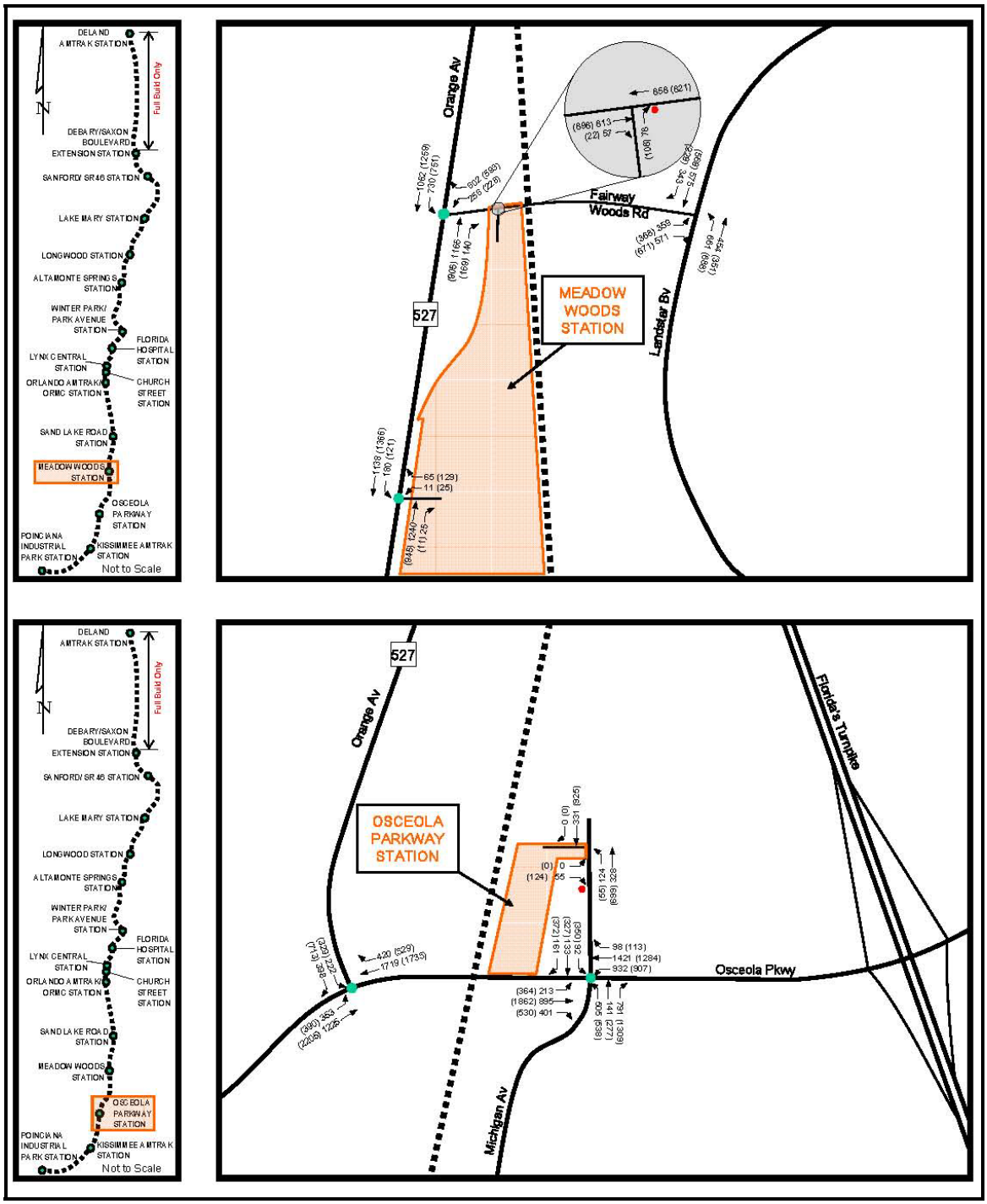

Figure 4-7 Station Turning Movement Volumes VII – 2025 Full Build

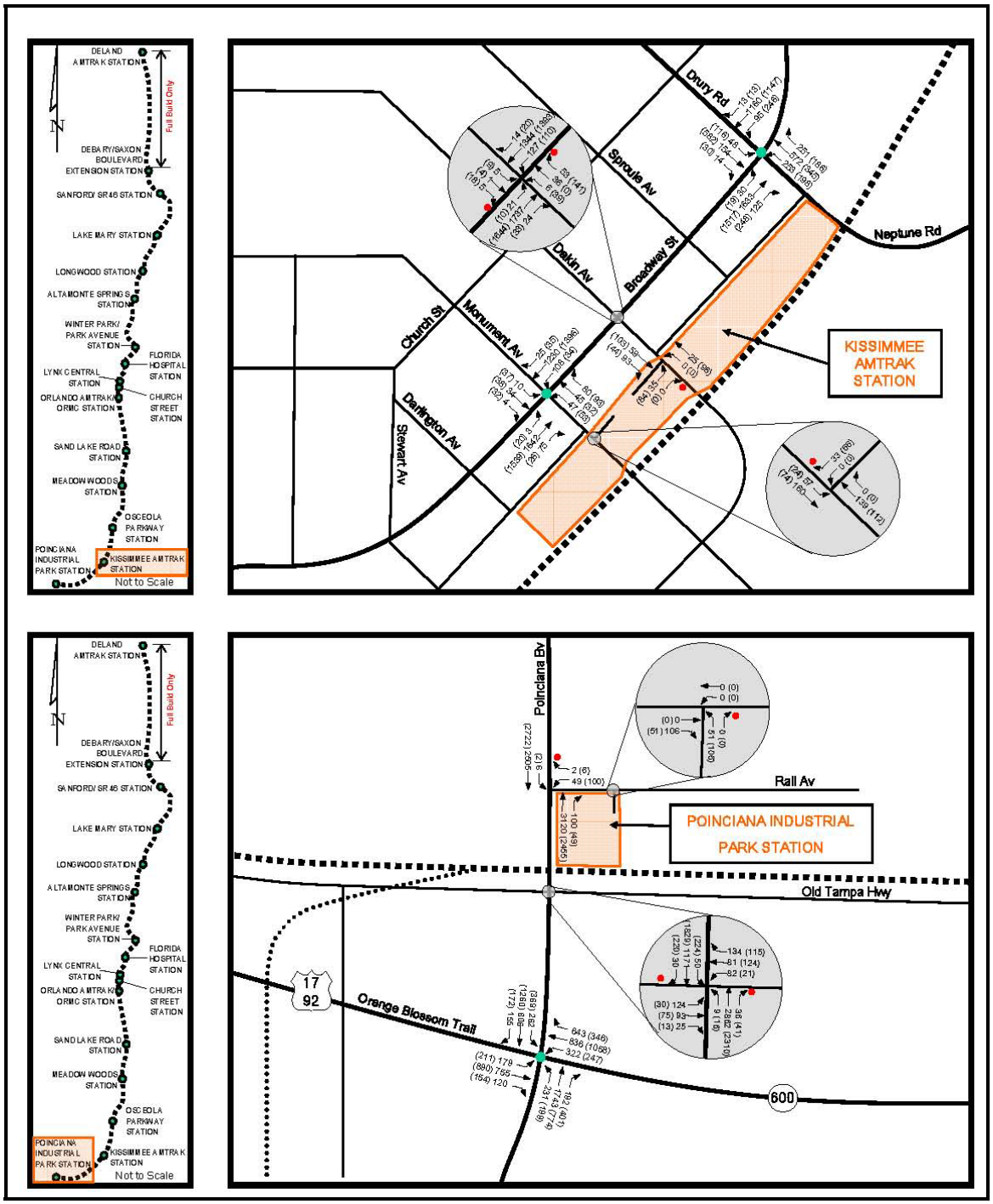

Figure 4-8 Station Turning Movement Volumes VIII – 2025 Full Build

4.1.4 Station Areas and Intersections

Potential traffic impacts were evaluated in the vicinity of park-n-ride lots for the TSM alternative and proposed station locations for the No Build and CRT Full Build. Since the level of project-related traffic at stations is low (See Section 4.1.3.) the project has little or no impact on traffic operations on the adjacent roadways and study intersections. The evaluation results are described in detail below. Hundreds of intersections located adjacent to the rail corridor will not be affected by the CRT project.

Station Areas

Traffic and parking was evaluated fore each of the 13 TSM park-and-ride lot locations. Seven of the park-and-ride lot locations will use existing surface parking lot facilities. Buses will use existing access and egress driveways. Since adequate access and infrastructure is currently provided at these seven existing facilities, the TSM Alternative will have little or no impact at these facilities. Vehicle trip generation and parking demand for all the park-and-ride locations is expected to be low to moderate. Therefore, the TSM Alternative traffic will have little or no impact on park-and-ride lot access and egress. Minor timing adjustments to adjacent signals may be needed to optimize traffic operations.

Traffic access/egress and circulation was evaluated for each of the CRT Full Build 12 origin stations where parking and kiss-and-ride will be provided. Vehicle trip generation and parking demand associated with the destination/walk access CRT stations is expected to be low. Since destination stations only generate negligible demand for parking, traffic operations were not evaluated for these stations and no adverse impacts from the Project are anticipated. Added peak hour traffic ranges from 15 at LYNX Central Station to 56 vehicles per peak hour at Florida Hospital. Parking demand and supply are discussed below.

From Table 4-2 above, the average total traffic at each of the 12 origin stations (not including the four destination stations) is approximately 150 vehicles during both the a.m. and p.m. peak hours (2.5 vehicles per minute). At most locations the station vehicle trips represent only a small percentage of the traffic on the adjacent roadways. For example at Meadow Woods Station, 416 trips would be generated, which represents 21% of the 2025 traffic on South Orange Avenue near the station. An example of the best case is the Sanford/SR 46 Station, which generates 100 trips, is only 4% of the 2025 traffic on SR 46, east of the station access.

Table 4-3 summarizes the station roadway traffic analysis results. Traffic volumes on roadways adjacent to the stations were screened for analysis based on the traffic volume screening criteria outlined in USDOT, Urban Mass Transportation Administration (UMTA, now FTA), Circular C 5620.01, Guidelines for Preparing Environmental Assessments, October 16, 1979. The impacts are deemed to be generally not significant if the proposed project would result in total traffic volumes of less than 600 vehicles per hour per lane (vphpl) on principal arterials and 500 vphpl on minor arterials or collectors.

The traffic volume screening analysis shows that the roadways adjacent to station at DeLand Amtrak Station, Debary/Saxon Boulevard Extension Station, Winter Park/Park

Avenue Station, Florida Hospital Station, LYNX Central Station, Church Street Station, and Orlando Amtrak/ORMC Station are below threshold criteria and do not require further analysis. The destination stations in the City of Orlando will generate negligible traffic volumes, and would not impact adjacent roadways.

Table 4-3: Station Traffic Screening Analysis Results

Station	Full Build 2025 Exceeds FTA Roadway Volume Threshold[1]	Full Build 2025 Impacts Public Roadway
DeLand Amtrak Station	**No**	**N/A**
DeBary/Saxon Blvd. Extension Station	**No**	**N/A**
Sanford/SR 46 Station	**Yes**	**No**
Lake Mary Station	**Yes**	**No**
Longwood Station	**Yes**	**No**
Altamonte Springs Station	**Yes**	**No**
Winter Park/Park Avenue Station	**No**	**N/A**
Florida Hospital Station	**No**	**N/A**
LYNX Central Station	**No**	**N/A**
Church Street Station	**No**	**N/A**
Orlando Amtrak/ORMC Station	**No**	**N/A**
Sand Lake Road Station	**Yes**	**No**
Osceola Parkway Station	**Yes**	**No**
Meadow Woods Station	**Yes**	**No**
Kissimmee Amtrak Station	**Yes**	**No**
Poinciana Industrial Park Station	**Yes**	**No**

[1]UMTA C 5620.1, Table K

The nine stations-Sanford/SR 46 Station, Lake Mary Station, Longwood Station, Altamonte Springs Station, Sand Lake Road Station, Meadow Woods Station, Osceola Parkway Station, Kissimmee Amtrak Station, and Poinciana Industrial Park Station-exceed the FTA criteria for an EA and need a Level of Service analysis. The Level of Service analysis results indicate that none of the added traffic on roadways adjacent to the stations will significantly impact traffic operations. In addition, no stations will divert traffic to sensitive areas such as residential neighborhoods, historic districts, or hospital zones

In summary, none of the station will have an adverse impact on the adjacent roadway system or sensitive areas.

Intersections

The TSM Alternative will result in lower traffic generation than the Full Build Alternative and will not impact gate down times at grade crossings. As a result, the TSM Alternative will have little or no impact to intersections.

A total of 45 intersections (30 are signalized and 15 are unsignalized) in the study area were selected for analysis for the CRT Full Build Alternative. Most of the study intersections (41) were selected based on their proximity to the proposed stations and represent the locations that project-related traffic would utilize. The intersections at SR 434/Ronald/Reagan Boulevard, CR 427/General Hutchinson Parkway, Ronald Reagan Boulevard/Longwood-Lake Mary Road, and North Orange Avenue/Colonial Drive were

selected for analysis because they carry high traffic volumes and are located adjacent to at-grade crossings.

LOS, delay, and queuing were evaluated for each of the study intersections according to methodologies outlined in the *Highway Capacity Manual (2003)*, an industry standard method of assessment. Analysis was performed for the a.m. and p.m. peak hours for the future 2025 No-Build and Build conditions using traffic volumes discussed above. Because several of the study intersections are located nearby at-grade crossings, the intersections and grade crossings were evaluated simultaneously. Simulations were created using Synchro/SimTraffic model software to evaluate the traffic and queuing operations at at-grade crossings and adjacent intersections.

For the No-Build condition, one freight train and one Amtrak train crossing in each peak hour were assumed. This is consistent with data that was used for the Existing Conditions analysis.

The Build condition was analyzed in the same way as the No-Build, with the exception that the freight service in the peak hour was eliminated and CRT trains were added. In the Build condition, four peak hour CRT trains were assumed in each direction, which is assumed to be the maximum frequency of the CRT operation.

The Project will not degrade any study intersection to a deficient LOS E or F condition. The project will increase delay slightly at most study intersections due to increased gate down times at the nearby grade crossing(s). However, other locations will experience reduced delay due to the removal of freight train service from the peak hours. Table 4-4 shows the four study intersections operating at LOS F in the No-Build that are expected to experience the greatest increased delay in one or both peak hours as a result of the Project. It should be noted that these intersections are projected to operate at LOS F without the proposed commuter rail project.

Measures that would improve operations at these locations can be implemented, including optimizing train signal equipment, adding turn lanes at the signalized intersections, and signalizing the intersection of Sligh Boulevard/Columbia Street.

In summary, the project will not cause any study intersection to deteriorate to deficient conditions. While the LOS will remain at F, increased delay from 165 to 460 seconds may be considered “deficient”. Measures will be implemented at four intersections to improve operating conditions.

Table 4-4: Intersection LOS Summary – Significant Potential Impact Locations

			No-Build				Build			
			a.m. Peak Hour		p.m. Peak Hour		a.m. Peak Hour		p.m. Peak Hour	
	County	Jurisdiction	Delay[1]	LOS[2]	Delay	LOS	Delay	LOS	Delay	LOS
Signalized Locations										
CR 427/Longwood Lake Mary	Seminole	Longwood	109	F	165	F	115	F	460	F
Reagan Boulevard/ Altamonte Drive	Seminole	Altamonte Springs	232	F	245	F	280	F	304	F
Poinciana Boulevard/ US 17/92	Osceola	Poinciana	453	F	374	F	514	F	460	F
Unsignalized Location										
Sligh Boulevard/Columbia Street	Orange	Orlando	323	F	317	F	*	F	492	F

[1] For signalized intersections, delay shown in seconds per vehicle for overall intersection. For the unsignalized intersection, delay is shown for worst minor street movement. All figures shown are without mitigation.

[2] LOS = Level Of Service

Note: * Results cannot be calculated in some instances due to conditions resulting from high volumes exceed capacity limits.

Source: Earth Tech, Inc.

4.1.5 Roadway At-Grade Crossings Delays

A critical component to the Full Build Alternative operation that will greatly reduce at-grade crossing delay (for CRT and Freight) will be the replacement of the old existing railway "Fixed Start" crossing warning system with new Constant Warning Time (CWT) crossing protection technology for crossing protection activation (i.e., lights and gates). The CWT technology determines, based on set trains speed, when to activate the crossing protection to provide a constant 30 seconds of advance warning for every train (CRT or Freight). In contrast, the existing Fixed Start system uses a fixed location for the at-grade crossing protection activation device that is based on the maximum train speed allowed. Therefore, if a train is traveling significantly slower than the maximum speed allowed, the crossing protection will be active much longer before the train arrives.

Table 4-5 shows the 30 at-grade crossing roadways that were evaluated for the 2025 No-Build and Build conditions to determine potential impacts. The highest vehicle delays occurred at a limited number of grade crossings immediately adjacent to stations. For these locations, the crossing delay is greatest when a train is decelerating for the station stop near, but prior to passing the at-grade crossing. The following is a list of these at-grade crossings:

- Lake Mary Boulevard
- CR 427 (Ronald Reagan Boulevard) at Longwood
- SR 436 (Altamonte Drive)
- Amelia Street
- Robinson Street
- Poinciana Boulevard

Peak Hour Delay Results

The calculation of vehicle delay and queuing at at-grade crossings was performed based on the future traffic volumes and methodology explained above. Using the standard Constant Warning Time (CWT) durations, the analysis results show that of the 30 study at-grade crossings, 27 will operate with average hourly vehicle delays of less than 80 seconds during the peak hours. The Transportation Research Board identifies 80 seconds as the threshold for LOS F.

Table 4-5: At-Grade Crossing Study Locations

Mile Post	Roadway (including any adjacent study intersection)	Classification
767.61	CR 46A	Urban Arterial
771.1	Airport Road	Minor Collector
773.35	Lake Mary Boulevard	Urban Arterial
776.12	CR 427/Reagan	Urban Arterial
777.81	CR 427(N)/Reagan	Urban Arterial
777.91	SR 434/Sanlando Springs	Principal Arterial
779.39	SR 427(S)/Rea/Longwood	Principal Arterial
780.55	SR 436/Altamonte Drive	Principal Arterial
783.21	Horatio Avenue	Minor Arterial
783.37	Maitland Avenue/427	Minor Arterial
786.06	Fairbanks Avenue/426	Principal Arterial
786.9	Orlando Avenue/17-92	Principal Arterial
787.98	Princeton Street	Minor Arterial
788.97	Magnolia Avenue	Arterial
789.14	Orange Avenue	Principal Arterial
789.48	Colonial Drive	Principal Arterial
789.73	Amelia Street	Collector
789.99	Robinson Street	Minor Arterial
790.23	Central Boulevard	Collector
790.49	South Street	Minor Arterial
791.02	Gore Street	Minor Arterial
791.77	Kaley Street	Collector
792.29	Michigan Street	Minor Arterial
794.98	Oak Ridge Road	Collector
797.5	Landstreet Road	Minor Arterial
805.7	Carroll Street	Minor Arterial
807.23	West Vine Street	Principal Arterial
807.55	Oak Street	Urban Collector
807.94	Drury Street	Collector
813.77	Poincianna Boulevard	Principal Arterial

The 3 grade crossings with significant adverse impacts are Lake Mary Boulevard, SR 436 (Altamonte Drive), and Poinciana Boulevard. All three are characterized as very high volume multi-lane roadways with capacity and peak hour delay predictions well above the

LOS F threshold. Most of the predicted delay at these crossings is associated with the deficiency in the roadway system in the No-Build Alternative. With the No-Build predicted to be such a severe LOS F delay at these locations, the added increment of delay caused by the Full Build is relatively low. Any additional delay at these grade crossings above the No-Build would be due to gate down times, not the insignificant additional traffic associated with the nearby CRT station itself. Mitigation of these impacts is described in Section 4.1.6.

Daily Delay Results

Daily delay at at-grade crossings was estimated to evaluate the total impact on vehicle delay project-wide. Daily vehicle delay was calculated for 111 grade crossings along the rail line within the limits of the proposed project. The No-Build cumulative daily delay at these grade crossings is a combined 34,069 minutes.

The CRT Full Build would only cause short gate down times (35-40 seconds) at most grade crossings and only a small portion of daily traffic would be potentially impacted. The CRT Full Build, without assuming any freight relocation or mitigation, is estimated to increase daily vehicle delay project-wide at the grade crossings by less than 8 percent or a combined 2,595 minutes. The Memorandum of Understanding with CSXT indicates that most of the through-movement freight trains (non-local) will be removed from the A-Line during peak periods.

Most of the increase in daily delay is at the three at-grade crossings listed in Table 4-4. The additional daily delay created by the CRT Full Build can be further reduced or eliminated by redirecting some of the current CSXT freight trains off the project corridor. Due to their great length and relatively slow speed, freight trains have a disproportionate impact on delay at grade crossings. Redirecting some of the long through freight trains would significantly reduce daily delay along the Corridor.

In summary, the CRT Full Build will not increase traffic delay for 108 of the at-grade crossings throughout the Study Corridor. Overall daily delay at grade crossings would increase by approximately 8 percent in the CRT Full Build. Vehicle delay at three at-grade crossings located adjacent to stations can be reduced by optimizing signal operations, (See Section 4.1.6 below) and redirecting some of the long through freight trains to other lines.

4.1.6 Mitigation

This section discusses measures that will be used to mitigate adverse effects at the limited number of identified locations. Table 4-6 summarizes the measures to mitigate project impacts at study intersections and grade crossings. The impact on vehicle delay at the at-grade crossings will be reduced by optimizing train signals to reduce gate down times at the major grade crossings adjacent to the Lake Mary Station, Altamonte Springs Station, and Poinciana Industrial Park Station. Other measures that will be implemented include: 1) slightly increase dwell time for trains approaching grade crossing to allow more time for traffic to clear, 2) reduce service frequency of trains, and 3) shift platforms further away from grade crossings.

Table 4-6: Mitigation Summary

Intersection	Proposed Measure		Result
CR 427/Longwood Lake Mary	Re-stripe eastbound left-turn lane as shared left-right lane. Shift Longwood platforms 300' north away from grade crossing		Improves peak hour delay to better than No-Build conditions.
Reagan Boulevard/ Altamonte Drive	Add 2nd eastbound left-turn lane		Improves peak hour delay to better than No-Build conditions.
Poinciana Boulevard/ US 17-92	Add northbound and southbound left-turn lanes		Improves peak hour delay to better than No-Build conditions.
Sligh Boulevard/ Columbia Street	Signalize Intersection		Improves operation and safety to acceptable conditions.
At-Grade Crossing Location	**FRA Gate ID #**	**Proposed Measure**	**Result**
Lake Mary Boulevard	6220656	Optimize train signal timings to reduce gate down times	Reduces Build delay by 40% at grade crossing in peak periods, below No-Build conditions.
Altamonte (SR 436)	622080N	Optimize train signal timings to reduce gate down times	Reduces Build delay by 40% at grade crossing in peak periods.
Poinciana Boulevard	622408S	Optimize train signal timings to reduce gate down times	Reduces Build delay by 25% to 40% at grade crossing in peak periods.

Source: Earth Tech, Inc.

Operations at the three signalized intersections shown in Table 4-6 will be mitigated by adding or modifying turn lanes for some approaches. The un-signalized intersection of Sligh Boulevard/Columbia Street will be improved by providing a new traffic signal. The locations of intersections and grade crossings where mitigation is recommended in the northern and southern portions of the Corridor are shown in Figure 4-9 and Figure 4-10, respectively.

CSXT freight trains generate a disproportionate amount of delay due to their length and slow speed. In addition to the specific mitigation measures, removal of through freight trains will be implemented as part of the CRT Full Build that will not only reduce the impact of the CRT Full Build but improve overall operations. These include removing most of the CSXT through-movement freight trains from the A-line during peak periods and a new Constant Warning Time signal system.

In summary, the CRT Full Build will have only a limited impact on intersections and roadways in the Study Corridor. The four study intersections and three at-grade crossings that may be impacted by the CRT Full Build can be improved through relatively low-cost mitigation measures. Elements that will be implemented as part of the CRT Full Build, such as a new Constant Warning Time signal system, will reduce grade crossing delays and improve operations and safety throughout the Corridor.

4.1.7 Traffic and Roadway Summary

Traffic operations were evaluated for study intersections and roadways in the Project Corridor for year 2025 No-Build and Build conditions. The project will shift a small amount of traffic away from existing roadways to origin stations. The level of Project-related traffic is low compared with traffic on adjacent roadways. There will be very little Project-related

traffic at the four destination stations in Orlando. The project will not adversely impact the major roadway movements at the station driveway locations.

The Project will not increase traffic delay for the vast majority of at-grade crossings throughout the Study Corridor. No study intersections will deteriorate to deficient conditions as a result of the Project. A total of four study intersections and three at-grade crossings located adjacent to stations may experience increased vehicle delay as a result of additional gate down times. The additional delay at these locations can be reduced by implementing mitigation measures that include additional turn lanes at intersections and signal optimization at grade crossings, and where possible, shifting platforms further away from the crossing.

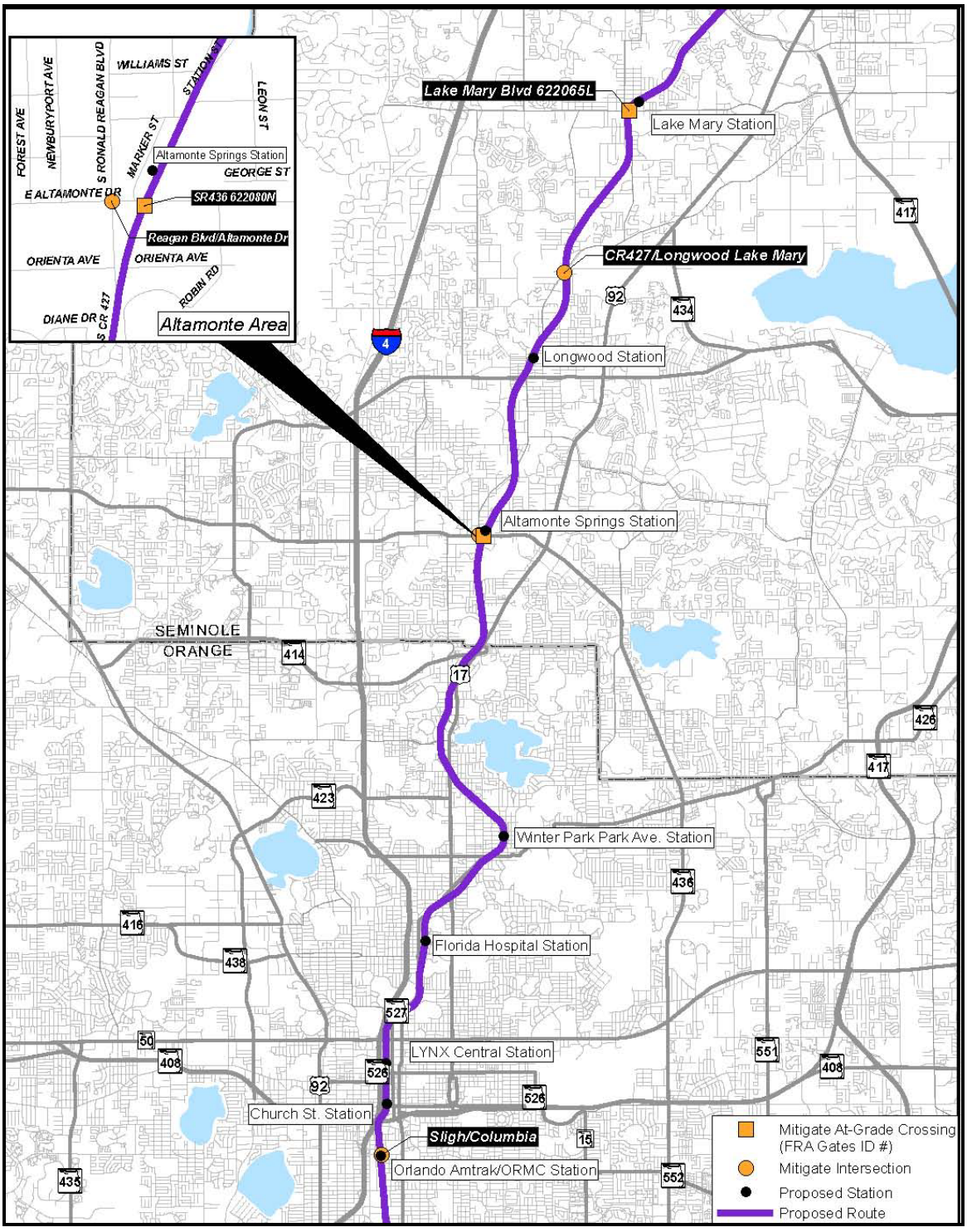

Figure 4-9 Intersection and Grade Crossing Mitigation – North Corridor

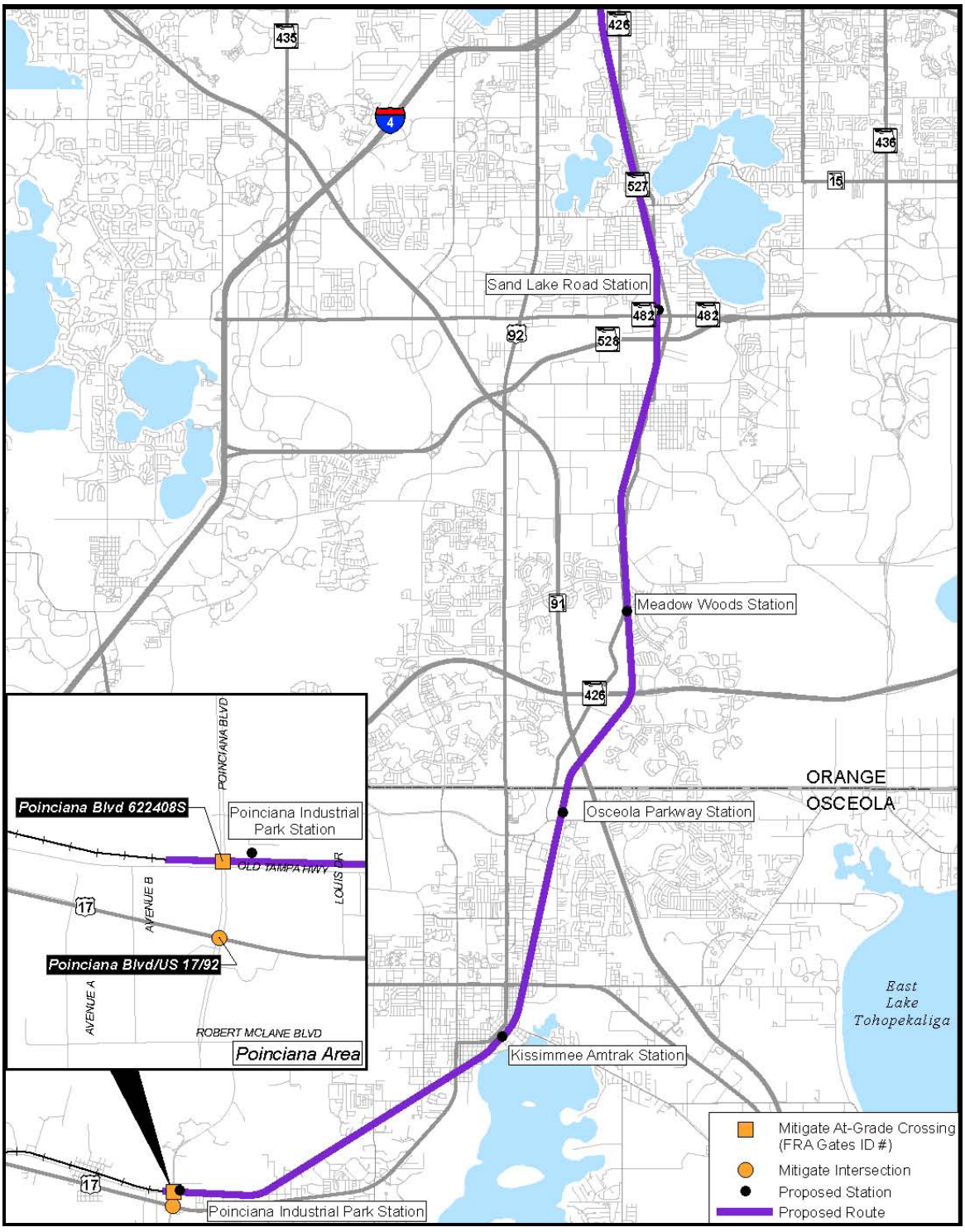

Figure 4-10 Intersection and Grade Crossing Mitigation – South Corridor

4.2 Parking

Parking was evaluated for the Full Build and TSM alternatives. Review of existing parking areas for the TSM Alternative was based on recent aerial photographs of the TSM park-and-ride lot locations.

Parking requirements for each of the CRT Full Build stations was determined using a combination of locally estimated demand and outputs from the regional demand model. All CRT stations will provide on-site parking facilities, with the exception of the five destination, or "walk access" stations. These destination stations are those located near activity areas, where CRT riders typically access by non-auto modes such as bus, walk, or bicycle. Vehicle trip generation and parking demand associated with these stations is low.

An inventory of both public and private off-street parking for the area within ½ miles radius of the CRT Full Build stations was completed. Also, on-street parking was inventoried on those streets immediately adjacent to the stations.

4.2.1 On-Street Parking

Parking at the proposed 13 TSM Alternative park-and-ride lot locations was reviewed. The following parking spaces are currently located at the proposed TSM station park-and-ride lot locations:

- Saxon Boulevard – 153 spaces
- SR 472/I-4 – 0
- North Gate Plaza – 90 spaces
- Seminole Town Center – 0
- Lake Mary/Seminole Center – 609 spaces
- Longwood/SR 434 – 277 spaces
- Altamonte/Fern Park "A" – 60 spaces
- Sand Lake – 73 spaces
- J. Young Parkway/Greenway – 0
- Osceola Parkway – 0
- Osceola Parkway/Old Dixie – 0
- Turnpike/Shady lane – 99 spaces
- Poinciana – 0

The above list indicates that there are 1,361 parking spaces in 7 existing lots that are proposed to be used for park-and-ride lots for the TSM Alternative. Most of the identified parking spaces were observed to be unoccupied. Six locations are currently undeveloped and do not have existing parking.

Existing public on-street parking supply and peak demand were evaluated for a two-block radius around the proposed "walk" stations - Winter Park, Florida Hospital, LYNX Central Station, Church Street, and Orlando Amtrak/ORMC. In the vicinity of the Winter Park Station there are 607 on-street spaces. Florida Hospital has 128 spaces on the adjacent

streets and LYNX Central Station has 91 on-street parking spaces. There are 32 on-street parking spaces in the vicinity of the proposed Church Street Station. At Orlando Amtrak, there are 96 on-street parking spaces. None of these spaces will be eliminated by the CRT Project and adequate on-site parking will be provided.

4.2.2 Station Parking

The following is a description of the existing conditions at the proposed CRT stations and the amount of parking that will be provided as part of the Full Build project.

- **DeLand Amtrak Station** There are 70 existing public parking spaces available at the Amtrak Station. An additional 180 spaces will be added on-site through the purchase of adjacent vacant land to accommodate the CRT requirements.
- **DeBary/Saxon Boulevard Extension Station** The station design includes 275 spaces in the vacant land parcel acquired for the station.
- **Sanford/SR 46 Station** The station design includes 370 spaces in the land parcel acquired for the station.
- **Lake Mary Station** The station design includes 650 spaces in the land parcel acquired for the station.
- **Longwood Station** The station design includes 375 spaces in the land parcel acquired for the station.
- **Altamonte Springs Station** The station design includes 650 spaces in the land parcel acquired for the station.
- **Winter Park/Park Avenue Station** There are 33 existing public parking spaces available at the Amtrak Station. Since this is, to some extent, a CRT destination station, it will not require on-site parking. For the Winter Park Station, the City of Winter Park has coordinated with FDOT to identify options to provide new parking facilities that will accommodate the parking demand for both downtown Winter Park and the proposed CRT station.
- **Florida Hospital Station** is a destination station and will not require on-site parking.
- **LYNX Central Station** is a destination station and will not require on-site parking.
- **Church Street Station** is a destination station and will not require on-site parking.
- **Orlando Amtrak/ORMC Station** There are 44 existing public parking spaces. The CRT station will be adjacent to the Amtrak Station and is a destination station and will not require on-site parking.
- **Sand Lake Road Station** The station design includes 650 spaces in the land parcel acquired for the station.
- **Meadow Woods Station** The station design includes 390 spaces in the land parcel acquired for the station. No public parking currently exists on this site.
- **Osceola Parkway Station** The station design includes 200 spaces in the land parcel acquired for the station. No public parking currently exists on this site.
- **Kissimmee Amtrak Station** There are 26 existing public parking spaces that will be eliminated. The CRT station will be constructed as part of the planned

Intermodal Center. Existing parking spaces will be used to supply the 390 required CRT parking spaces for this project.

- **Poinciana Industrial Park Station** The station design includes 250 spaces in the land parcel acquired for the station. No public parking currently exists on this site.

Table 4-7 shows the proposed parking supply for each station. The proposed project will provide a total of 4,410 system-wide parking spaces.

According to requirements originally in FTA (UMTA) Circular 5920.1 project impacts that fall into one of the following categories will not require additional analysis of impacts on parking:

1) The transit improvement provides parking for on-site activities (e.g., parking for maintenance or administrative employees).

2) Fewer than ten parking spaces are eliminated.

3) Fewer than 50 spaces are eliminated and replacement parking is provided, either through new parking facilities or the use of underutilized parking facilities (surplus parking in the project area).

4) Over 50 parking spaces are eliminated and comparable replacement spaces are part of the proposed action. Comparable parking is that space located no more than an additional 200 foot walk (approximately one-half block) from the parker's destination.

For station locations where businesses or residences would be impacted (Lake Mary Station, Longwood Station, Altamonte Springs Station, and Sand Lake Road Station), the businesses or residences will be relocated as part of the Project's Relocation Plan. The Kissimmee Amtrak Station parking will be replaced with the new parking that is part of the Kissimmee Intermodal project. The Project will not reduce parking for any businesses/residences that will continue to operate adjacent to the Project. In summary, the CRT Project's impact on parking is not significant.

Table 4-7: Station Parking Supply and Impact Summary

Station	Proposed Station Parking Supply (spaces)	Adequate Parking Provided By Project	Existing Parking Spaces Impacted[1]	Replacement Parking Provided?	Parking Impacts? (based on FTA C 5620.1)[2]
DeLand Amtrak Station	180	Yes	0	N/A	No
DeBary/Saxon Blvd. Extension Station	275	Yes	0	N/A[3]	No
Sanford/SR 46 Station	300	Yes	0	N/A	No
Lake Mary Station	650	Yes	20[5]	Yes	No
Longwood Station	375	Yes	40[5]	Yes	No
Altamonte Springs Station	650	Yes	365[5]	Yes	No
Winter Park Station	City[4]	Yes		N/A	No
Florida Hospital Station	None	Yes	0	N/A	No
LYNX Central Station	None	Yes	0	N/A	No
Church Street Station	None	Yes	0	N/A	No
Orlando Amtrak/ORMC Station	None	Yes	0	N/A	No
Sand Lake Road Station	650	Yes	85[5]	Yes	No
Meadow Woods Station	390	Yes	0	N/A	No
Osceola Parkway Station	200	Yes	0	N/A	No
Kissimmee Amtrak Station	390	Yes	235[6]	Yes	No
Poinciana Industrial Park Station	250	Yes	0	N/A	No
TOTAL	4,310	Yes	765		

[1] Numbers are based on aerial photographs and are approximate.

[2] Parking impacts determined based on guidelines in UMTA C 5620.1 requirements, October 16, 1979.

[3] N/A = Not Applicable

[4] The City of Winter Park will provide new facilities to accommodate CBD and CRT station parking.

[5] Project to reconstruct existing surface parking

4.3 Transit

This section addresses the potential impacts of the CRT Full Build Alternative on transit and related services in the study area, and the ability of the CRT Full Build Alternative to address the goals and objectives, as developed in the AA study and refined during the EA process, related to access and mobility compared to the No-Build and TSM Alternatives. Categories addressed include:

- Existing Transit and Related Services
- Geographic areas of service
- Travel times and reliability
- Frequency and hours of service
- Transit demand, patronage, and mode share
- Integration of regional transit services

4.3.1 Existing Transit and Related Services

A detailed description of the existing transit network and related services in the Study Corridor is contained in the *CRT Transit Existing Conditions Report, December 2005*. Existing Corridor transit service consists of bus routes operated by two regional transit authorities serving the four-county study area. The regional transit bus services within the Study Corridor are provided by the CFRTA, known as LYNX, and the Volusia County Public Transit System, known as VOTRAN. Amtrak intercity rail passenger service utilizes the CSXT A-line tracks. Additionally, there are private intercity bus services and a variety of public and private shuttle bus operators.

All public transit services in the study area today are buses operating in mixed traffic, with the exception of the existing downtown bus circulator. The CRT Full Build Alternative would add commuter rail service to the existing network of transit and related services within the study area, would not eliminate or reduce any of those services, and therefore, would have no adverse impact on them. The benefit would be to provide greater access and potential transfers to the bus system, especially at LYNX Central Station and DeBary/Saxon. Each existing service and impact screening result is summarized below.

LYNX Fixed Route Service

LYNX serves Orange, Seminole and Osceola Counties. The tri-county area covers approximately 2,500 square miles with a resident population of more than 1.8 million people. LYNX recorded 21.9 million riders during FY 2003. There are currently 62 routes in the total fixed route system, of which 24 are operating within the Study Corridor. The Full Build Alternative would operate commuter rail in its own ROW and would not compete for capacity on roadways and at terminals with existing LYNX fixed route services. LYNX does not currently operate any rail transit. The Full Build Alternative does not require any new fixed bus routes above those featured in the No-Build Alternative. Some LYNX fixed bus routes would be modified to provide improved transfer connections where proposed commuter rail stations are near existing bus routes. The bus route modifications associated with the Full Build Alternative will not adversely impact riders using existing LYNX fixed route services, and are outlined in the *CRT Transit Operating Plan, December 2005* Report.

LYNX Central Station

LYNX Central Station (LCS), which opened in November 2004, is Orlando's major transit intermodal facility located near the center of the Study Corridor along North Garland Avenue, between Amelia Street on the north and Livingston Street on the south. There are 33 existing LYNX bus routes serving the LCS, which has capacity for 23 buses at a time and provides a modern indoor terminal with fully sheltered bus bays for transit passengers. Accommodation of future commuter rail platforms is included in the layout of the LCS, and the CRT Full Build Alternative is fully consistent with it. The platforms would be located along the east side of the LCS facility at the existing CSXT double-track railroad where construction and operation will not adversely impact existing bus operations. Commuter rail will provide an additional intermodal transfer option at the LCS, increase the overall capacity of the facility, and do so without adding additional bus traffic to the streets.

VOTRAN Fixed Route Service

VOTRAN provides local service throughout Volusia County within the 1,207 square mile service area. VOTRAN operates 24 fixed routes, one commuter express route and Beach Trolleys. VOTRAN recorded 3.3 million riders during FY 2003. There are currently five VOTRAN routes operating within the Study Corridor. The CRT Full Build Alternative does not require any new fixed bus routes above those featured in the No-Build Alternative. Some VOTRAN fixed bus routes would be modified to provide improved transfer connections where proposed commuter rail stations are near existing bus routes. The bus route modifications associated with the CRT Full Build Alternative will not adversely impact riders using existing VOTRAN fixed route services.

Amtrak

Existing Amtrak service in the Study Corridor serves a long distance intercity travel market, not the commuter travel market. The Silver Star and Silver Meteor are the two Amtrak routes between New York and Miami that operate through the entire Study Corridor and make stops at the existing Amtrak stations in DeLand, Winter Park, Orlando, and Kissimmee. The existing Sanford Amtrak station closed in 2005 and is no longer in use. Southbound, both Amtrak routes operate during the late morning, and northbound they operate during the early afternoon. Both times are outside the peak for commuter rail operations. A third Amtrak train, the transcontinental Sunset Limited, operated only in the northern portion of the Study Corridor with Orlando as its Florida terminal point. This route operated three times per week prior to service being suspended east of Texas due to Hurricane Katrina.

The CRT Full Build Alternative will modify portions of passenger platforms at the four existing Amtrak stations to accommodate the relatively short commuter rail DMU trains, which are expected to be 2-3 cars long compared to the existing Amtrak trains that are typically 10 cars long. Amtrak trains will be able to continue to serve these four existing stations during construction and operation of the commuter rail service. Ongoing coordination between the CRT sponsors, FTA, Amtrak, and the local jurisdictions during subsequent design phases will resolve any remaining issues specific to each station location. Amtrak passengers will benefit from the improvements in station access and transfer options which the CRT Full Build Alternative will bring. In addition to these four Amtrak locations, the CRT Full Build Alternative will construct twelve new commuter rail stations at other locations along the rail line, none of which will adversely impact Amtrak.

Finally, the Amtrak Auto Train route that operates daily between Virginia and Florida, has its southern terminal in Sanford and does not operate south of that facility. The Auto Train makes no intermediate stops within the Study Corridor, shares no stations with the proposed commuter rail, and its current operations are outside the peak period of proposed commuter rail operation. In summary, the CRT Full Build Alternative will not adversely impact any of the existing Amtrak operations in the Study Corridor.

Private Transportation Services in Corridor

The Corridor is within the Central Florida region, which has one of the largest private sector transportation markets in the country. A variety of private bus operators provide transit service in the Corridor; however, most of these are charter service companies or

small carriers and do not serve the commuter market identified in the travel market analysis.

- *Greyhound Lines Inc.*: Intercity bus service is provided by Greyhound Lines Inc. Their scheduled service is between DeLand, Orlando, and Kissimmee. Between DeLand and Orlando there are three southbound trips and four northbound trips. Between Orlando and Kissimmee, there are six southbound trips and seven northbound trips. The 2005 schedules do not serve the commuter market and the fares range from $9.50 to $16.50 one-way. The CRT Full Build Alternative is not expected to have any adverse impact on Greyhound Lines, Inc. because the commuter rail service is focused on early morning and late afternoon with intermediate stops, while the intercity bus service is generally mid-day.

- Motor Coaches/Vans/Limousines(Major Carriers): In 2005, there were approximately 191 private transportation providers operating in the metropolitan Orlando area. These operators vary in service type and area, users, hours of operation, employees, annual vehicle miles, fares and number of vehicles operated. The private transportation providers primarily serve the tourist and business travel markets with door-to-door service, not the commuter market. The CRT Full Build Alternative is not expected to have any adverse impact on private transportation providers in the Corridor because of the very different markets served.

4.3.2 Geographic Areas of Service

The geographic location of transit services in the Corridor, and in particular, the location of station stops, is an important measure of how well travel markets are served and how accessible the services are to the traveling public. This section describes the geographic coverage of the existing transit system in the Corridor, and how it would change with the TSM/Baseline and CRT Full Build Alternatives. The analysis shows that the CRT Full Build Alternative would have no adverse impact on the geographic area of transit service in the study area, and would increase the service area compared to both the No-Build and TSM Alternatives.

The existing commuter transit service in the Corridor consists of fixed route bus service provided by LYNX and VOTRAN operating in mixed traffic. The geographic area of service is limited to existing developed areas utilizing the existing roadway network. The geographic areas of service provided by the existing Amtrak operations and private bus companies in the Corridor are large, but their fare structures and schedules do not serve the identified travel market demand.

The No-Build Alternative expands the geographic area of service of the LYNX and VOTRAN systems by extending existing routes and adding new routes to serve new and growing markets, some of which are in the Study Corridor. Additionally, the No-Build Alternative includes the Flex Bus service in the Altamonte Springs area, which expands the geographic reach of transit service, though not in the north/south I-4 travel market. The TSM Baseline Alternative consists of new and improved LYNX and VOTRAN bus routes operating in the Corridor beyond what is provided in the No Build Alternative, and includes a number of new and expanded Park n' Ride facilities. The TSM Baseline geographic area of service was developed specifically to address the travel markets as identified in the travel market analysis conducted in early 2005.

Full Build Alternative

The CRT Full Build Alternative, as described in Chapter 2, consists of commuter rail service operating within the existing CSXT A-Line Corridor. The CRT Full Build Alternative would provide commuter rail service connecting the counties of Volusia, Seminole, Orange, and Osceola, with end points in DeLand on the north and Poinciana Boulevard on the south. The CRT Full Build Alternative includes those TSM Baseline bus routes that are not redundant to the commuter rail service.

The geographic area of service of the CRT Full Build Alternative is greater than that of the TSM Baseline because it incorporates many of the new TSM Baseline routes, and in addition, is able to utilize an existing rail line located within a densely developed Corridor between I-4 and Route 17/92 that buses cannot readily access with high capacity service. Moreover, the commuter rail service is able to directly connect with high density destination stations such as Florida Hospital Station, Church Street Station, and Orlando Amtrak/ORMC Station, not easily reached by bus service due to constrained local roadway networks.

4.3.3 Travel Times and Reliability

Travel time and service reliability are key measures of transit service quality and the ability to attract and retain ridership, particularly for trip makers that have a choice between driving or taking transit. The analysis shows that the Full Build Alternative would significantly improve travel times in the Study Corridor compared to both the No-Build and TSM Alternatives. The Full Build Alternative would have no adverse impact on travel times and reliability in the study area.

Existing travel times by automobile in the Corridor during the morning and afternoon peak commuting periods are slowed by significant traffic congestion on I-4 and on parallel routes such as 17/92 in the northern portion of the Corridor, and Orange Avenue and Route 441 in the southern portion of the Corridor. Travel times on LYNX and VOTRAN buses, particularly the commuter buses, using these routes are directly impacted by existing traffic congestion because all existing bus routes operate in mixed traffic, other than the downtown circulator.

The No-Build Alternative will result in little improvement in transit travel times and service reliability in the Corridor, and in many areas the travel times and service reliability will deteriorate compared to today. The additional bus routes provided as part of the TSM Baseline Alternative will operate over a roadway network that includes all the elements of the No-Build described above, plus the addition of exclusive bus-only ramps to facilitate access to and from I-4. Additionally, the TSM Baseline Alternative provides new and improved Park n' Ride facilities and other passenger conveniences. The result is a modest improvement in travel time and schedule reliability compared to the No-Build, but the fundamental capacity constraints in the regional highway network described in the No-Build Alternative would continue to adversely impact transit in the TSM Alternative. For example, in the northern portion of the Corridor, the peak highway travel time between the proposed DeBary/Saxon Boulevard Extension Station site and downtown Orlando via automobile is 73 minutes. The TSM Baseline bus route travel time for the same trip is approximately 90 minutes, counting intermediate stops. The high growth rate in population and employment in the Corridor is expected to result in worsening traffic

congestion and delay in the region even with construction of all highway improvements contained in the LRTP.

Full Build Alternative

The CRT Full Build Alternative adds a high capacity, congestion free passenger corridor roughly parallel with I-4 and SR 17/92, which for many trip origins and destinations is also the shortest travel distance. This combination of exclusive ROW and direct routing, which is available only in the CRT Full Build Alternative, results in significantly reduced travel times and improved schedule reliability for many trips compared to the TSM Baseline and No-Build Alternatives. For example, the travel time for the trip between DeBary/Saxon Boulevard Extension Station and downtown Orlando using the proposed commuter rail service in the CRT Full Build Alternative would take 54 minutes, as compared to 73 minutes for the automobile and 90 minutes for the TSM bus service.

Additional travel time savings would be achieved by the CRT Full Build Alternative during the planned reconstruction of I-4 between 2009 and 2014. During this period of construction the commuter rail service will provide travelers with the choice of a convenient, comfortable, and reliable alternative to driving. Attracting some auto trips to use commuter rail instead of driving on I-4 will help reduce demand on I-4 and assist in maintenance of traffic during construction.

4.3.4 Frequency and Hours of Service

Frequency and hours of service are key factors when travelers decide whether to choose transit. The analysis shows that the CRT Full Build Alternative would have no adverse impact on the frequency and hours of transit service available to the public in the study area, and would actually increase service frequency in many markets compared to the No-Build Alternative. The frequency and hours of service of the CRT Full Build and TSM Alternatives are comparable.

Existing transit in the Corridor operates at relatively low service frequencies. As summarized in Chapter 2 and described in detail within the *CRT Transit Operating Plans Report, September 2005*, existing bus routes in the LYNX system typically operate at frequencies of 60 minutes, with some buses operating every 30 minutes during the peak period. Buses in the VOTRAN system within the Corridor are typically operating at 120 minute frequency with 60 minute frequency during the peak period. Because of the long wait time between buses, existing service frequencies make it difficult to attract travelers that have a choice of modes.

Service frequencies on some routes are increased in the No-Build compared to the existing condition, resulting in shorter average waiting time before the bus arrives. The No-Build Alternative would increase the number of routes that have a 30 minute peak period frequency in the LYNX system, and would increase the frequency on selected VOTRAN routes from a bus every 120 minutes to a bus every 60 minutes. The hours of operation in the No-Build would increase with the addition of weekend service on selected routes.

The TSM Baseline Alternative features implementation of eight new express and limited stop bus routes in the Corridor. By adding new routes and significantly increasing frequency on existing routes in the Corridor, the TSM Baseline Alternative significantly

increases the frequency of transit service in the Corridor compared to the No-Build. The days and hours of service do not significantly change in the TSM Baseline Alternative compared to the No-Build.

Full Build Alternative

The Full Build Alternative provides commuter rail service in the Corridor operating at service frequencies of 15 minutes peak, 60 minutes mid-day, and 120 minutes evenings. This CRT Full Build Alternative this EA report, is considered to be the maximum system upon which to assess potential impact. As noted in the Preface of this report, the LPA Alternative service frequency would be every 30 minutes in the peak and 120 minutes in the off-peak. Regardless of the sub alternative, the hours of service for the commuter rail service in the CRT Full Build condition would be weekdays only starting at approximately 5:30 a.m. to 10:30 p.m. As with the TSM Baseline Alternative, there would be no weekend or late evening commuter rail service in the CRT Full Build Alternative.

One measure of the transit Level of Service provided is the number of buses and/or commuter rail trains per hour serving major activity centers. Table 4-8 compares the alternatives using this measure at four major employment activity centers and confirms that the CRT Full Build and TSM Alternatives would provide comparable frequency of service, as required by FTA.

Table 4-8: Level of Transit Service to Major Activity Centers (buses/trains per hour)

	Heathrow/ Lake Mary		Altamonte/ Maitland		Downtown Orlando		Disney	
Alternative	Base	Peak	Base	Peak	Base	Peak	Base	Peak
No-Build	7	8	9	10	61	65	16	16
Full TSM	10	20	11	17	64	76	19	23
Full Build	10	20	11	17	61	68	19	23
LPA TSM	9	18	10	15	63	74	18	21
LPA Build	9	18	10	15	60	68	18	21

Note: Base is service frequency per hour mid-day. Peak is service frequency per hour during a.m. and p.m. peak periods.
Numbers shown are in each direction. Major activity centers shown represent the four biggest employment "super districts" with boundaries identified in the Travel Market Analysis, January 2005.

4.3.5 Integration of Regional Transit Services

Regional transit services are integrated today primarily through the LCS in downtown Orlando which opened in November 2004. This state-of-the-art bus facility ties together local, express, and downtown circulator bus services and includes the provision for commuter rail service along the east side of the facility with cross platform integration to the bus facility.

The No-Build Alternative includes a number of other regional transit services, such as the Altamonte Springs Flex Bus service. Additionally, there are plans for smaller scale intermodal centers at locations in the Corridor, such as in DeLand and Kissimmee. The No-Build Alternative lacks a transit service that can reliably connect these new regional transit services and facilities into a coherent system.

The TSM Baseline Alternative would add bus routes and include a number of new Park n' Ride and LYNX Superstop locations. Many of these routes would serve the

existing LCS and would connect with the other planned services and facilities contained in the No-Build. However, except for the connection with LYMMO in downtown Orlando, the bus network the TSM would create lacks transit mode choices at intermodal centers other than buses in mixed traffic.

Full Build Alternative

The CRT Full Build Alternative would provide a strong connection to all the existing and planned transit services in the region. As mentioned above, the LCS was designed specifically to accommodate commuter rail along its east side. The location of the LCS between I-4 and the rail line and adjacent to the downtown circulator system is the ideal focal point for this new service. As travel demand grows and the number and frequency of bus service into the LCS increases over time, the addition of commuter rail to provide line haul north-south service would enable LCS capacity to be used for routes that serve other markets. Additionally, the commuter rail service would directly connect with the planned Flex Bus service in Altamonte Springs and a number of new intermodal centers being planned along the Corridor by counties and municipalities.

The CRT Full Build Alternative provides the strongest system identity and highest capacity for connecting the existing and planned transit services in the region long-term.

4.3.7 Transit Impacts Summary

The CRT Full Build Alternative will have a strong positive impact on the quantity and quality of transit services provided within the study area compared to the No-Build and TSM Alternatives. Existing transit services in the study area are generally limited to fixed route bus services provided by LYNX and VOTRAN operating in mixed traffic. Travel demand in the Corridor is projected to grow significantly in the future. The No-Build and TSM transit network improvements, while adding some routes and increasing frequency, would continue to operate largely in mixed traffic that is severely congested today and expected to worsen in the future.

The CRT Full Build Alternative adds a high capacity, congestion-free passenger corridor roughly parallel with I-4 and SR 17/92, which for many trip origins and destinations, is also the shortest travel distance. This combination of exclusive ROW and direct routing, which is available only in the CRT Full Build Alternative, results in significantly reduced travel times and improved schedule reliability. The CRT Full Build provides a mix of transit services that best serve projected travel demand as evidenced by the highest systemwide transit patronage and mode share compared to the No-Build and TSM Alternatives.

4.4 Travel Demand Forecasting Model

Travel demand forecasting for the CRT EA was initiated using the version of model developed earlier and used by METROPLAN ORLANDO and FDOT for various travel forecasting purposes. The model was developed as part of the FSUTMS modeling system, promoted by FDOT, and used throughout the state. Data developed by METROPLAN ORLANDO reflecting their 2025 regional plan was used as the starting point for the analysis.

The model system covers the three counties making up the METROPLAN ORLANDO MPO, plus the entirety of Lake County, western Volusia County, and a small corner of Polk County. The model includes nearly 2,000 traffic analysis zones, ranging in size from a couple blocks in downtown Orlando to several square miles in the outer portions of the region. External stations are established at the boundary of the region and trip tables are developed for external-to-internal and external-to-external (through) trips.

Typical of other FSUTMS model systems, the Orlando models focus on three main trip purposes, home based work (HBW), home based other (HBO), and non-home based. However, because of the critical importance of tourism to the Orlando area, separate trip purposes were developed for trips to the main tourist centers (Disney, Sea World, and Universal Studios), plus additional special purposes for trips to Orlando Airport and to the Orange County Convention Center. Trips to these special attractions are divided between those originating from households in the Orlando area, those made by visitors to the area residing in hotels and other tourist facilities, and trips destined to these areas from outside Orlando.

The Orlando transportation model is designed to operate in the conventional manner of trip generation, trip distribution, modal choice, and assignment. The modal choice model used in the transportation model was developed in several steps over the years, and has been used in recent studies of light rail transit and other transit-related projects in the area. The model is based on the differences between automobile travel by auto occupancy group and by travel by transit, with both walk and auto access. Separate factors are included in the transit elements of the model to differentiate between in-vehicle and out-of-vehicle time, but not generally by sub-mode of transit service.

4.4.1 Modeling Modifications

During the CRT EA, a number of issues were raised with the Federal Transit Administration (FTA) concerning the best way to model transit behavior, particularly in cities (like Orlando) with little or no experience with developing fixed-guideway transit services. Additional research by FTA during this period also indicated that some of the practices including within the Florida State Urban Transportation Modeling System (FSUTMS) model system, may not have been adequate to measure the impact of transit system performance. Therefore, a number of modifications were made to the mode choice model and other associated portions of the modeling system. An extensive series of discussions were held with FTA to coordinate the development of improved modeling component Transit Demand, Patronage, and Mode Share

Regional model results for the CRT Full Build Alternative show that the walk mode of access/egress is strongest at the destination stations of Florida Hospital, LYNX Central Station, Church Street, and Orlando Amtrak/ORMC. Meadow Woods Station, with a large residential neighborhood nearby, also shows a strong walk access mode. The bus mode of access/egress is important at the suburban station locations, as well as at LYNX Central Station, where concentration of convenient local bus connections and the LYMMO downtown circulator are attractive to users. Suburban stations provide bus bays to handle the planned feeder bus routes. Local Park n' Ride and Kiss-and-Ride access/egress mode is expected to be strongest at the suburban stations where the planned parking and curbside areas will have capacity to handle the anticipated demand. The Full Build Alternative would increase systemwide transit demand, patronage, and mode share compared to the No-Build and TSM Alternatives.

Ridership growth on the LYNX and VOTRAN transit systems has been modest over the past several years, though recently increasing due to economic growth and increasing gas prices. The TSM Baseline Alternative would increase overall transit system boardings and passenger miles by 10.6% and 14.0%, respectively, compared to the No-Build Alternative. The increases are attributable to a combination of increased geographic area of service and increased frequency of service compared to the No-Build.

Full Build Alternative

The Full Build Alternative achieves the highest boardings and passenger miles compared to both the TSM Baseline and No-Build Alternatives. Linked transit trips are a good indicator of the mode shift achieved because it counts each trip only once in each direction regardless of whether transfers are involved. As shown in Table 4-9, the CRT Full Build Alternative would result in the largest gain in systemwide linked transit trips of any alternative.

Table 4-9: 2025 Daily Transit Trips (Linked Trips)

Alternative	Daily Transit Trips	Change from No-Build Alternative	Change from TSM Alternative
No-Build	102,900	-	-
TSM	113,500	10,600	-
Full Build	120,940	18,040	7,440
LPA	118,250	15,350	4,750

Table 4-10, shows total transit system boardings, which includes transfer boardings and compares them among the alternatives. The table also shows passenger miles in the Study Corridor. Growth in passenger miles is increasing at a rate faster than growth in overall ridership because average trip length is increasing. Table 4-10 shows the transit system boardings for the LPA, and CRT Full Build Alternatives. The increase in systemwide boardings in the region for the CRT Full Build Alternative ranges from 28,940 (+20.1%) for the CRT Full Build compared to the No-Build Alternative, and from 7,200 (+4.7%) for the LPA to 14,140 (+9.2%) for the CRT Full Build new riders compared to the TSM Alternative.

Table 4-10: 2025 Transit Ridership Statistics

	No-Build	Full TSM	LPA	Full Build
LYNX	120,960	135,160	134,230	135,310
I-Ride	13,330	13,330	13,320	13,320
LYMMO	3,990	4,080	3,880	3,760
CRT	0	0	8,310	13,760
VOTRAN	1,380	1,890	1,920	2,450
CRT Work	0	0	8,190	13,100
CRT Peak	0	0	2,048	3,275
Annual	0	0	2,110,740	3,495,040
Total	139,660	154,460	161,660	168,600
LYNX	645,050	741,040	707,200	699,350
I-Ride	45,580	45,850	45,870	45,870
LYMMO	2,810	2,880	2,710	2,610
CRT	0	0	113,670	181,950

	No-Build	Full TSM	LPA	Full Build
VOTRAN	5,730	7,080	7,630	10,460
Total	699,170	796,850	877,080	940,240
Annual	213,946,000	243,836,000	268,386,000	287,713,000

4.4.2 Analysis

The analysis of alternatives for the commuter rail project included several steps. First, a regional No-Build alternative was established, reflecting planned improvements to LYNX transit services included in their current transit development plan, but very limited further increases beyond that time point.

The second step was the development of a Transportation Systems Management (TSM) or baseline system reflecting what would be done in the commuter rail corridor if the system were not implemented. This system included some additional services outside the corridor, derived from an analysis of travel patterns requested the FTA. Within the commuter rail corridor, limited stop buses were developed to run along US 17/92 (primarily) with formal stations roughly in locations similar to those in the commuter rail system. This TSM was accepted by the FTA for this project.

The commuter rail system was initially defined as the "Full Build" system from DeLand to Poinciana, running at half-hour headways during the peak periods and two-hour headways during the base day. Later, a more aggressive service plan featuring 15-minute peak headways and hourly base day service was adopted to obtain maximum impacts as stated previously. Also, during the analysis, alternative station locations were identified, including an additional stop in downtown Orlando near Church Street and additional stations in the south corridor. In addition to these changes, further analysis was conducted for a locally preferred alternative (LPA) system that did not include the extension northward to DeLand and an "initial operating segment" (IOS). Travel forecasts were made for each of these options, and the results are shown in Table 4-10 Details on the travel demand forecasting methodology and results are contained in a separate technical report listed in the Appendix D.

4.5 Freight

Trucking and Freight Rail are the primary modes for existing freight movements in the Corridor. The impact of the project on freight transportation is summarized below. The St. Johns River is a navigable waterway at the north end of the Corridor. The Project's impact on Marine traffic is also reviewed.

4.5.1 Freight Rail

Freight Rail freight service in the Corridor is primarily along the CSXT A-line that begins in Jacksonville, Florida, passes through the Study Corridor roughly parallel to I-4 and ends in Auburndale, Florida, where it connects with the S-line. The 60.8 mile CRT Study segment has approximately 42 miles of single track and 18.5 miles of double track. Railway yards within the study area exist at Rand Yard in Sanford, Kaley Yard in Orlando, and Taft Yard, located south of Sand Lake Road in Orange County. Many commercial and industrial sidings exist throughout the study area. A major spur track intersects the A-

line in downtown Orlando. The spur line is owned by CSXT, but leased and operated by the Florida Central Railroad, which provides access to areas near Mount Dora in west Orange County. A second major spur line intersects the A-line south of Taft Yard. This spur line is owned and operated by Orlando Utilities Commission (OUC) and provides access to the OUC power plant located east of Orlando International Airport.

The concentration of freight rail traffic varies along the 60.8 mile Corridor by county, by day of the week and by time of day. Freight train operations on the line are a mixture of through and local freight trains. Many of the through freight trains are long "unit" trains regularly transporting more than 100 carloads per train while winding slowly through the Corridor. On average, there are approximately ten through freight trains every day. Delays observed at some crossings regularly result in gate down times of 4 minutes or more depending on the location. The local freight trains are typically shorter and are concentrated closer to the yards with the largest volume being approximately 10 trains per day operating over a 5 mile segment between Taft Yard and Kaley Yard in Orange County.

As stated in the preface of this report, in December 2004, CSXT officials presented to FDOT executives a Strategic Plan, which voluntarily proposed designating the A- line as primarily for passenger service, and the S-line for freight service. Thus, the CSXT proposal was to gradually shift the freight trains on the A-line over to the S-line, as capacity improvements are made to the S-line and as passenger use increases on the A-line from commuter rail and, in the future, intercity passenger rail.

In support of the Strategic Plan and the CRT Project, FDOT and the project sponsors have been negotiating freight traffic density and train operating patterns on the A-line with the CSXT. A fundamental component of these negotiations is a MOU that eliminates freight traffic during the proposed CRT service periods, consistent with the CSXT Strategic Plan.

The No-Build and TSM/Baseline Alternatives would not change the existing rail line infrastructure or add passenger service, and therefore, would have no impact on rail freight operations in the Corridor. The CRT Full Build Alternatives would add a new signal system and approximately 42 miles of second mainline track. These upgrades will result in a faster and safer operation through the Study Corridor for both passenger rail traffic and freight rail traffic. Only a short section in Maitland and the St John's River Bridge will not be double tracked. The LPA will add 25 new miles of double track.

The commuter rail passenger trains will be one, two and three unit DMU vehicle train sets with the ability to accelerate and decelerate like transit buses, but on the railway line. The amount of time each CRT train will occupy a grade crossing is extremely short (30 to 60 seconds) compared to a slow moving long unit type freight train. The preceding intersection analysis (Section 4.1.4) indicates adding commuter rail will slightly increase delay at and near three at-grade crossings due to gate down time in the peak hour time periods as previously discussed. It should be noted that the CSXT plan to direct through freight trains away from the A-line will represent a vast reduction in the amount of time a train would be blocking a crossing. The length of a single CSXT 100 car unit train equals 33 CRT (3-DMU consist) trains. Furthermore, there is a dramatic increase in traffic congestion that results from queuing due to a long slow train blocking the crossing for several minutes, verses the commuter rail train for 30 to 60 seconds.

4.5.2 Trucking

The 60.8 mile CRT A-line Corridor has 126 active at-grade crossings, nine arterial road bridges crossing over the A-line and one CSXT railway bridge over SR 17/92 in Maitland. Truck movements within this Corridor can generally be categorized as long-distance and local. Long distance truck traffic passing through Orlando either north-south or east-west typically utilizes I-4, the Florida Turnpike, or one of the other toll roads, including State Routes 408, 417, or 528, all of which are currently 100 percent grade separated from the proposed CRT commuter rail line. Local truck traffic and long-distance truck traffic that originates or terminates in the Corridor utilizes other arterial and collector roadways and as a result, may need to cross the A-line at-grade.

In the No-Build Alternative there are numerous roadway improvement projects that increase the capacity of the regional highway network and its ability to handle truck traffic, including the planned reconstruction of I-4.

The TSM Baseline Alternative would add new bus routes and increase service frequency of existing bus routes in the Study Corridor. On I-4 these buses would utilize planned HOV lanes and bus ramps and would have little impact on either the long-distance or local truck traffic that use I-4. On other arterial and collector roads in the Corridor, the additional bus service will slightly increase volume on certain streets compared to the No-Build, though the difference is unlikely to have any impact on local truck traffic.

During the CRT peak hour service period, the commuter rail CRT Full Build Alternative will increase intersection delay slightly near grade crossings compared to the No-Build and TSM/Baseline Alternatives. Outside of the CRT peak hour, the relocation of the long slow freight trains will reduce delay at these crossings and have a significant benefit to truck traffic.

The CRT Full Build Alternative would have no impact on long-distance through truck traffic because all major through routes are currently grade separated. Long-distance truck traffic that originates or terminates in the Corridor and local delivery truck traffic is potentially impacted during the CRT peak hour service. However, the measures presented previously in this section of the EA regarding intersection, grade crossing and roadways will mitigate the impact of the CRT Full Build Alternative on all truck traffic mentioned above.

4.5.3 Marine Transportation

At the north end of the Corridor, the St. Johns River forms the border between Seminole and Volusia Counties. The CSXT Railway A-line crosses the St. Johns River on a single track bridge at this location with moveable 113’ (bascule) span operated by a CSXT Railway Bridge Tender 24 hours a day. The bridge opens to an angle of 60 degrees maximum to the horizontal. The lateral clearance is 90’. The vertical clearance when the lift span is closed is approximately 7’- 8’ and when the span is open, to the maximum angle, it is 40’. The river is a very shallow (less 10’ deep) with a draft of approximately 14’ – 17’ measured in the navigation channel (January 2006).

Generally, this river is only a navigable waterway to flat bottom and small recreational boats. In the vicinity of the CRT Corridor, marine traffic is primarily small recreational boats that can usually cross under the bridge with the lift span closed. In addition, there is

a periodic dinner cruise boat originating at the Sanford Marina that does require the lift bridge to open for it to travel to points north. The recreational boat traffic is heaviest on the weekends. The only barge traffic near the CSXT A-line lift bridge services the existing Florida Power and Light generating plant located on the north shore of the river adjacent to the west side of the A-line. It does not travel east of the A-line.

Figure 4-11 Existing CSXT Lift Bridge at St. Johns River

The number of times the lift span is opened varies each day. During the week in the morning, the span is rarely required to be opened for marine traffic. In the late afternoon, recreational boat activity levels are higher. Weekday marine traffic requiring the lift span to be opened in the proposed peak operating windows (6:00 a.m. to 9:00 a.m. and 3:00 p.m. to 6:00 p.m.) was observed to be 0 and 5 recreational boats respectively (January 2006). The entire day was estimated to have 10 cycles of the bridge span lifting. Water level fluctuations due to heavy rainfall can influence the clearance available and result in more lift span cycles being required.

The No-Build and TSM/Baseline Alternatives only provide bus service in the Corridor and would utilize existing roadway bridges across the St. Johns River.

The CRT Full Build Alternative would utilize the existing rail bridge across the St. Johns River for commuter rail operations. The CRT service would operate frequently during weekdays in the morning and afternoon peak commuting periods. The CRT commuter trains are shorter (1, 2 or 3 cars) than Amtrak passenger trains (10 cars) and would travel at speeds equivalent or faster than the Amtrak trains. Because marine traffic on the St. John's River at this location is recreational and relatively light during the weekdays, CRT commuter operations will not be delayed due to marine traffic.

4.6 Summary

As described in the above sections, the CRT Full Build Alternative provides substantial transportation benefits and better addresses the purpose and need for the Project as identified in Chapter 1 than does either the No-Build or TSM Baseline Alternative. The CRT Full Build Alternative provides these substantial transportation benefits with no significant adverse transportation impacts. The CRT Full Build Alternative addresses the Project goals and objectives related to transportation, in particular, the mobility goal and its objectives to maximize transit ridership, maximize transit reliability, minimize travel time, and integrate with regional transit service.

No study intersections will deteriorate to deficient conditions as a result of the CRT Full Build. The CRT will not increase traffic delay for the vast majority of at-grade crossings throughout the Study Corridor. A total of six study intersections and three grade crossings located adjacent to stations may experience increased vehicle delay as a result of additional project gate down times. The delay at these locations can be mitigated by implementing measures to improve operations, such as additional turn lanes at intersections and railroad and traffic signal optimization at grade crossings.

The parking supply identified for the Project would be adequate to accommodate parking demand and the limited locations with potential parking impacts are fully mitigated in the CRT Full Build Alternative.

The CRT Full Build Alternative has no adverse impact on other existing and planned transit service. A limited number of existing bus routes will be slightly modified to serve the new stations. No new buses will be added in comparison to the No-Build. Fewer than 4 buses per hour will be added to the streets adjacent to the stations. Amtrak trains run in the off peak and will be scheduled between the CRT operations. The CRT Full Build Alternative would attract substantial new transit ridership and in so doing reduces regional Vehicle Miles Traveled. By operating within an established active rail line with its own right-of-way, the commuter rail service will provide a highly reliable transit service free of the roadway congestion encountered by transit modes that share roadways with general traffic.

The CRT Full Build Alternative has no significant impacts on other freight transportation modes operating in the study area. The infrastructure improvements and operating plan of the Full Build Alternative has been fully coordinated with CSXT, which currently operates freight rail service in the Corridor. A MOU with CSXT addresses and confirms that there will be no adverse impact on freight rail transportation in the Corridor. As described in the section above, the Full Build Alternative will have no adverse impact on truck or marine traffic.