

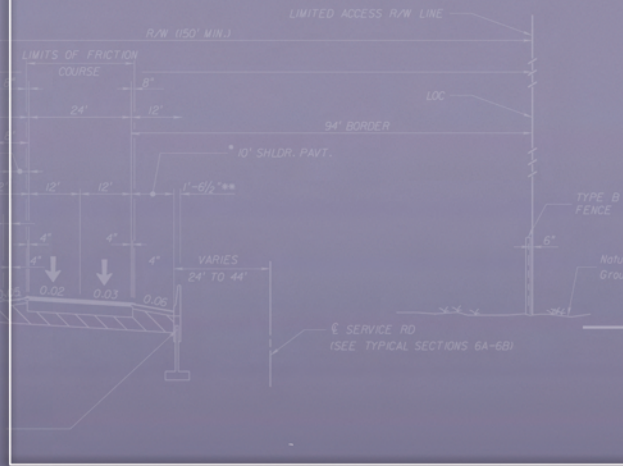
DESIGN TRAFFIC
TECHNICAL MEMORANDUM

FLORIDA DEPARTMENT
OF TRANSPORTATION

District 5

Financial Project IDs: 240200-2

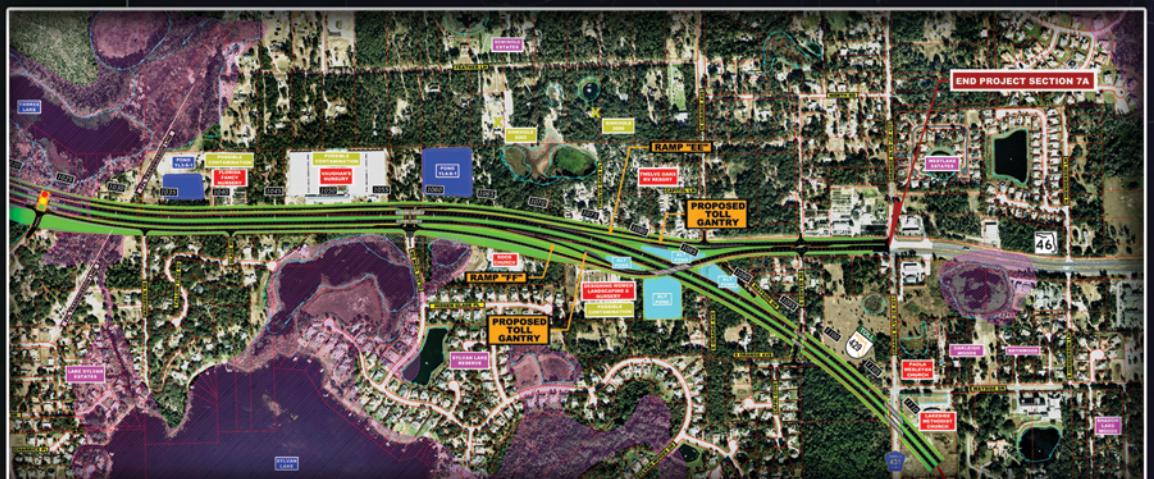
Roadway ID: 77320000



Final

SR429/SR46

WEKIVA PARKWAY SECTION 7A



September 2013

CERTIFICATION

BY

FLORIDA DEPARTMENT OF TRANSPORTATION - DISTRICT FIVE

Financial Project ID: 240200-2

“I have reviewed the Traffic Forecasting Procedure adopted by the Florida Department of Transportation and have arrived at the projected design traffic volumes. I have found these to be consistent with the historical data and other available information.”

Terry Rains

Project Manager – Design Traffic
Florida Department of Transportation

Date

CERTIFICATION

BY

GMB ENGINEERS & PLANNERS, INC.

Financial Project ID: 240200-2

I, Jorge E. Tolosa, Florida P.E. Number 67397, have prepared and reviewed the Design Traffic for the above referenced Florida Department of Transportation project. I have specifically followed the "Design Traffic Procedure" as adopted by the Florida Department of Transportation. Based on traffic count information, general data sources, and other pertinent information, the Design Traffic has been prepared using current traffic engineering, transportation planning, and Florida Department of Transportation practices and procedures.



Final

SR 429/SR 46 (Wekiva Parkway – Section 7A) Design Traffic Technical Memorandum

For 429/SR 46 (Wekiva Parkway – Section 7A) Final
Engineering Design Study
From East of Wekiva River Road to Orange Boulevard
Seminole County, FL.

Financial Project ID: 240200-2

Roadway ID: 77320000

Prepared by:

GMB Engineers & Planners, Inc.

Orlando, Florida

Prepared for:

Florida Department of Transportation

District Five - Deland



September 2013

Executive Summary

The Florida Department of Transportation (FDOT) District Five is conducting a Final Engineering Design Study to evaluate the future capacity for the new roadway construction of the SR 429/SR 46 (Wekiva Parkway – Section 7A / Roadway ID: 77320000) from east of Wekiva River Road to Orange Boulevard in Seminole County, Florida. GMB's role is to perform the Design Traffic Analysis to determine the impacts and assess the need for future capacity improvements on the SR 429/SR 46 New Roadway Corridor.

The traffic data that was collected for the year 2013 and existing conditions were evaluated to determine arterial and intersection levels of service (a.m. and p.m. peak hours) for the year 2013. During the year 2013 a.m. and p.m. peak hour conditions, the following intersections along the project corridor were found to operate at a LOS worse than their adopted LOS standard:

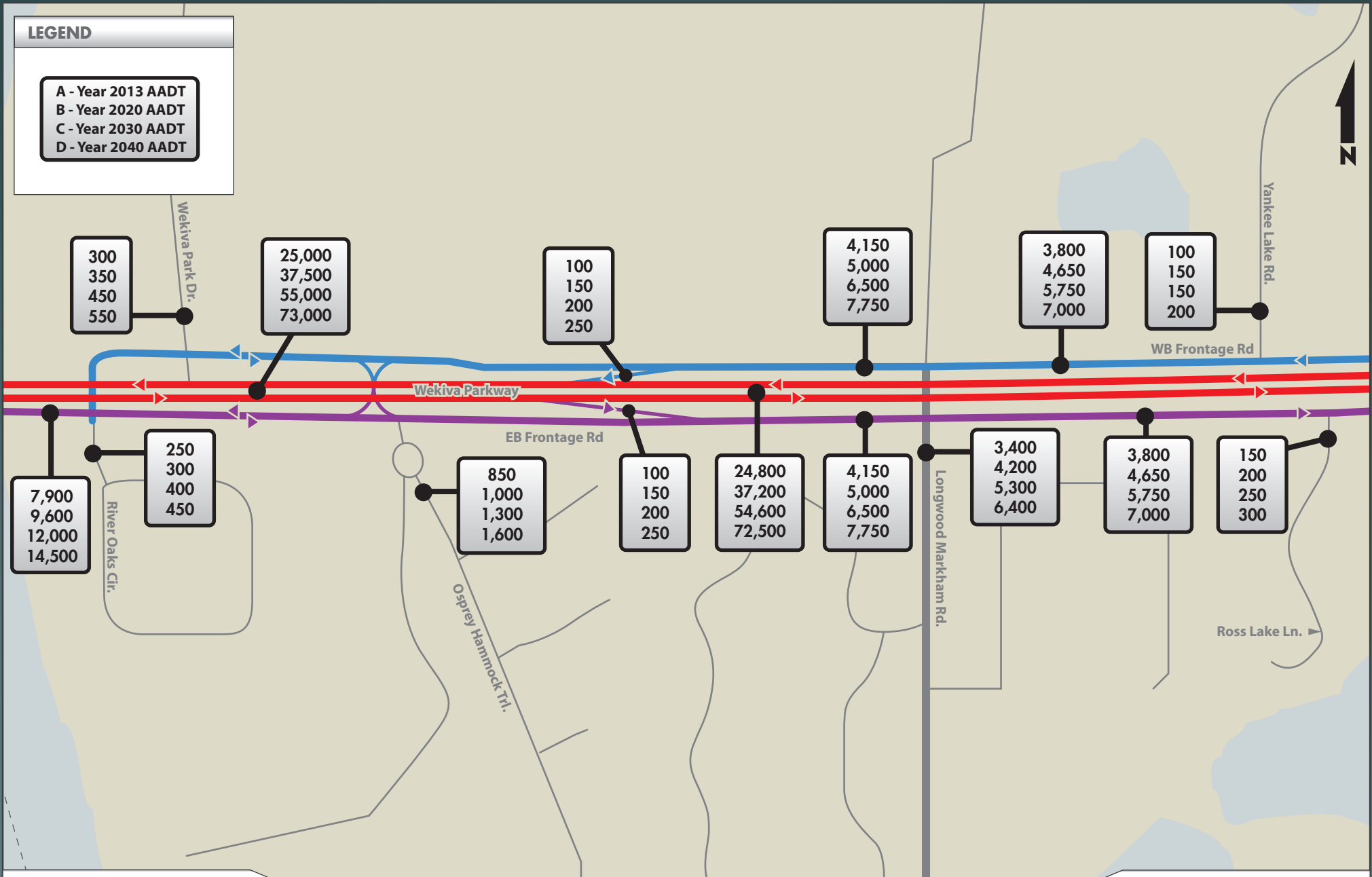
- SR 46 at Wekiva Park Drive (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Yankee Lake Road (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Bella Foresta Place (stop controlled - during the a.m. peak hour)
- SR 46 at Glade View Road (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Twelve Oaks Place (stop controlled - during the p.m. peak hour)
- SR 46 at Orange Avenue (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Wayside Drive (stop controlled - during the p.m. peak hour)
- SR 46 at Center Road (stop controlled - during the p.m. peak hour)

In addition, SR 46 corridor from east of Wekiva River Road to Orange Boulevard currently operates under unacceptable level of service conditions during the existing a.m. peak and p.m. peak hour conditions.

Based on the comparison of the methodologies examined, we recommend the use of the year 2040 future traffic projections obtained from the CFRPM model for the development of future traffic forecasts along the SR 429 (Wekiva Parkway) corridor, Frontage Road, and Orange Boulevard for the Build Alternative. In addition, we recommend the use of the historical annual growth rate of 3.3% to develop the future traffic forecasts along all the other side streets for the Build Alternative. The projected Annual Average Daily Traffic (AADT) volumes for the opening year 2020, mid-design year 2030, and design year 2040 for the Build Alternative are illustrated in Figure **ES-1A**, **ES-1B**, and **ES-1C**.

LEGEND

- A - Year 2013 AADT
- B - Year 2020 AADT
- C - Year 2030 AADT
- D - Year 2040 AADT



DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

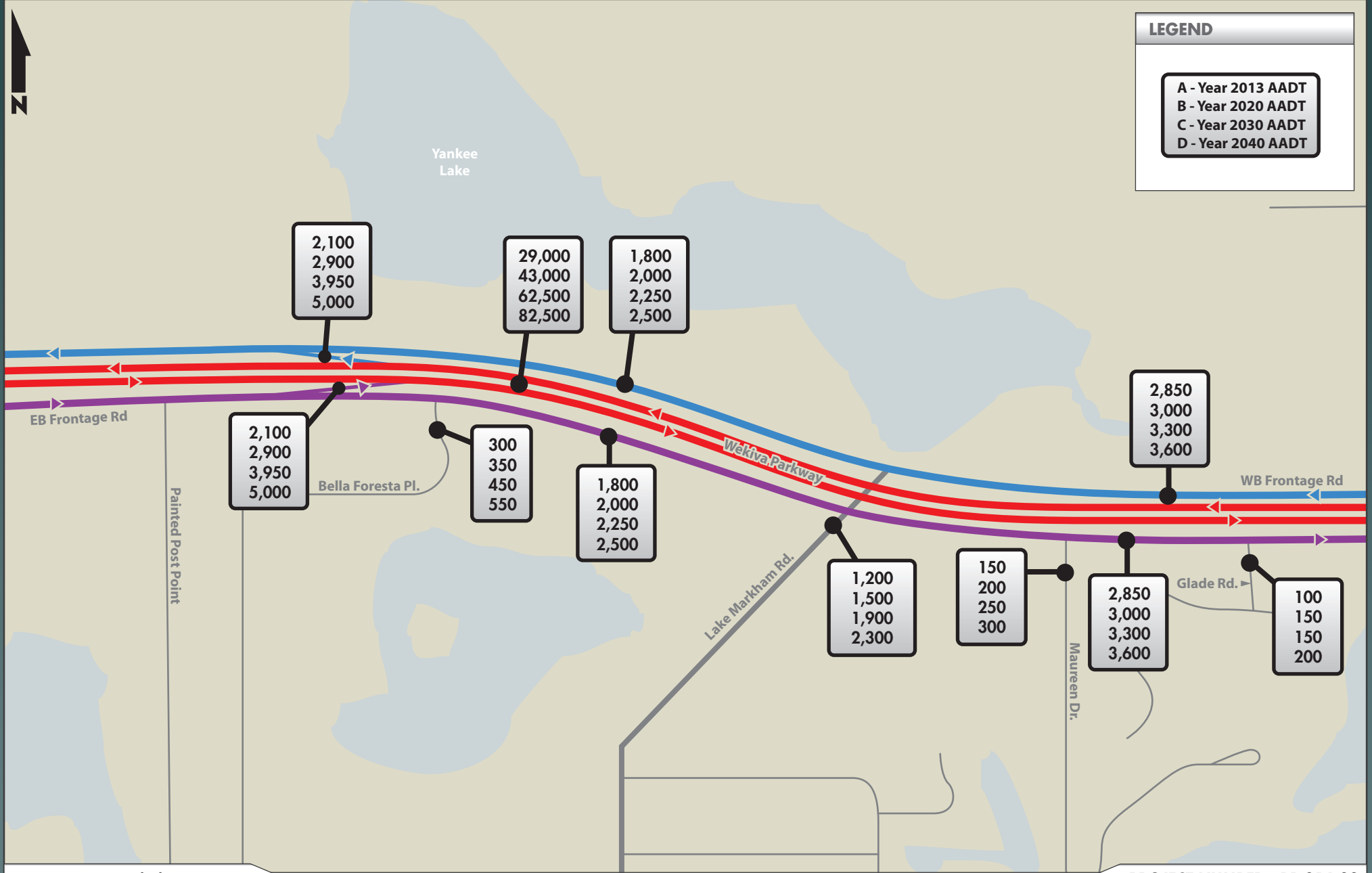
FIGURE ES-1A

Future AADT Volumes - Build Alternative



LEGEND

- A - Year 2013 AADT
- B - Year 2020 AADT
- C - Year 2030 AADT
- D - Year 2040 AADT



DATE CREATED: 8/7/2013

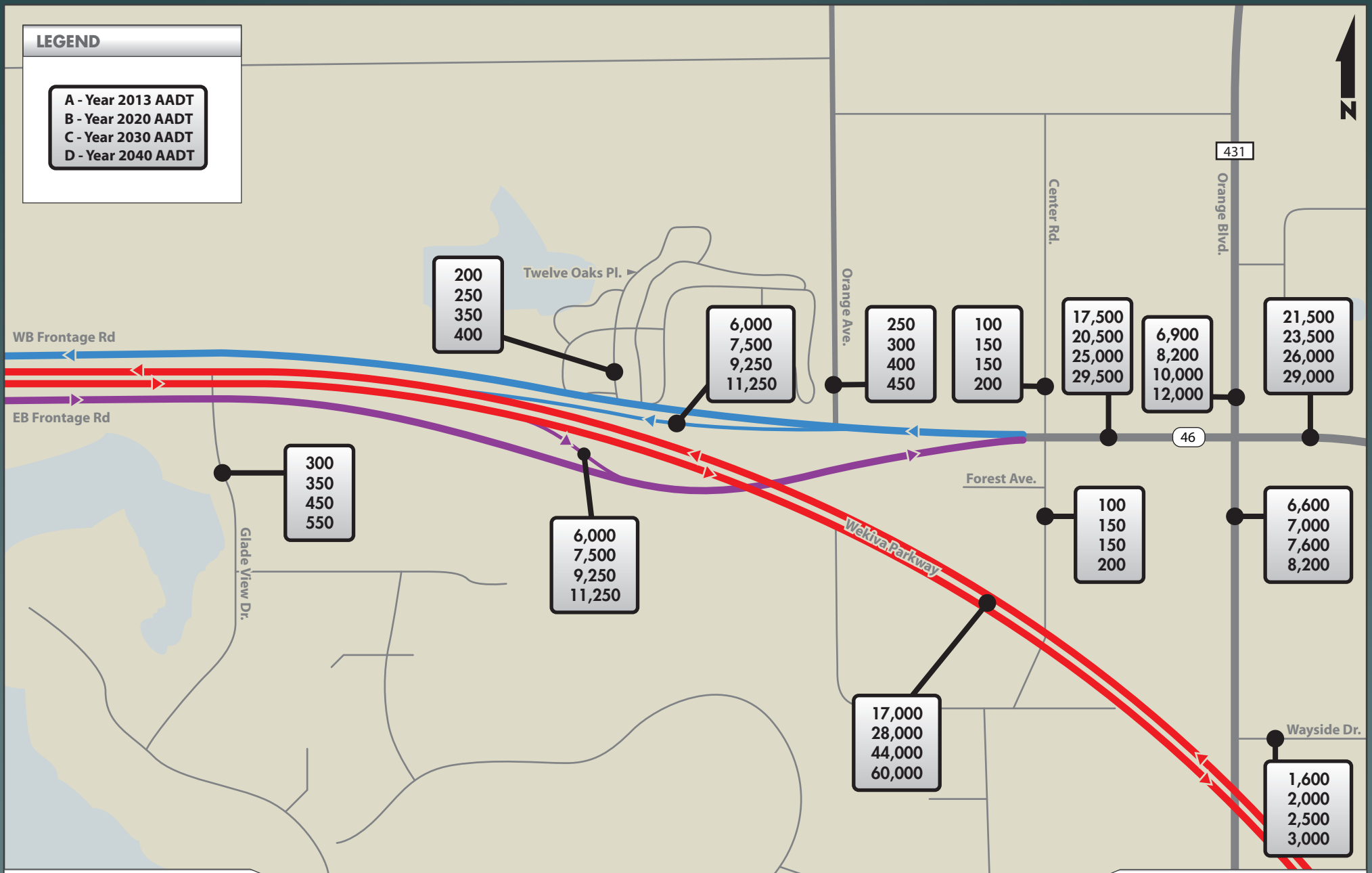
PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE ES-1B
 Future AADT Volumes - Build Alternative

LEGEND

- A - Year 2013 AADT
- B - Year 2020 AADT
- C - Year 2030 AADT
- D - Year 2040 AADT



DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

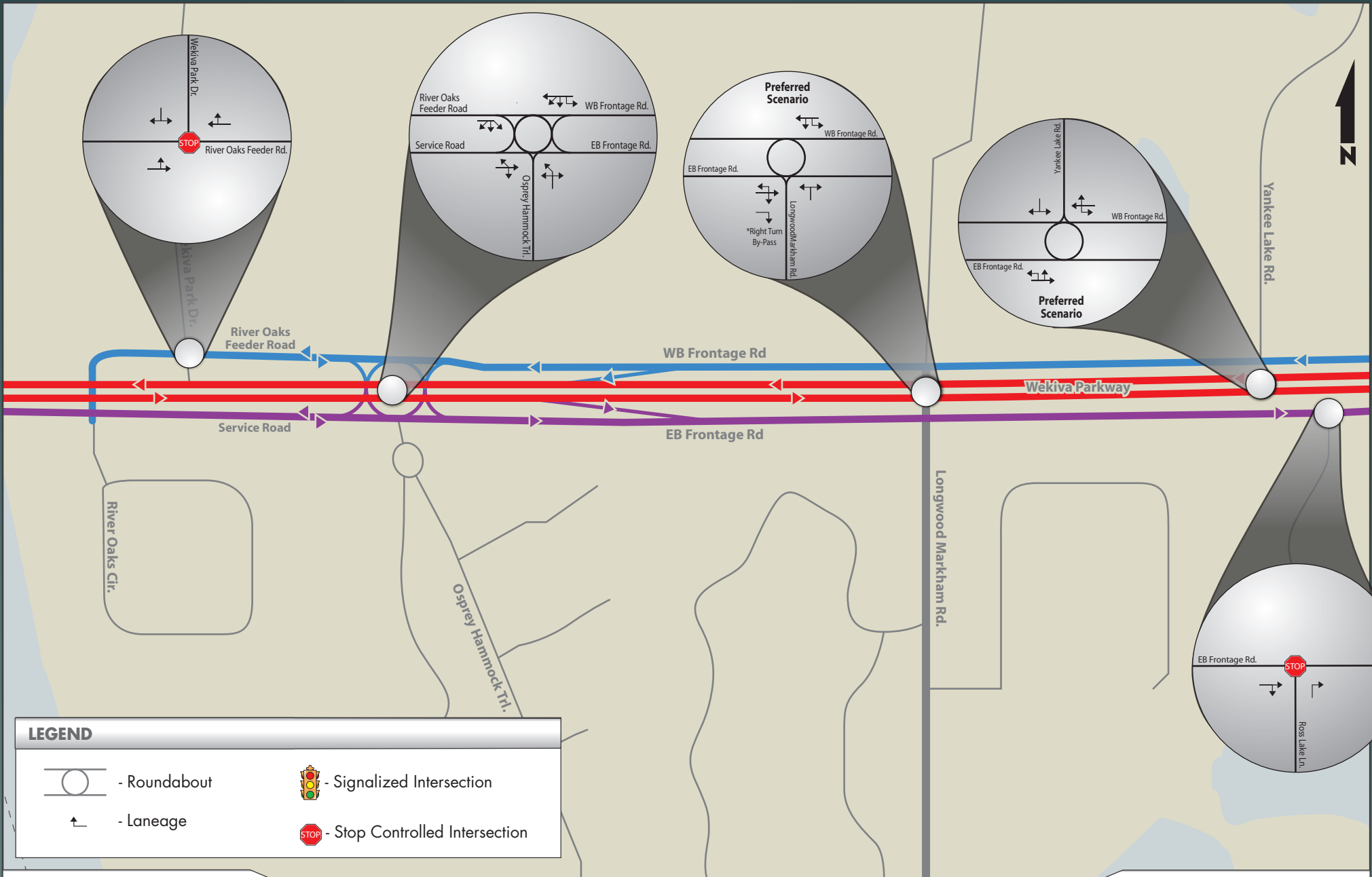
FIGURE ES-1C

Future AADT Volumes - Build Alternative

The proposed Build Alternative geometry for the SR 429 (Wekiva parkway) includes the construction of a new four (4) lane divided limited access toll road facility generally following the existing SR 46 alignment. The project will also include designing a two (2)-lane non-tolled, Frontage Road for local travel, slip ramps to enter and exit the Wekiva Parkway, and several bridges over side streets.

Per the request of FDOT staff and the design team, the Frontage Road was analyzed under two (2) scenarios. For the first scenario, the Frontage Road was analyzed as a two (2)-lane road (one lane on each direction) with roundabouts at the intersections of Osprey Hammock Trail, Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road. The second scenario was similar to the first scenario. However, for this second scenario, the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road were analyzed as “T intersections” with two (2) through lanes along the eastbound and westbound approaches of the intersections (four lanes total along the Frontage Road through the intersections).

Based on the analysis for the two (2) scenarios, it was concluded that the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road are anticipated to generate similar delays under both the Build Alternative Scenarios through the design year 2040. However, based on safety, maintenance, and design considerations, we recommend Scenario 1 as the preferred scenario for the SR 429/SR 46 (Wekiva Parkway – Section 7A) Build Alternative. The recommended Build Alternative Geometry for the corridor can be seen in Figure **ES-2A**, **ES-2B**, and **ES-2C**.



LEGEND

 - Roundabout	 - Signalized Intersection
 - Laneage	 - Stop Controlled Intersection

DATE CREATED: 9/9/2013

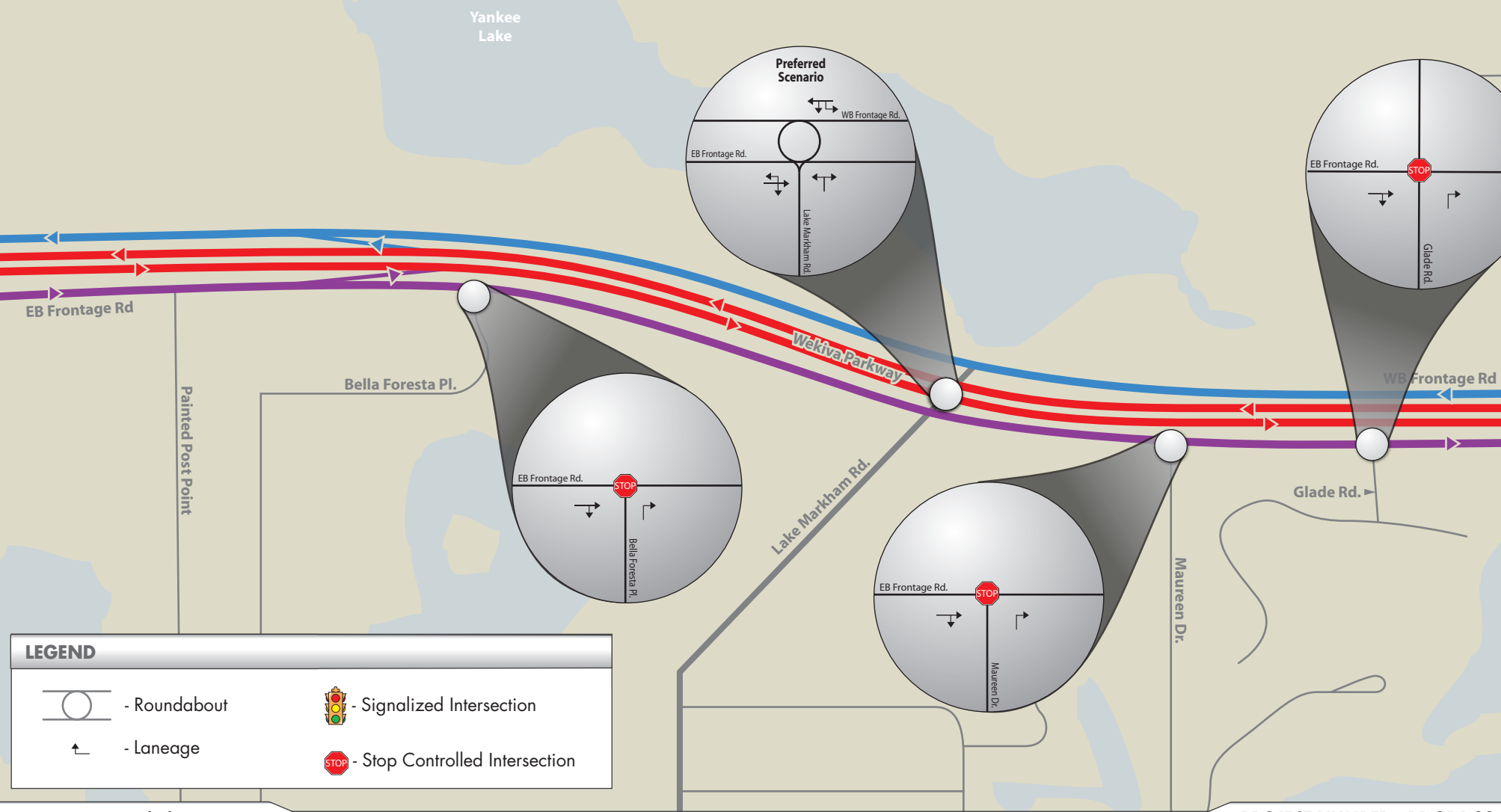
PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)





Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE ES-2A

Build Geometry



LEGEND

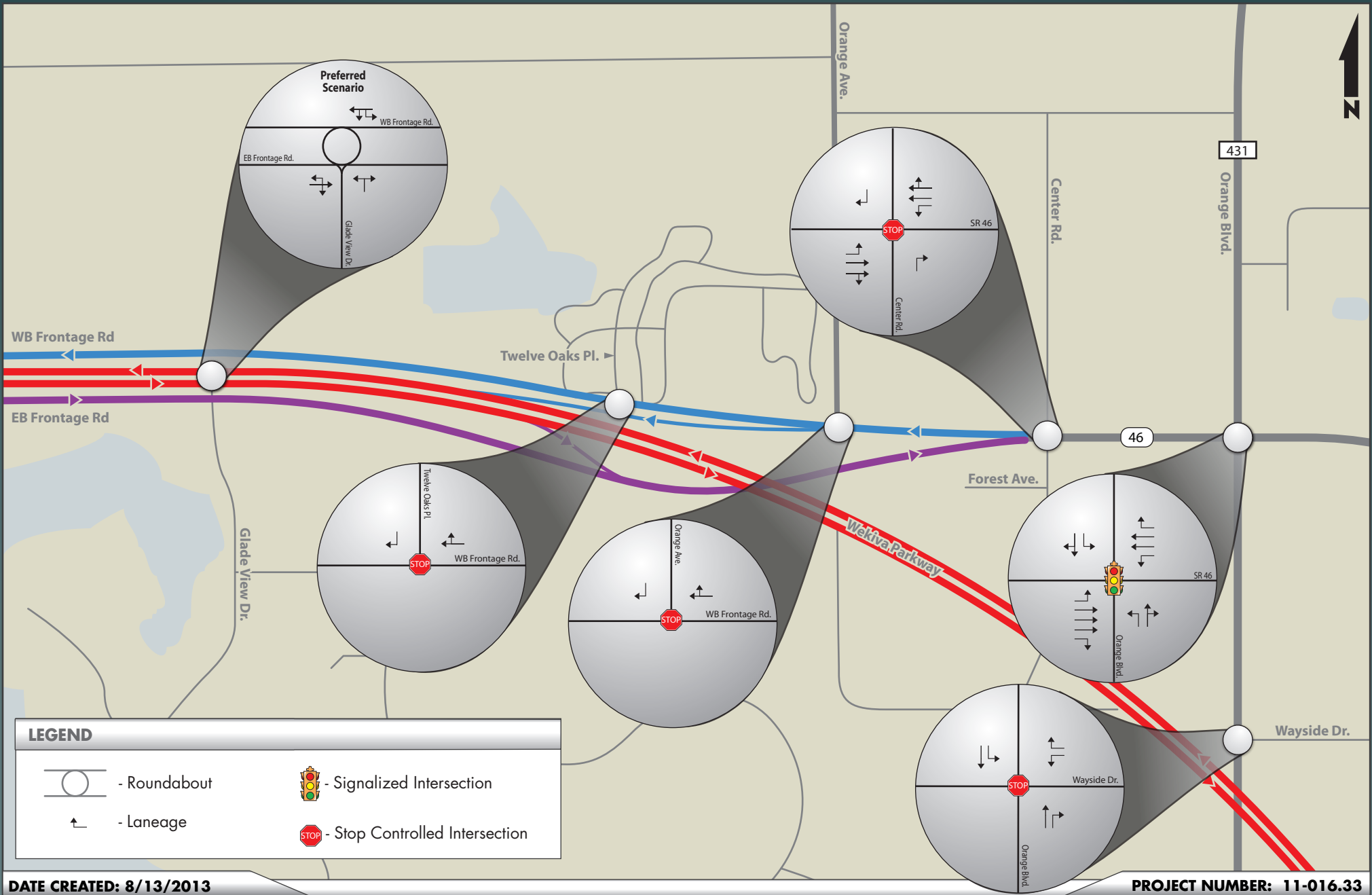
 - Roundabout	 - Signalized Intersection
 - Laneage	 - Stop Controlled Intersection

DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE ES-2B
 Build Geometry



LEGEND

 - Roundabout	 - Signalized Intersection
 - Laneage	 - Stop Controlled Intersection

DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE ES-2C
 Build Geometry

Based on the HCS ramp merge/diverge analyses the following acceleration/deceleration lane lengths are recommended for the ramps along the SR 429 (Wekiva Parkway – Section 7A) corridor:

- EB Off Slip Ramp – Deceleration Lane Length of 590 feet
- WB On Slip Ramp – Acceleration Lane Length of 590 feet
- EB On Slip Ramp – Acceleration Lane Length of 1,000 feet
- WB Off Slip Ramp – Deceleration Lane Length of 1,000 feet
- EB Off Ramp "FF" – Deceleration Lane Length of 1,000 feet
- WB On Ramp "EE" – Acceleration Lane Length of 1,000 feet

Under the Build Alternative, all the SR 429 (Wekiva Parkway) freeway segments are projected to operate at an acceptable LOS during the opening year 2020, mid-design year 2030, and design year 2040 traffic conditions, with the exception of the freeway segment of SR 429 from the EB On/WB Off Slip Ramps to the EB Off "FF"/WB On "EE" Ramps, which is anticipated to operate at an adverse LOS E during the design year 2040 peak hour/peak direction conditions. It is important to note that this freeway segment is anticipated to operate at an unacceptable LOS only beyond the year 2037.

The SR 429/Wekiva Parkway Section 7A is being designed as a six (6) lane limited access tolled expressway but will only be built initially as a four (4) lane limited access tolled expressway. In addition, based on the FDOT Five Year Work Program FY 2014/2018, funding for the acquisition of Right of Way for a six (6) lane cross-section expressway is programmed in FY 2015/2016. Therefore, it is recommended that a traffic reevaluation be performed by the year 2036 to determine if this section of the Wekiva Parkway needs to be built as a six (6) lane limited access tolled expressway.

In addition to the above-mentioned improvements, this study used the red time formula (source: ITE Traffic Engineering Manual, 5th Edition) to develop the queue length requirements at signalized intersection of SR 46 at Orange Boulevard for the Build Alternative. The recommended queue lengths for the turn lanes are shown in **Table ES-1**.

Table ES-1: Recommended Queue Lengths of Turn Lanes for Signalized Intersections – Year 2040 Build Alternative

Turning Movement	Number of Turn Lanes	Calc'd Queue Length (ft)	Rec'd Queue Length (ft)
INTERSECTION: SR 46 and Orange Boulevard			
EB Left	1	232	250
EB Right	1	110	125
WB Left	1	140	150
WB Right	1	226	250
NB Left	1	163	175
SB Left	1	182	200

Note:

1. Queue Lengths are calculated based on the following formula: $L = (A) (DHV) (1-G/C) (T+1) (F) / (3600/C) / (N)$ where:

L = Queue length

DHV = design hour volume, in vph

G/C = ratio of green time to cycle length

T = percent of heavy vehicles

F = adjustment factor (1.25 to 2)

C = cycle length

N = # of lanes

A = Assumed 25 feet for automobile

2. Recommended queue lengths are shown in yellow shade and bold letters.

3. A minimum queue length of 100 feet is assumed as the recommended length for calculated lengths of less than 100 feet.

Furthermore, the queue length requirements for the dedicated turn lanes at the unsignalized intersections of SR 46 at Center Road and Orange Boulevard at Wayside Drive were developed based on the 95th percentile queue length obtained from the HCM 2000 intersection analysis and can be found in **Table ES-2**.

Table ES-2: Recommended Queue Lengths of Turn Lanes for Unsignalized Intersections – Year 2040 Build Alternative

Intersection	Turning Movement	Rec'd Queue Length (ft)
SR 46 & Center Road	WB Left	100
	EB Left	100
Wayside Drive & Orange Boulevard	NB Right	100
	SB Left	100

Notes:

1. Recommended queue lengths were obtained from the 95th Percentile Queue (ft) obtained using the HCM 2000 Methodology

2. A minimum queue length of 100 feet is assumed as the recommended length for calculated lengths of less than 100 feet.

3. Recommended queue lengths are shown in yellow shade and bold letters.

It should be noted that the specific lengths do not include the taper or deceleration distance (refer to FDOT index 301 to determine the appropriate specific taper and deceleration length). These storage lengths are recommended at locations where these lengths can be achieved. Actual design and implementation of these storage length requirements will be a function of design and the physical practicality of their construction.

FINAL

SR 429/SR 46 (Wekiva Parkway – Section 7A) Design Traffic Technical Memorandum

This Design Traffic Technical Memorandum is prepared in support of the New Roadway Construction Project of SR 429/SR 46 (Wekiva Parkway – Section 7A) from East of River Oaks Circle to Orange Boulevard. This technical memorandum includes the development of existing traffic volumes, evaluation of existing operating conditions, and development of design traffic characteristics. In addition, this final technical memorandum entails the development of future traffic forecasts for one (1) Build Alternative and evaluation of the characteristics and operating conditions of the corridor during the service life of the proposed roadway project.

**Financial Project ID: 240200-2
Roadway ID: 77320000**

Prepared by:

**▶ GMB Engineers & Planners, Inc.
2602 E Livingston St, Orlando, Florida**

Prepared for:

▶ FDOT District 5

▶ 9/27/2013

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1 Introduction

The Florida Department of Transportation (FDOT) District Five is conducting a Final Engineering Design Study to evaluate the future capacity for the new roadway construction of the SR 429/SR 46 (Wekiva Parkway – Section 7A / Roadway ID: 77320000) from east of Wekiva River Road to Orange Boulevard in Seminole County, Florida. GMB's role is to perform the Design Traffic Analysis to determine the impacts and assess the need for future capacity improvements on the SR 429/SR 46 New Roadway Corridor. The Design Traffic Process for this study is divided in two phases. They are:

- **Phase I** – This phase of the study entails the development of existing design traffic volumes, design characteristics, and evaluation of existing operating conditions. In addition, this Phase of the study entails the development of future traffic forecast for the Build Alternative
- **Phase II** – This phase of the study includes an evaluation of the characteristics and operating conditions of the corridor during the service life of the proposed roadway project.

The current document is prepared in support of both Phases of the Design Traffic Analysis.

1.1 Description of Project

The existing SR 46 corridor is primarily an east/west facility from east of Wekiva River Road to Orange Boulevard in Seminole County, Florida. The segment of SR 46 to be studied in Seminole County (Roadway ID: 77030000 from M.P. 0.072 to M.P. 3.475) is a two lane undivided urban other principal arterial.

The New Roadway Construction Project of the SR 429/SR 46 (Wekiva Parkway – Section 7A) will generally follow the existing SR 46 alignment and is expected to be a four (4) lane divided limited access toll road facility. The project will include designing non-tolled, service/frontage roads for local travel, slip ramps to enter and exit the Wekiva Parkway, and several bridges over side streets. The conceptual “line and grade” design for the project can be found in **Appendix A**.

Per the request of FDOT staff and the design team, the Frontage Road was analyzed under two (2) scenarios. For the first scenario, the Frontage Road was analyzed as a two (2)-lane road (one lane on each direction) with roundabouts at the intersections of Osprey Hammock Trail, Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road. The second scenario was similar to the first scenario. However, for this second scenario, the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road were analyzed as “T

intersections” with two (2) through lanes along the eastbound and westbound approaches of the intersections (four lanes total along the Frontage Road through the intersections).

It is to be noted that the construction of the new six-lane limited access tolled SR 429/SR 46 (Wekiva Parkway – Section 7A) is included as a planned cost feasible improvement in the MetroPlan Orlando 2030 Long Range Transportation Plan (LRTP). Based on conversations with FDOT staff, this segment of SR 429 (Wekiva Parkway) is being designed as a six (6) lane limited access tolled expressway but will only be built initially as a four (4) lane limited access tolled expressway. In addition, construction funding for this new roadway project is programmed for FY 2018 (Financial ID # 240200-2). **Figure 1** shows the project location map including the new alignment for the SR 429/SR 46 (Wekiva Parkway) and its service road.

1.2 Objective

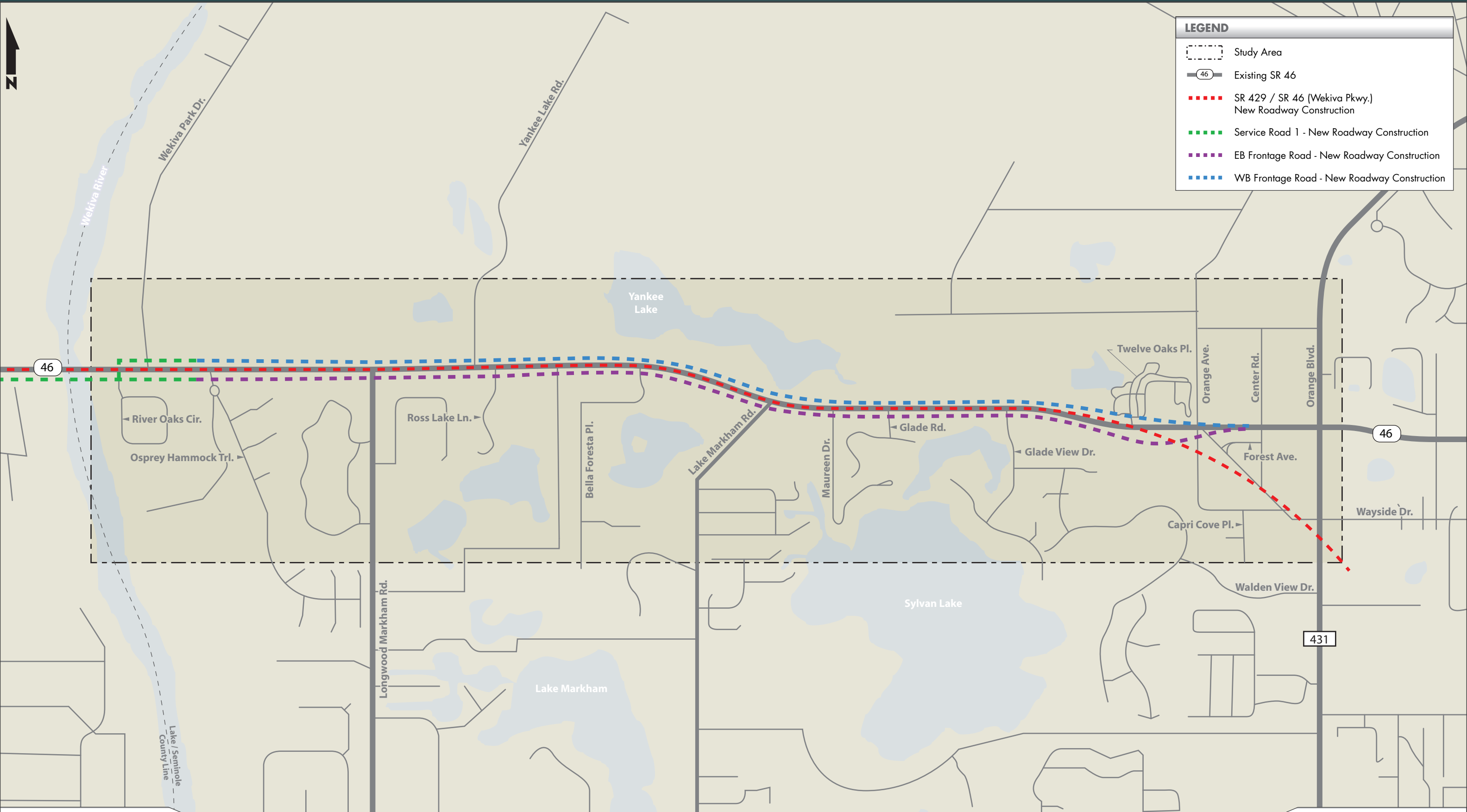
The objective of this Technical Memorandum is to provide the FDOT District Five with the annual average daily traffic (AADT), Peak Hour Volumes (PHV), intersection, and roadway Levels of Service (LOS) for the base year 2013. This report also involves the development of the design traffic characteristics including Standard K factor, Design Hour Directional Demand (D), and percentage of trucks for both the design hour and daily demand (T_f , T_{24}) that will be used in obtaining the future traffic volumes and future operational analysis. In addition, this report includes the development of AADT forecasts for the opening year 2020, mid-design year 2030 and design year 2040 for one (1) Build Alternative.

1.3 Methodology

The methodology used for the development of this report includes:

- Collect available traffic count information from the FDOT's and County's historical traffic count records and from actual field count data. Review previous studies, traffic characteristics and other relevant data for the study corridor.
- Based on the data collected, use the year 2013 peak hour turning movement counts for performing intersection LOS analyses for the project corridor.
- Evaluate the existing traffic volumes based on capacity to determine if the roadway is currently operating under constrained or unconstrained conditions.
- Based on the data collection process, estimate the travel roadway characteristics of the corridor. These characteristics include Standard K factor, Directional factor (D), Daily Truck factor (T_{24}), and Peak Truck factor (T_f).

- Develop future year traffic volume forecasts for the corridor based on trends analysis of historical traffic counts, and/or travel demand models Florida Standard Urban Transportation Model Structure (FSUTMS), previous studies, and Bureau of Economic & Business Research (BEBR) population projections.
- Develop the design hour turning movement volumes for the opening year, mid-design year, and design year for the Build alternative by applying the design characteristics including Standard K and D to the future year AADTs using TURNS5 program.
- Provide LOS analysis for the intersections, ramps, and roadway segments along the study corridor for the Build alternative for the opening, mid-design and design year design hour conditions.
- Based on the level of service analysis, provide recommendations for improvements to accommodate the anticipated travel demand.
- Provide 18 KIP Equivalent Single Axle Load (ESAL) analysis for the study corridor.



DATE CREATED: 7/24/13

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 1
 Project Location

2 Project Information

2.1 Project Location, Limits and Field Inventory

Within the project limits, SR 46 is an east/west, two-lane urban other principal arterial serving both local and regional traffic. In addition, SR 46 is a major evacuation route that extends from Lake County to northern Brevard County. The existing roadway characteristics that are relevant to this study are shown in **Table 1**. Straight Line Diagrams (SLDs) and the relevant Roadway Characteristics Inventory data (RCI) for the SR 46 corridor are provided in **Appendix B** of this report.

Table 1: Roadway Characteristics of SR 46 Corridor

Characteristic	Observation
Limits	77030000 – East of Wekiva River Road (M.P. 0.072) to Orange Boulevard (M.P. 3.475)
Location	Unincorporated Seminole County (Road ID: 77320000 M.P. 0.072 to M.P. 3.475)
FDOT Roadway ID	77030000
Roadway Maintaining Agency	77030000 (M.P. 0.072 to M.P. 3.475): FDOT
Functional Classification	Two Lane Undivided Urban Other Principal Arterial (M.P. 0.072 to M.P. 3.475)
Speed Limits	77030000 (M.P. 0.072 to M.P. 3.475): 55 MPH
Adopted LOS Standard	<ul style="list-style-type: none"> ▪ FDOT: 77030000 (M.P. 0.072 to M.P. 3.475): LOS D ▪ Seminole County: 77030000 (M.P. 0.072 to M.P. 3.475): LOS E
Study Intersections from West to East	<p>SR 46 @</p> <ul style="list-style-type: none"> ▪ River Oaks Circle (M.P. 0.166) – Stop Controlled ▪ Wekiva Park Drive (M.P. 0.239) – Stop Controlled ▪ Osprey Hammock Trail (M.P. 0.414) – Stop Controlled ▪ Longwood Markham Road (M.P. 0.863) – Signalized ▪ Yankee Lake Road (M.P. 1.137) – Stop Controlled ▪ Ross Lake Lane (M.P. 1.196) – Stop Controlled ▪ Bella Foresta Place (M.P. 1.595) – Stop Controlled ▪ Lake Markham Road (M.P. 1.958) – Stop Controlled ▪ Maureen Drive (M.P. 2.138) – Stop Controlled ▪ Glade Road (M.P. 2.288) – Stop Controlled ▪ Glade View Drive (M.P. 2.616) – Stop Controlled ▪ Twelve Oaks Place (M.P. 2.964) – Stop Controlled ▪ Orange Avenue (M.P. 3.144) – Stop Controlled ▪ Wayside Drive (M.P. 3.156) – Stop Controlled ▪ Center Road (M.P. 3.314) – Stop Controlled ▪ Orange Boulevard (M.P. 3.475) – Signalized <p>Orange Boulevard @</p> <ul style="list-style-type: none"> ▪ Wayside Drive – Stop Controlled
Land Uses	Predominantly vacant and residential land uses north and south of the SR 46 corridor.
Pavement Width	12 foot wide travel lanes.
Sidewalks	<ul style="list-style-type: none"> ▪ 77030000 (M.P. 0.072 to M.P. 0.347): None ▪ 77030000 (M.P. 0.347 to M.P. 0.592): 5 foot sidewalks on the south side ▪ 77030000 (M.P. 0.592 to M.P. 3.475): None
Parallel Parking	None
Shared Use Path and Bike Lanes	77030000 (M.P. 0.072 to M.P. 3.475): undesignated bike lanes along both eastbound and westbound directions
Access Class	77030000 (M.P. 0.072 to M.P. 3.475): Access Management Class 3
Transit	There are no existing transit services along the study corridor

3 Existing Conditions

This section describes the analysis of traffic flow operating conditions for the base year 2013 at the major intersections and roadway segments along the project corridor.

In analyzing the year 2013 operating conditions of the intersections and roadway segments, traffic counts collected from the field during April through July of 2013 were used along with the existing roadway and intersection geometries. The balanced turning movement volumes collected in the field were used for the year 2013 level of service (LOS) analysis for the intersections and roadway segments.

The year 2013 conditions LOS analysis for the intersections of SR 46 at Longwood Markham Road and SR 46 at Orange Boulevard was performed using the signal timing data provided by Seminole County. The existing conditions intersection analysis was performed using the Synchro Software (version 7.0). In addition, the existing conditions arterial LOS analysis was performed by comparing the existing arterial traffic volumes against generalized peak hour directional service volumes obtained from the 2012 FDOT Quality/Level of Service Handbook (December 18, 2012 version). The following sub-sections describe the overall process.

3.1 Traffic Count Information

Figure 2 provides the location of traffic counts and type of traffic count data collected for the study. All existing traffic count data was collected during April through July of 2013. The data collected includes:

- 48-hour vehicle classification counts (2 locations)
- 48-hour volume counts (7 locations)
- 4-hour intersection turning movement counts including bike and pedestrian for a.m. and p.m. peak hours (25 intersections)

The weekday turning movement counts were collected for the intersections between the peak hours of 7:00-9:00 a.m. and 4:00-6:00 p.m. It is to be noted that 4-hour turning movement counts were collected for the following eight (8) intersections for informational purposes only and therefore, they were not evaluated as part of this study:

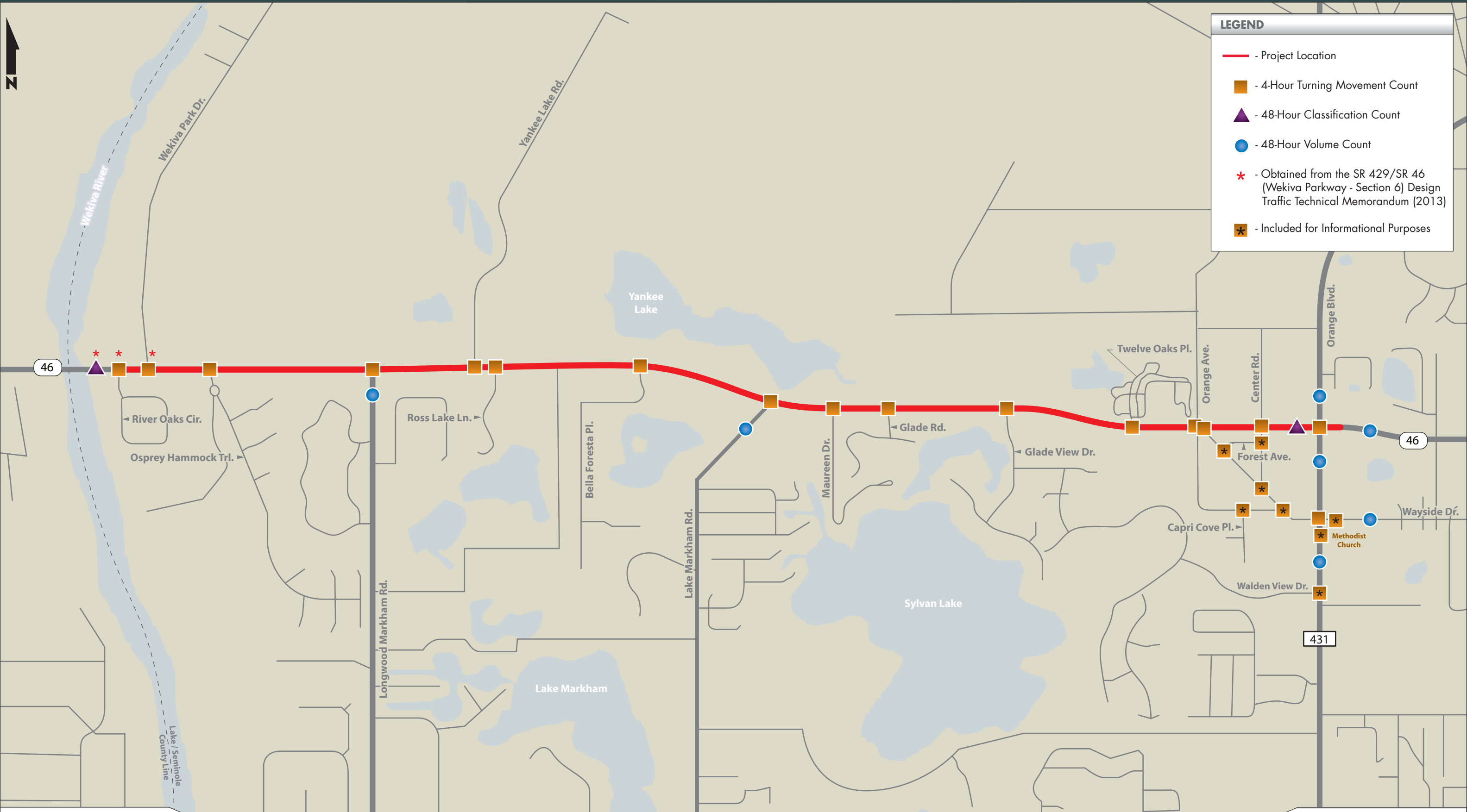
- Orange Boulevard at Walden View Drive (unsignalized intersection)
- Orange Boulevard at Lakeside Methodist Church Driveway (unsignalized intersection)
- Wayside Drive at S. Orange Avenue (unsignalized intersection)

- Wayside Drive at S. Center Road (unsignalized intersection)
- Wayside Drive at Forest Avenue (unsignalized intersection)
- Wayside Drive at Lakeside Methodist Church Driveway (unsignalized intersection)
- S. Orange Avenue at Capri Cove Place (unsignalized intersection)
- S. Center Road at Forest Avenue (unsignalized intersection)

As part of the traffic count program for this project, and as mentioned above, two (2) locations were utilized in this study as vehicle classification counts. Vehicle composition for the classification count was broken into three primary vehicle types:

- Passenger Vehicles – Motorcycles, Cars, Vans, and Pickups;
- Medium Truck – Buses and 2 axle Single Unit Trucks;
- Heavy Trucks – (3 or 4 axles) Single Unit Trucks, 2 axle Tractors (with 1 or 2 axle Trailer), 3 axle Trailers (2 or 3 axle Trailers), and (5, 6 and 7 axle) Multi-trailers.

Based on these categories, percentages for overall trucks (medium and heavy) were determined for peak and daily traffic conditions. Copies of all traffic count data are provided in **Appendix C**. FDOT seasonal and axle adjustment factors for Seminole County are provided in **Appendix D**.



DATE CREATED: 7/24/13

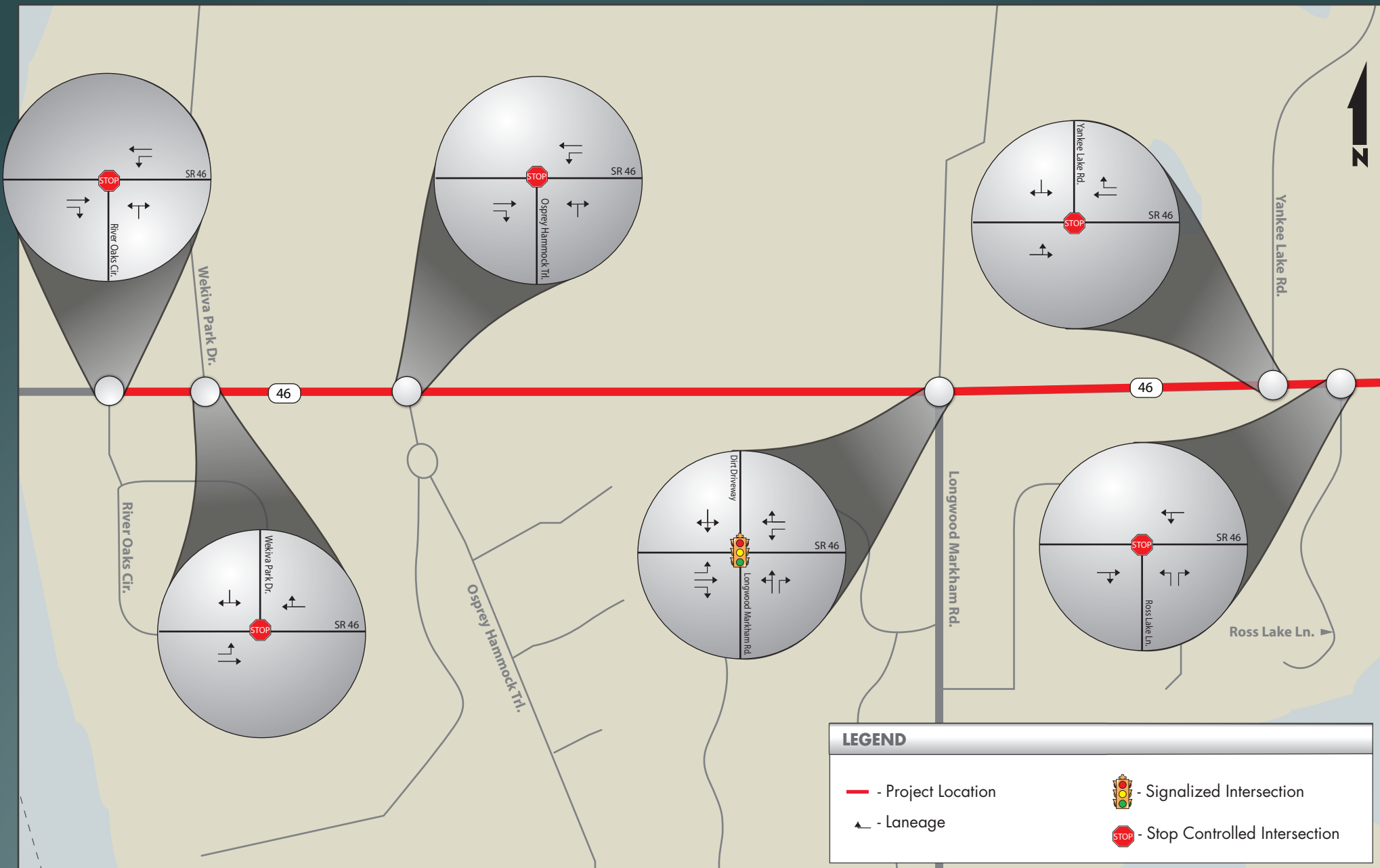
PROJECT NUMBER: 11-016.33

3.2 Existing Geometry

Figures 3-1 through 3-3 provide the year 2013 intersection geometry for all the intersections to be evaluated in this study. The year 2013 intersection geometry information was obtained and verified based on field visits and aerial photographs. The following intersections are evaluated as part of this study:

- SR 46 at River Oaks Circle (Unsignalized Intersection)
- SR 46 at Wekiva Park Drive (Unsignalized Intersection)
- SR 46 at Osprey Hammock Trail (Unsignalized Intersection)
- SR 46 at Longwood-Markham Road (Signalized Intersection)
- SR 46 at Yankee Lake Road (Unsignalized Intersection)
- SR 46 at Rose Lake Lane (Unsignalized Intersection)
- SR 46 at Bella Foresta Place (Unsignalized Intersection)
- SR 46 at Lake Markham Road (Unsignalized Intersection)
- SR 46 at Maureen Drive (Unsignalized Intersection)
- SR 46 at Glade Road (Unsignalized Intersection)
- SR 46 at Glade View Drive (Unsignalized Intersection)
- SR 46 at Twelve Oaks Place (Unsignalized Intersection)
- SR 46 at Orange Avenue (Unsignalized Intersection)
- SR 46 at Wayside Drive (Unsignalized Intersection)
- SR 46 at Center Road (Unsignalized Intersection)
- SR 46 at Orange Boulevard (Signalized Intersection)
- Orange Boulevard at Wayside Drive (Unsignalized Intersection)

The existing geometry plays a vital role in assessing the intersection LOS. LOS is a qualitative measure of how efficient a roadway or intersection operates. LOS A represents the highest traffic flow quality, while LOS E represents traffic flow at capacity. LOS F represents forced flow congested conditions. LOS B, C and D represent a gradual degradation in traffic flow quality before reaching capacity. The existing geometry was considered as one of the factors in determining potential intersection improvements to accommodate the travel demand.



LEGEND	
	- Project Location
	- Laneage
	- Signalized Intersection
	- Stop Controlled Intersection

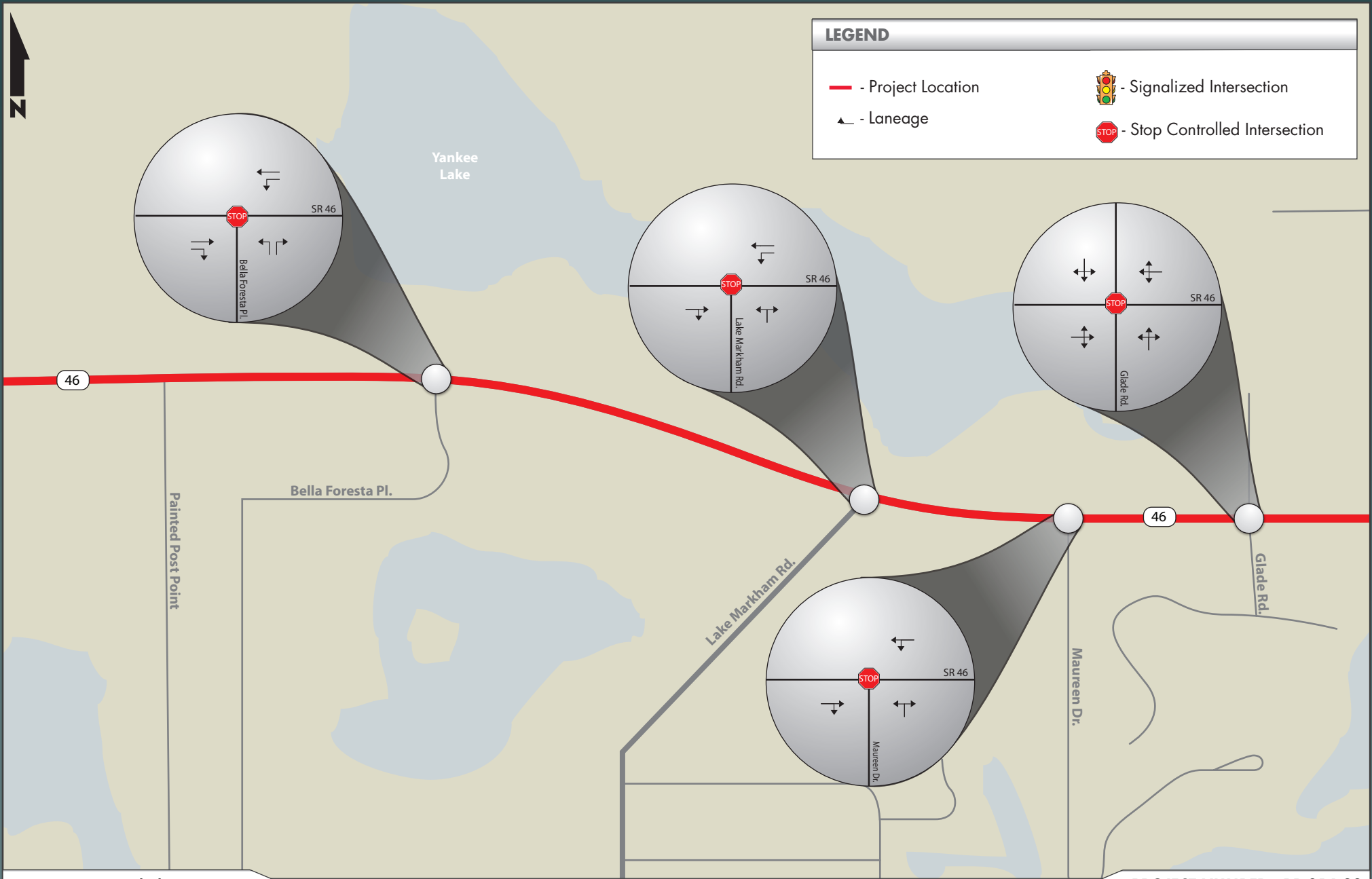
DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 3-1
Existing Geometry



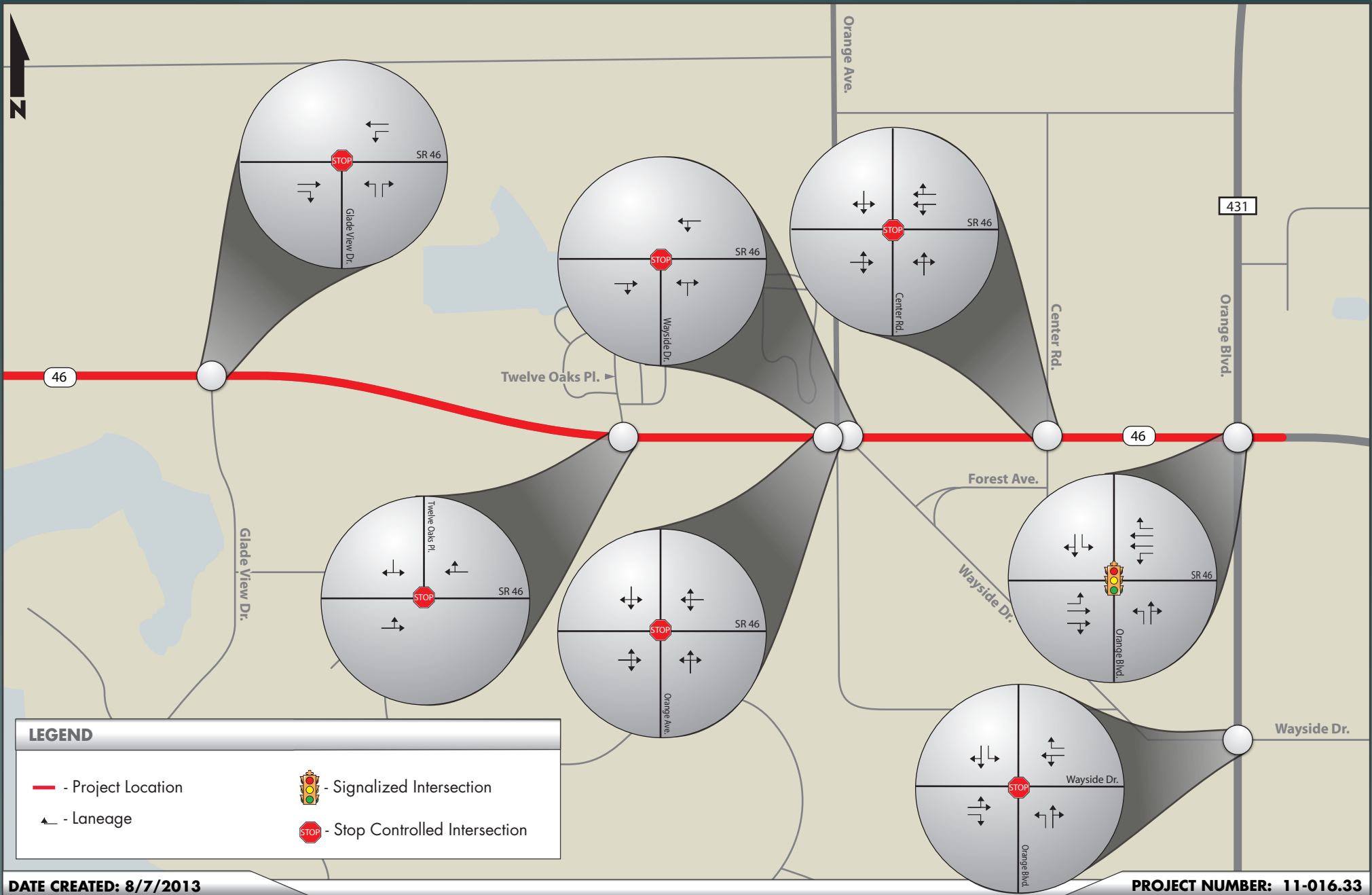
DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 3-2
Existing Geometry



Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 3-3
Existing Geometry

3.3 Existing Traffic Volumes

The traffic count information collected was used to develop existing traffic characteristics for the project corridors and the intersecting side streets. The truck factor for the peak condition was used in the existing intersection analysis. Based on the 48-Hour classification counts, the directional splits (D measured) for the roadways in the study area were derived. The adjusted AADT volumes for the individual roadway segments are provided in **Table 2** and **Figures 4-1 through 4-3**. As shown in **Figure 4-1 through 4-3**, the year 2013 existing peak hour turning movement counts collected at the intersections of River Oaks Circle, Wekiva Park Drive, Osprey Hammock Trail, Yankee Lake Road, Ross Lake Lane, Bella Foresta Place, Maureen Drive, Glade Road, Glade View Drive, Twelve Oaks Place, Orange Avenue, Wayside Drive, and Center Road were used to estimate the existing year 2013 AADT volumes for the side streets by applying the standard K factor of 9.0%.

3.3.1 Year 2013 Turning Movement Counts

Turning movement counts were obtained for the a.m. and p.m. peak hour conditions for the study intersections during the year 2013. The actual (original) year 2013 a.m., and p.m. peak hour turning movement volumes collected at the study intersections are shown in **Appendix C**. For the purpose of this study, the original year 2013 a.m. and p.m. peak hour turning movement volumes were adjusted using the seasonal adjustment factors obtained from the 2012 Florida Traffic Information (FTI) DVD to be conservative and balanced. The balanced turning movement counts for the a.m. and p.m. peak hour conditions are shown in **Figures 5-1 through 5-3**.

Table 2
SR 429 / SR 46 Design Traffic Technical Memorandum
 YR 2013 Existing Traffic Volumes

Roadway / Segment	Traffic Count Date	Type of Count	Measured Characteristics								Axle Adj. ⁽¹⁾	Seasonal Adj. ⁽¹⁾	Adjusted AADT ⁽²⁾	
			ADT	Peak Hr.	NB/EB	SB/WB	Peak Time	"K"	"D"	"T ₂₄ "				"T _f "
Mainline Characteristics (SR 46)														
East of Wekiva River Road	5/7/2013 to 5/8/2013	48-Hour Classification	19,574	1,978	743	1,235	5:00-6:00 PM	10.1%	62.4%	10.4%	7.1%	1.00	0.99	19,500
West of Orange Boulevard	7/16/2013 to 7/17/2013	48-Hour Classification	20,102	1,897	766	1,131	5:00-6:00 PM	9.4%	59.6%	10.6%	8.3%	1.00	1.02	20,500
East of Orange Boulevard	7/24/2013 to 7/25/2013	48-Hour Volume Count	23,352	1,968	802	1,166	5:00-6:00 PM	8.4%	59.2%	NA	NA	0.95	1.02	22,500
Average								9.3%	60.4%	10.5%	7.7%			
Side Street Characteristics														
River Oak Circle ⁽³⁾														
South of SR 46	4/30/2013	4-Hour Turning Movement Count	267	24	8	16	5:00-6:00 PM	9.0%	66.7%	NA	NA	NA	0.99	250
Wekiva Park Drive ⁽³⁾														
North of SR 46	4/30/2013	4-Hour Turning Movement Count	311	28	17	11	5:00-6:00 PM	9.0%	60.7%	NA	NA	NA	0.99	300
Osprey Hammock Trail ⁽³⁾														
South of SR 46	7/17/2013	4-Hour Turning Movement Count	833	75	29	46	5:00-6:00 PM	9.0%	61.3%	NA	NA	NA	1.02	850
Longwood-Markham Road														
South of SR 46	7/16/2013 to 7/17/2013	48-Hour Volume Count	3,320	370	237	133	5:00-6:00 PM	11.1%	64.1%	NA	NA	0.99	1.02	3,400
Yankee Lake Road ⁽³⁾														
North of SR 46	7/17/2013	4-Hour Turning Movement Count	100	9	5	4	7:15-8:15 AM	9.0%	55.6%	NA	NA	NA	1.02	100
Ross Lake Lane ⁽³⁾														
South of SR 46	7/17/2013	4-Hour Turning Movement Count	133	12	3	9	5:00-6:00 PM	9.0%	75.0%	NA	NA	NA	1.02	150
Bella Foresta Place ⁽³⁾														
South of SR 46	7/18/2013	4-Hour Turning Movement Count	278	25	12	13	7:15-8:15 AM	9.0%	52.0%	NA	NA	NA	1.02	300
Lake Markham Road														
South of SR 46	7/16/2013 to 7/17/2013	48-Hour Volume Count	1,200	105	46	59	4:45-5:45 PM	8.8%	56.2%	NA	NA	0.99	1.02	1,200
Maureen Drive ⁽³⁾														
South of SR 46	7/17/2013	4-Hour Turning Movement Count	156	14	4	10	5:00-6:00 PM	9.0%	71.4%	NA	NA	NA	1.02	150
Glade Road ⁽³⁾														
South of SR 46	7/17/2013	4-Hour Turning Movement Count	122	11	5	6	4:45-5:45 PM	9.0%	54.5%	NA	NA	NA	1.02	100
Glade View Drive ⁽³⁾														
South of SR 46	7/17/2013	4-Hour Turning Movement Count	311	28	12	16	5:00-6:00 PM	9.0%	57.1%	NA	NA	NA	1.02	300
Twelve Oaks Place ⁽³⁾														
North of SR 46	7/16/2013	4-Hour Turning Movement Count	200	18	14	4	5:00-6:00 PM	9.0%	77.8%	NA	NA	NA	1.02	200
Orange Avenue ⁽³⁾														
North of SR 46	7/16/2013	4-Hour Turning Movement Count	233	21	12	9	5:00-6:00 PM	9.0%	57.1%	NA	NA	NA	1.02	250
South of SR 46	7/16/2013	4-Hour Turning Movement Count	22	2	1	1	5:00-6:00 PM	9.0%	50.0%	NA	NA	NA	1.02	20
Wayside Drive														
South of SR 46	7/17/2013	4-Hour Turning Movement Count	1,533	138	9	129	7:30-8:30 AM	9.0%	93.5%	NA	NA	NA	1.02	1,600
West of Orange Boulevard	7/17/2013	4-Hour Turning Movement Count	1,722	155	135	20	7:45-8:45 AM	9.0%	87.1%	NA	NA	NA	1.02	1,800
East of Orange Boulevard ⁽³⁾	7/16/2013 to 7/17/2013	48-Hour Volume Count	1,604	197	61	136	4:45-5:45 PM	12.3%	69.0%	NA	NA	0.99	1.02	1,600
Center Road ⁽³⁾														
North of SR 46	7/17/2013	4-Hour Turning Movement Count	78	7	6	1	4:45-5:45 PM	9.0%	85.7%	NA	NA	NA	1.02	80
South of SR 46	7/17/2013	4-Hour Turning Movement Count	67	6	1	5	4:45-5:45 PM	9.0%	83.3%	NA	NA	NA	1.02	70
Orange Boulevard														
North of SR 46	7/16/2013 to 7/17/2013	48-Hour Volume Count	5,498	487	279	208	4:30-5:30 PM	8.9%	57.3%	NA	NA	0.99	1.02	5,600
South of SR 46	7/16/2013 to 7/17/2013	48-Hour Volume Count	5,492	542	369	173	5:00-6:00 PM	9.9%	68.1%	NA	NA	0.99	1.02	5,500
South of Wayside Drive	7/16/2013 to 7/17/2013	48-Hour Volume Count	6,322	567	335	232	5:00-6:00 PM	9.0%	59.1%	NA	NA	0.99	1.02	6,400

Notes:

1. Most Recent Seasonal and Axle Adjustment factors were obtained from the 2012 FTI DVD.

2. Measured ADT * Axle Adjustment * Seasonal Adjustment = Adjusted AADT

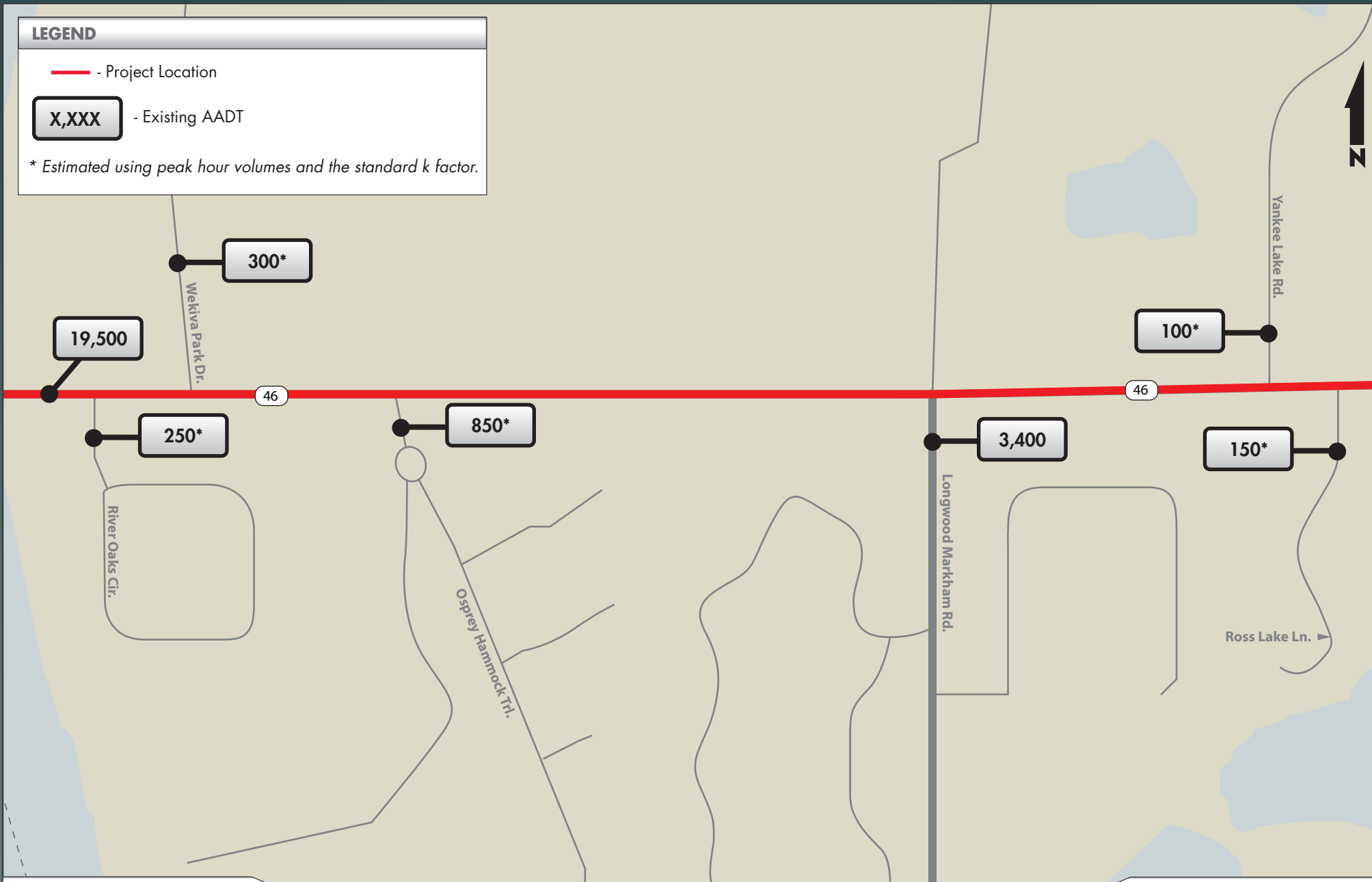
3. AADT was estimated using the peak hour volume, the Standard "K" Factor, and the Seasonal Adjustment Factor

LEGEND

— - Project Location

X,XXX - Existing AADT

* Estimated using peak hour volumes and the standard k factor.



DATE CREATED: 8/12/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

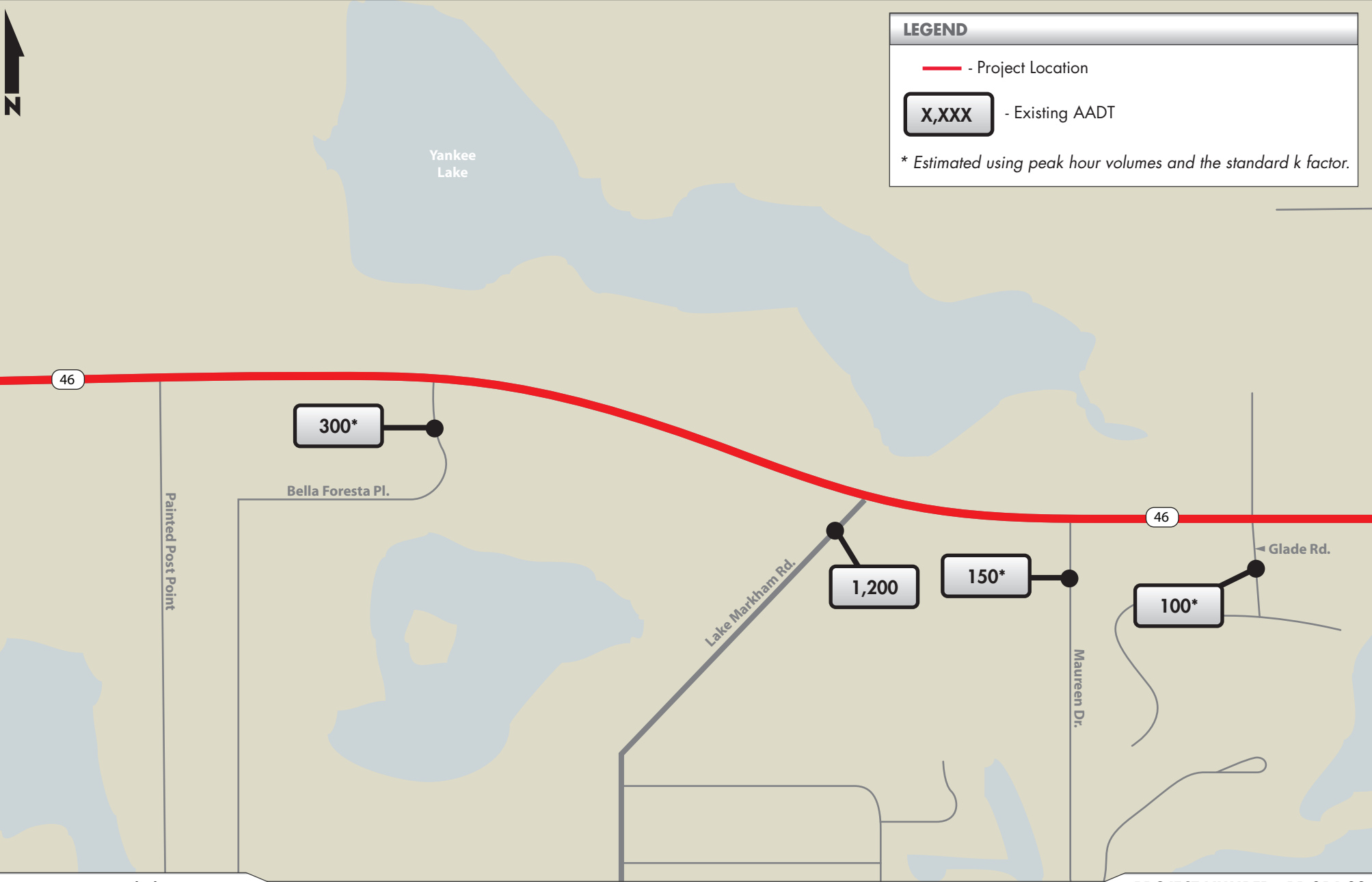
FIGURE 4-1
Year 2013 Existing AADT



LEGEND

- Project Location
- Existing AADT

** Estimated using peak hour volumes and the standard k factor.*



DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

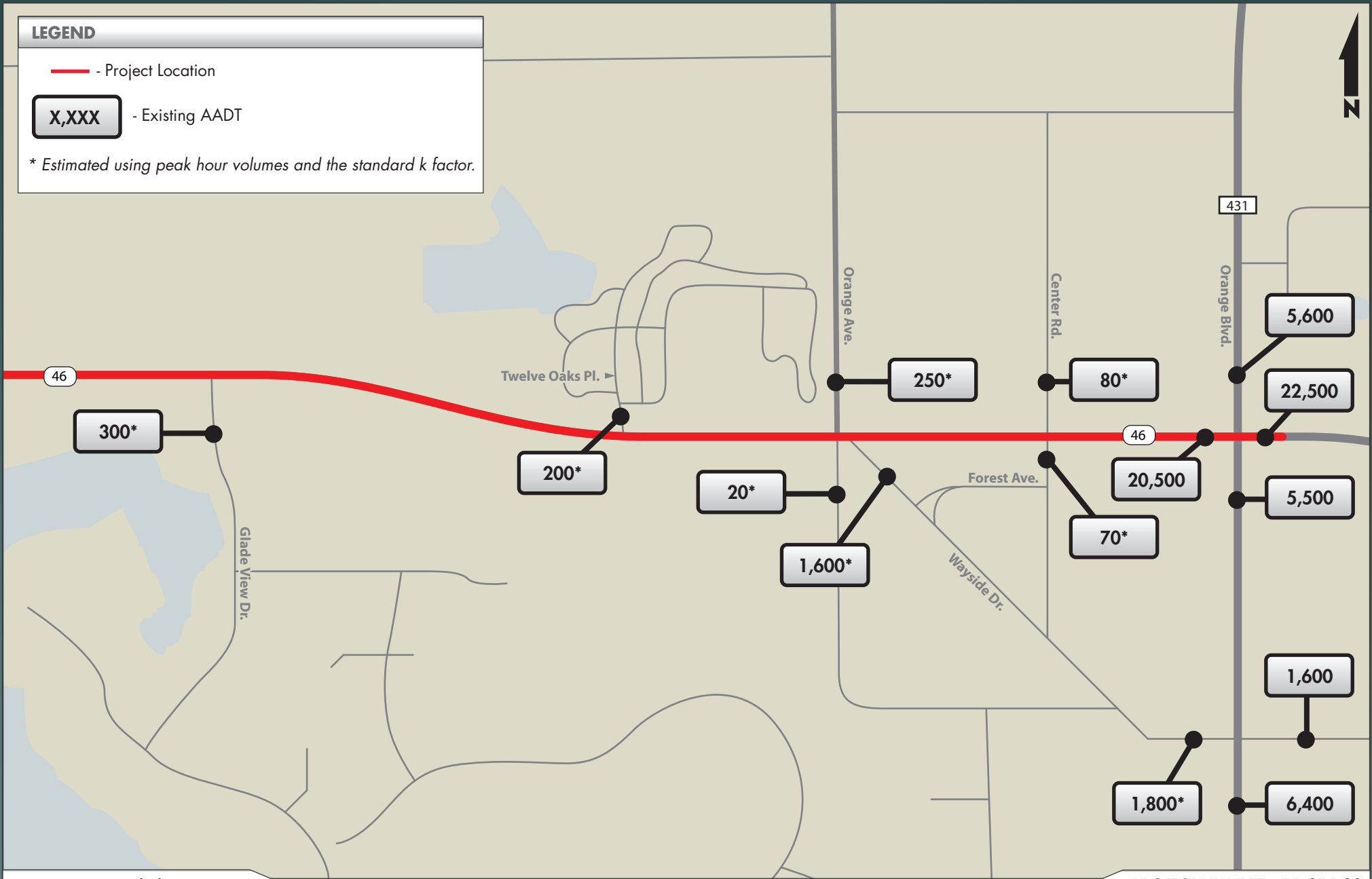
Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 4-2
Year 2013 Existing AADT

LEGEND

- Project Location
- X,XXX - Existing AADT

* Estimated using peak hour volumes and the standard k factor.



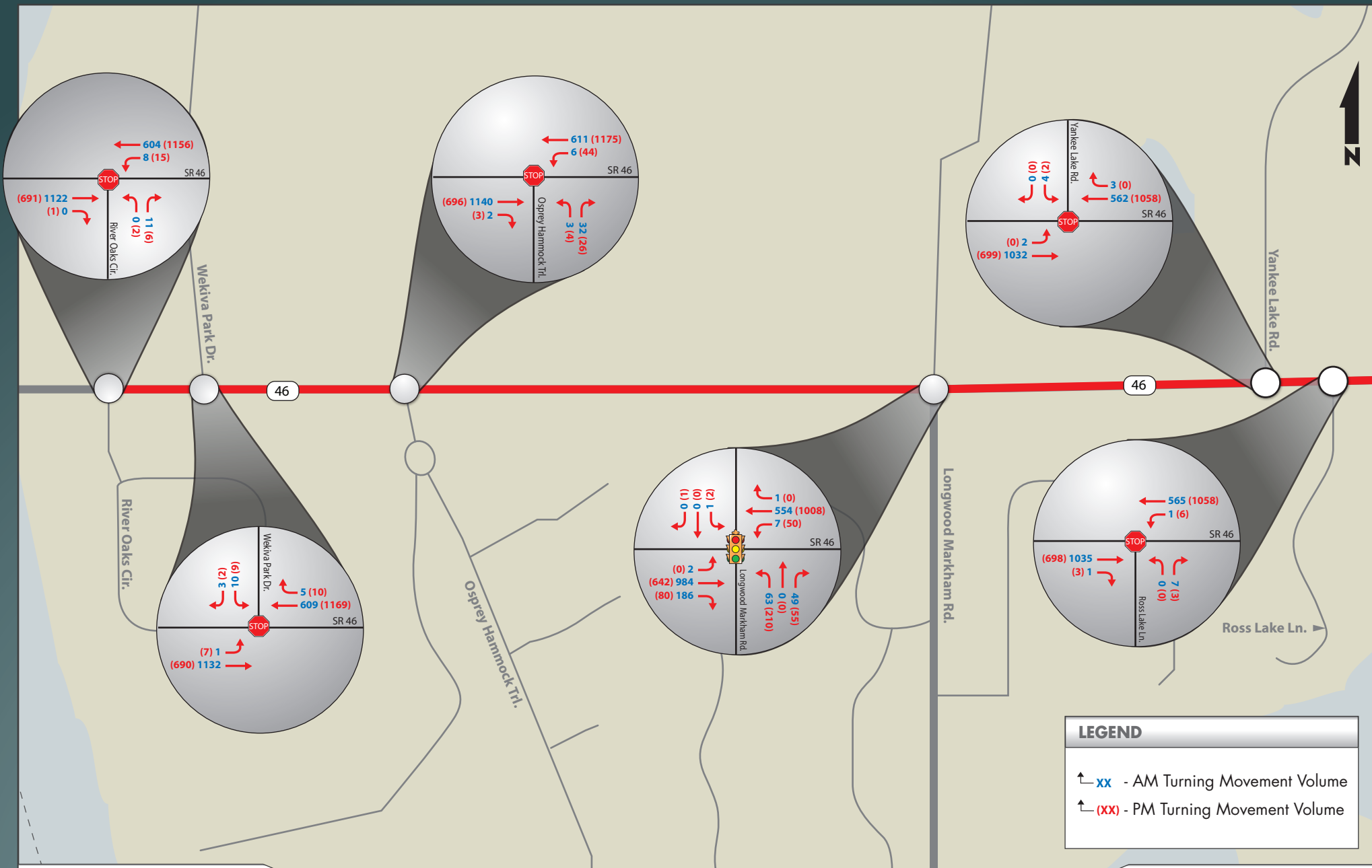
DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 4-3
Year 2013 Existing AADT



DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

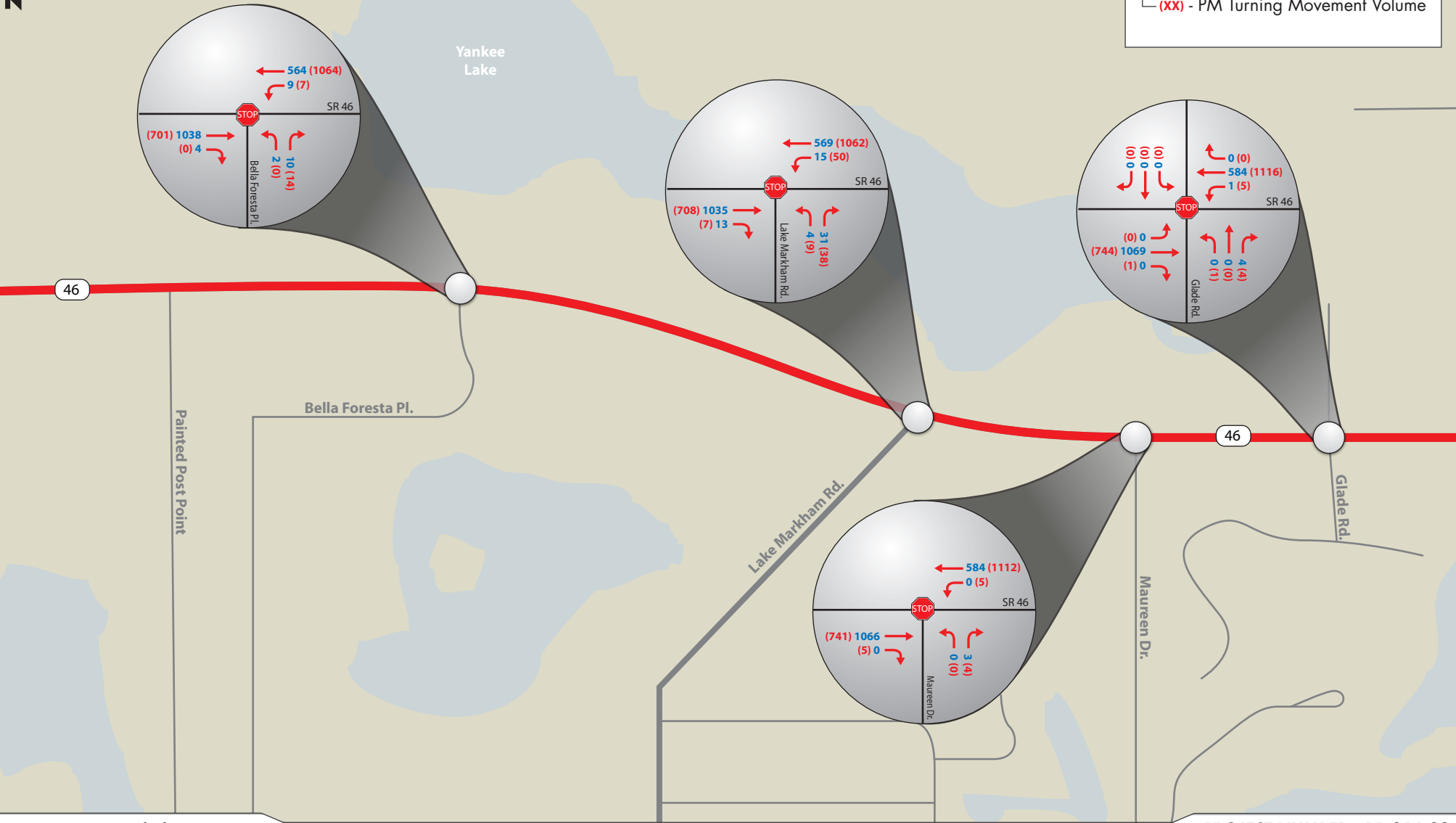
Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 5-1
Year 2013 AM / PM Peak Hour
Turning Movement Counts



LEGEND

↖ xx - AM Turning Movement Volume
 ↖ (xx) - PM Turning Movement Volume

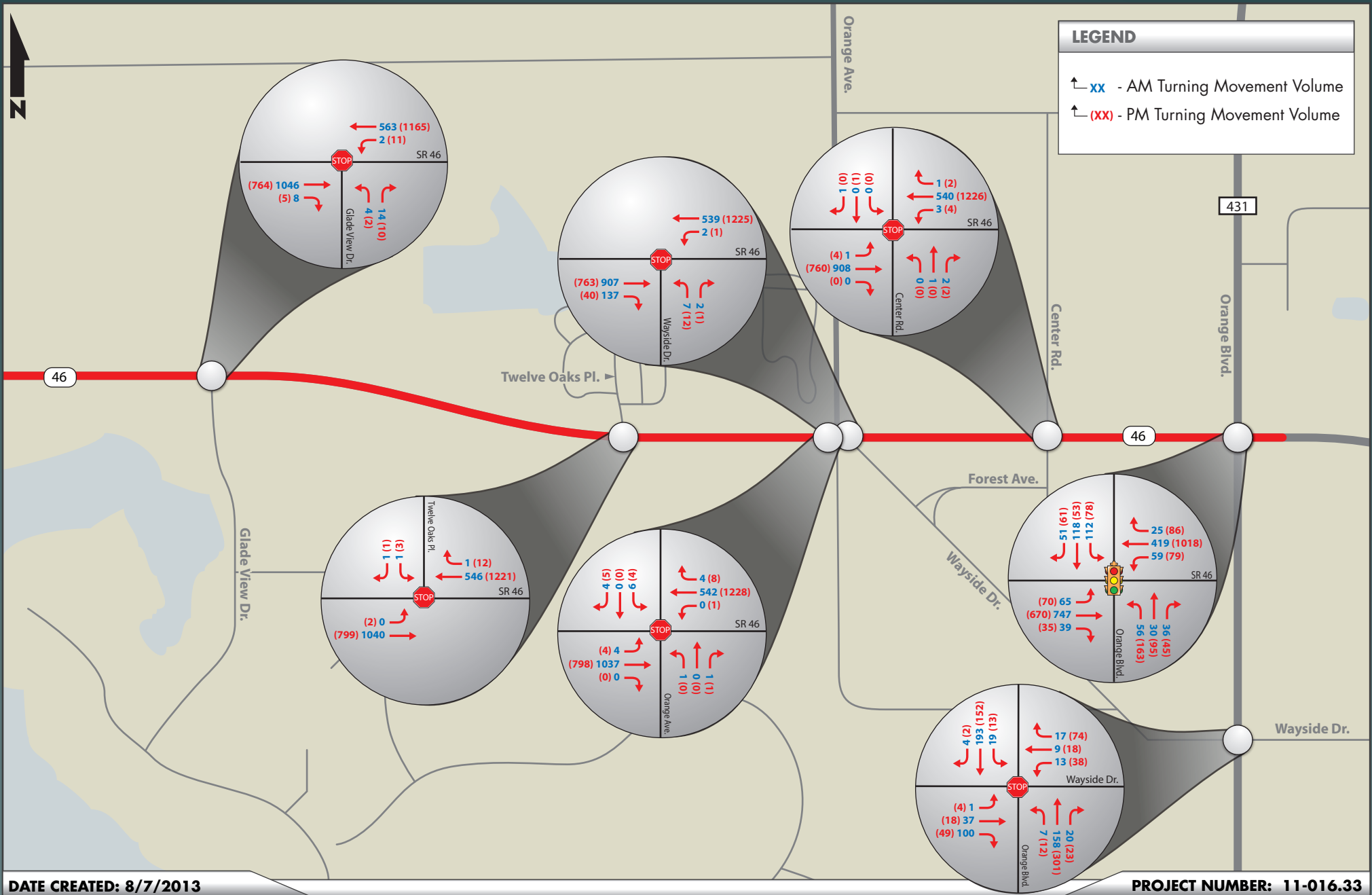


DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 5-2
 Year 2013 AM / PM Peak Hour
 Turning Movement Counts



DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 5-3
Year 2013 AM / PM Peak Hour
Turning Movement Counts

3.4 Year 2013 LOS Analysis

The level of service for the study intersections was determined using the procedures as outlined in the Transportation Research Board's (TRB) – Highway Capacity Manual (HCM 2000) using the Synchro Software (version 7.0). Specific analysis techniques utilized in the study include the signalized, unsignalized intersections, and arterial analyses. Since Synchro calculates arterial LOS only between signalized intersections, the a.m. and p.m. peak hour peak direction volumes between the intersections were compared against the latest Generalized Peak Hour Directional Service Volumes (dated December 18, 2012) from 2012 FDOT Quality/Level Of Service Handbook to obtain the arterial LOS.

3.4.1 Year 2013 Intersection LOS Analysis

The year 2013 a.m. and p.m. peak hour turning movement volumes along with the year 2013 intersection geometry were used in the intersection LOS analysis. The signal timing data provided by Seminole County was used for the intersections of SR 46 at Longwood-Markham Road and SR 46 at Orange Boulevard LOS analysis.

According to HCM 2000, an average control delay per vehicle from 55 seconds up to 80 seconds is considered LOS E condition and beyond 80 seconds is considered LOS F condition at a signalized intersection. In addition, for stop-controlled intersections, an average control delay per vehicle from 35 seconds up to 50 seconds is considered LOS E condition and beyond 50 seconds is considered LOS F condition.

A summary of the LOS analysis for the study intersections is included in **Table 3**.

Table 3: Year 2013 Existing Intersection LOS Analysis Summary

Study Intersection	Traffic Control	FDOT Adopted LOS	AM Peak Hour		PM Peak Hour	
			Delay (sec/vehicle)	LOS	Delay (sec/vehicle)	LOS
SR 46 @						
River Oaks Circle	Stop	D	11.3/22.2	B/C	9.2/27.2	A/D
Wekiva Park Drive	Stop	D	8.9/ 55.6	A/ F	12.2/ 84.0	B/ F
Osprey Hammock Trail	Stop	D	11.7/32.5	B/D	9.6/26.6	A/D
Longwood-Markham Road	Signal	D	14.5	B	32.0	C
Yankee Lake Road	Stop	D	0.1/ 63.9	A/ F	0.0/ 57.0	A/ F
Ross Lake Lane	Stop	D	0.0/20.0	A/C	0.3/14.1	A/B
Bella Foresta Place	Stop	D	11.6/ 43.9	B/ E	9.3/14.9	A/B
Lake Markham Road	Stop	D	11.2/26.3	B/D	9.6/31.6	A/D
Maureen Drive	Stop	D	0.0/21.6	A/C	0.3/14.7	A/B
Glade Road	Stop	D	0.0/19.8	A/C	0.3/34.8	A/D
Glade View Road	Stop	D	10.9/ 44.9	B/ E	10.0/ 123.0	A/ F
Twelve Oaks Place	Stop	D	0.0/28.1	A/D	0.1/ 69.1	A/ F
Orange Avenue	Stop	D	0.2/ 45.2	A/ E	0.3/ 86.2	A/ F
Wayside Drive	Stop	D	0.1/34.3	A/D	0.1/ 101.7	A/ F
Center Road	Stop	D	0.1/25.2	A/D	0.2/ 84.5	A/ F
Orange Boulevard	Signal	D	26.4	C	32.8	C
Orange Boulevard @						
Wayside Drive	Stop	E	7.6/11.9	A/B	8.0/13.5	A/B

Notes:

1. HCM 2000-based outputs are presented for the unsignalized and signalized intersections.
2. In case of unsignalized intersections, worst-case results (delay and LOS) are reported for movements in both the major and minor approaches.
3. The adopted Seminole County LOS standard for the intersection of Orange Boulevard at Wayside Drive is "E".

As shown in **Table 3**, during the year 2013 a.m. and p.m. peak hour conditions, the following intersections along the project corridor were found to operate below (worse than) their adopted LOS standard:

- SR 46 at Wekiva Park Drive (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Yankee Lake Road (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Bella Foresta Place (stop controlled - during the a.m. peak hour)
- SR 46 at Glade View Road (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Twelve Oaks Place (stop controlled - during the p.m. peak hour)
- SR 46 at Orange Avenue (stop controlled - during the a.m. and p.m. peak hours)
- SR 46 at Wayside Drive (stop controlled - during the p.m. peak hour)
- SR 46 at Center Road (stop controlled - during the p.m. peak hour)

The existing year 2013 a.m. and p.m. peak hour intersection capacity analysis along with the signal timing data used in the intersection analysis are included in **Appendix E**.

3.4.2 Year 2013 Arterial LOS Analysis

FDOT has classified the study segment along SR 46 from east of Wekiva River Road to Orange Boulevard as a two lane undivided urban other principal arterial with LOS standard “D”.

For the purpose of assessing the arterial LOS of this segment of SR 46, the generalized peak hour directional service volumes for the LOS letters “A” through “D” were obtained from Table 7 of the 2012 FDOT Quality/Level of Service Handbook and are shown below.

Urban Area Class I (40 mph or higher)

- LOS A – 0 vehicles per hour (VPH)
- LOS B – 0 VPH
- LOS C – 830 VPH
- LOS D – 880 VPH

Table 7 of the 2012 FDOT Quality/Level of Service Handbook is included in **Appendix F**.

As shown in **Table 4**, SR 46 corridor from east of Wekiva River Road to Orange Boulevard currently operates under unacceptable level of service conditions during the existing a.m. peak and p.m. peak hour conditions.

Table 4: Year 2013 Existing Arterial LOS Analysis Summary

Roadway Segment on SR 46	Area Type	FDOT Adopted LOS	Service Volume at LOS Std.	Peak Hour ⁽¹⁾ Peak Direction Volume (VPH)	Arterial LOS
AM Peak Hour (Eastbound)					
Wekiva River Road to Lake Markham Road	Urban	D	880	1,172	F
Lake Markham Road to Orange Boulevard	Urban	D	880	1,073	F
PM Peak Hour (Westbound)					
Lake Markham Road to Orange Boulevard	Urban	D	880	1,158	F
Wekiva River Road to Lake Markham Road	Urban	D	880	1,242	F

Notes:

1. Peak Hour/Peak Direction Volumes were obtained from the balanced intersection turning movement volumes.

4 Development of Design Characteristics

The design traffic characteristics established in this section will be used in developing Design Hour Volumes (DHV) for the intersections and Directional Design Hour Volumes (DDHV) for the roadway segments for the future conditions. These characteristics are determined based on the procedure outlined in the FDOT's Project Traffic Forecasting Handbook, dated January 2012.

4.1 Standard K Factor

The K factor represents the relationship between the travel demand occurring during the peak hour and the AADT. The ratio of peak hour to AADT factor (K) is used in the FDOT's planning through design phases. As indicated in the Project Traffic Forecasting Handbook, a Standard K Factor of 9.0% for Controlled Access facilities and arterials within "Other Urbanized Areas" is recommended for the SR 429/SR 46 (Wekiva Parkway) corridor (including the frontage road) and the side streets that intersect the corridor.

4.2 D Factor

The directional distribution factor, D is based on the median value of the directional factors for the highest 200 hours of each continuous count station. In determining this factor for SR 46 and the side streets that intersect the main roadway corridor, statewide and national guidelines were compared to the field collected project traffic counts and traffic information contained in the 2012 FTI DVD. The measured D for the study area roadways are shown in **Table 5**. The average of the measured D factors for SR 46 corridor within the study limits is 60.4%.

Table 5: YR 2013 Measured "D" Factors

Roadway / Segment		2013 Measured "D"
Mainline Characteristics		
SR 46	East of Wekiva River	62.4%
	West of Orange Boulevard	59.6%
	East of Orange Boulevard	59.2%
	Average	60.4%
Side Street Characteristics		
Longwood-Markham Road	South of SR 46	64.1%
Lake Markham Road	South of SR 46	56.2%
Orange Boulevard	North of SR 46	57.3%
	South of SR 46	68.1%
	South of Wayside Drive	59.1%
	Average	61.0%

The 2012 FTI DVD was used to obtain the historical D factors for five (5) years between 2008 and 2012 for the FDOT count location site #770074 (SR 46 east of Wekiva River). The historical counts and traffic data for FDOT count location site #770074 can be found in **Appendix D**. As seen in **Table 6**, the average, minimum, and maximum D factors over the five years for the count location site #770074 along the SR 46 corridor are 52.3%, 51.6% and 52.8%, respectively.

Table 6: SR 46 Historical FTI Data - D Values

Year	Site # 770074 (SR 46 – East the Wekiva River)
2008	52.75%
2009	51.56%
2010	51.95%
2011	52.60%
2012	52.80%
Average	52.33%
Minimum	51.56%
Maximum	52.80%

Table 7 provides the recommended range of D values from the FDOT Project Traffic Forecasting Handbook and the HCM 2000 for urban arterials.

Table 7: Recommended Range of D Values

Values	Urban Arterial	
	FDOT ¹	HCM ²
Low	50.8%	52.0%
Average	57.9%	54.5%
High	67.1%	57.0%

Notes:

1) Source: *FDOT Project Traffic Forecasting Handbook, January 2012, Figure 2.9*

2) Source: *HCM 2000*

4.2.1 SR 429/ SR 46 (Wekiva Parkway) Corridor

The average measured D from the 2013 traffic counts is 60.4%, while the average historical D obtained from the 2012 FTI DVD is 52.3%. Therefore, based on the comparison of average measured D and average historical D, **a D factor of 56.4% (average of historical and measured values) is recommended for the SR 429/ SR 46 (Wekiva Parkway) corridor including the frontage road.**

4.2.2 Side Streets

For the purposes of this study, The D value for the side streets was determined based on the average of the measured D values for all the side streets intersecting the SR 46 corridor where tube counts were collected. Therefore, **a D value of 61.0% is recommended for all side streets of the corridor.**

4.3 T₂₄ & T_f Factors

The daily truck factor, T₂₄ represents the percentage composition of medium sized and heavy trucks occurring in the traffic stream for a 24-hour period. The peak hour truck factor, T_f, is the percentage of truck traffic during the peak hour and is recommended as one-half of the T₂₄ factor in the Project Traffic Forecasting Handbook. The truck factor for the daily condition will be used in determining Equivalent Single Axle Loadings (ESAL) for the project corridor.

4.3.1 SR 429/ SR 46 (Wekiva Parkway) Corridor

As mentioned earlier in the report, two (2) 48-hour vehicle classification volume counts were conducted along SR 46 within the project limits (east of Wekiva River Road and west of Orange Boulevard). As shown in **Table 8**, an average T_{24} factor of 10.5% and an average T_f factor of 7.7% were measured for the SR 46 corridor.

Table 8: YR 2013 SR 46 Measured “ T_{24} ” and “ T_f ” Factors

Roadway / Segment	2013 Measured “ T_{24} ”	2013 Measured “ T_f ”
East of Wekiva River Road	10.4%	7.1%
West of Orange Boulevard	10.6%	8.3%
Average	10.5%	7.7%

Table 9 contains the historical SR 46 T_{24} factors, from the 2012 FTI DVD, for years 2008 through 2012 for the FDOT count site location within the corridor (site #770074).

Table 9: SR 46 Historical FTI Data - T_{24} Values

Year	Site # 770074 (SR 46 – East the Wekiva River)
2008	11.50%
2009	10.00%
2010	8.80%
2011	8.50%
2012	7.30 %
Average	9.22%
Minimum	7.30%
Maximum	11.50%

The measured T_{24} from the 2013 traffic counts is 10.5%, while the average of the historical T_{24} factors is 9.2%. In order to be conservative, a **T_{24} factor of 10.5% is recommended for the SR 429/ SR 46 (Wekiva Parkway) corridor including the frontage road. In addition, a T_f factor of 7.7% as measured in the field is recommended for the SR 429/ SR 46 (Wekiva Parkway) corridor including the frontage road.**

4.3.2 Side Streets

For the purpose of this study, truck factors were not measured along the side streets of the corridor. Therefore, a T_{24} factor of 2.0% and a T_f factor of 1.0% are recommended for the side streets of the corridor.

4.4 Recommended Design Traffic Characteristics

Based on the afore-mentioned discussions, **Table 10** provides a summary of the recommended design traffic characteristics for this study.

Table 10: Recommended Design Traffic Characteristics

Roadway / Segment	Recommended Design Characteristics			
	Standard "K" Factor	"D" Factor	" T_{24} " Factor	" T_f " Factor
Mainline Characteristics				
SR 429/SR 46 (Wekiva Parkway) and Frontage Road	9.0%	56.4%	10.5%	7.7%
Side Street Characteristics				
Side Streets	9.0%	61.0%	2.0%	1.0%

5 Development of Future Traffic Forecasts

The development of traffic projections for the SR 429 (Wekiva Parkway) study corridor requires the examination of historical growth, proposed development levels within the corridor vicinity, and a basic understanding of local traffic circulation patterns and travel characteristics of the corridor.

5.1 Design Period

Based on the information provided by FDOT District Five, the following design periods were used to provide the future traffic forecasts and roadway, ramp, and intersection operation analyses for the study corridor.

- Opening Year – 2020
- Mid-design Year – 2030
- Design Year – 2040

5.2 Programmed and Planned Improvements

The following programmed / planned improvements are scheduled for the study area and were identified based on a review of the latest MetroPlan Orlando 2030 LRTP, Lake-Sumter MPO LRTP, and the FDOT Five Year Work Program FY 2014/2018. The programmed / planned improvement documentation can be found in **Appendix G**.

5.2.1 Programmed Improvements

The following programmed improvements are scheduled for the study corridor and the intersecting corridors in the next five years, based on the FDOT Five Year Work Program FY 2014/FY 2018:

- **SR 429 (Wekiva Parkway) from West of Old McDonald Road to East of Wekiva River Road (Financial ID # 238275-7):** Funding for the construction of this segment as a four (4) lane, limited access expressway is programmed in FY 2017.
- **SR 429 (Wekiva Parkway) from East of Wekiva River Road to Orange Boulevard (Financial ID # 240200-2):** Funding for the construction of this segment as a four (4) lane, limited access expressway is programmed in FY 2018.
- **SR 429 (Wekiva Parkway) from Orange Boulevard to West of I-4 (Financial ID # 240200-4):** Funding for the Right of Way Acquisition for the construction of a four (4) lane limited access expressway is programmed in FY 2015.

5.2.2 Planned Improvements

Based on a review of the latest adopted MetroPlan Orlando 2030 and Lake-Sumter MPO LRTPs, the following improvements are planned for the study corridor and the intersecting corridors by the year 2035.

- **SR 429 (Wekiva Parkway) from West of Old McDonald Road to East of Wekiva River Road:** The construction of this segment as a four (4) lane limited access expressway is a planned improvement.
- **SR 429 (Wekiva Parkway) from East of Wekiva River Road to I-4:** The construction of this segment as a six (6) lane limited access expressway is a planned improvement.

5.3 Year 2040 Roadway Analysis Alternatives

The future traffic forecast volumes were determined for one (1) Build Alternative and it is described in the following sections.

5.3.1 Build Alternative

For the purpose of this scenario, the Build traffic forecasts were developed for the SR 429 (Wekiva Parkway) corridor from east of Wekiva River Road to Orange Boulevard as a six (6) lane divided controlled access tolled facility. In addition, this alternative includes a non-tolled, frontage road for local travel. It is to be noted that based on conversations with FDOT staff, this section of SR 429 (Wekiva Parkway) is being designed as a six (6) lane limited access tolled expressway but will only be built initially as a four (4) lane limited access tolled expressway (see **Appendix A**).

5.4 Future Travel Demand

The development of traffic forecasts for study corridors is not complete without a review of the historical traffic growth, population estimates along the corridor, and a review of the future year model forecasts. Due to the specific conditions associated with any roadway, it is necessary to utilize the various methods in projecting future traffic forecasts (such as trends analysis, population estimates and Travel Demand Models) for comparison purposes. The following sections discuss the various methodologies used in developing future travel demand in the study.

5.4.1 Historical Traffic Growth

A trend analysis was performed for the FDOT count location site #770074 (SR 46 east of Wekiva River). Based on the historical data obtained from the count station, a future growth trend was established by a least square linear regression of the historic counts. As seen in **Table 11**, the trend analysis for the count station #770074 along SR 46 resulted in an annual growth rate of 3.3% with a trend R-squared value greater than 75%. The trend analysis sheets are provided as **Appendix H**.

Table 11: Trend Analysis Growth Rate

Location	2012 AADT	2040 AADT	R2 (%)	Annual Growth Rate (%)
Mainline (SR 46)				
East of Wekiva River	20,200	38,900	78.7%	3.3%

5.4.2 Seminole County Population Projections

Population projection data obtained from the BEBR Bulletin 165 published by the University of Florida were used for comparison purposes. **Table 12** shows the year 2012 population data and the high and medium population estimates for the Year 2040 along with the corresponding growth rate.

Table 12: Population Analysis

Seminole County	Population Analysis		
	2012	2040	Growth
Medium Population Estimate	428,104	540,300	0.9%
High Population Estimate	428,104	653,700	1.9%

As seen on **Table 12**, the medium and high population estimates obtained from BEBR reported an annual growth rate of 0.9% and 1.9% per year, respectively. The BEBR population projection data are included in **Appendix H**.

5.4.3 Travel Demand Model

The modeling efforts were completed for the Build Alternative using the latest Central Florida Regional Planning Model, Version 5.0 (CFRPM V5.0). This model represents the latest adopted LRTP project lists in FDOT District Five including Orange, Seminole, Volusia, Lake, Brevard, Osceola, Marion, Flagler, and Sumter Counties. The latest adopted model has a 2005 base validated model and a 2035 Cost Feasible

Plan model. It is to be noted that the validated CFRPM model used for the Final Design Traffic Technical Memorandum (DTTM) for SR 46 Final Engineering Design Study from west of US 441 to east of Round Lake Road (Financial Project Id # 238275-2/3) prepared in November 2012 was used as the starting point for the modeling efforts of this study.

A model run was performed for the design year 2040 using the year 2040 socio economic (zonedata) extrapolated from the years 2005 (base year) and 2035 (adopted cost feasible year) zonedata. The population data obtained from the extrapolated year 2040 zonedata for Lake and Seminole Counties was checked for reasonableness against the medium population estimates for the year 2040 obtained from the BEBR Bulletin 265.

Table 13: Zonedata Population Check

County	Year 2040 BEER Medium Population Estimates	Year 2040 CFRPM Population Data	Percent Difference
Lake	484,500	554,041	14.4%
Seminole	540,300	504,028	-6.7%
Total	1,024,800	1,058,069	3.2%

As seen in **Table 13**, the year 2040 population data from the CFRPM zonedata is approximately 3.2% higher than the year 2040 medium BEER population estimates.

It is to be noted that the year 2040 model run was performed using the 2035 CFRPM Cost Feasible network which includes the planned tolled SR 429 (Wekiva Parkway) as well as all the planned improvements identified in Section 5.2.2.

Because of the unique circumstances of this project, including the demolition of SR 46 and its replacement with the planned SR 429 (Wekiva Parkway) a different approach was undertaken to develop the travel demand model growth rates within the study area. This method involved conducting a model run for the year 2013 using the 2035 CFRPM Cost Feasible network (including all the planned improvements identified in Section 5.2.2) along with year 2013 zonedata interpolated from the years 2005 (base year) and 2015 (interim year) zonedata.

The year 2012 Model Output Conversion Factors (MOCF) for Lake and Seminole Counties were used to convert the Peak Season Weekday Average Daily Traffic (PSWADT) obtained from the 2013 and 2040 travel demand models to AADT. The years 2013 and 2040 CFRPM travel demand forecasts for the Build Alternative are summarized in **Table 14**. The CFRPM model plots are provided in **Appendix I**.

Table 14: CFRPM Future Traffic Forecasts

Roadway Segment	YR 2013 CFRPM		YR 2040 BUILD - CFRPM		YR 2013-2040 Annual Growth Rate
	YR 2013 (PSWADT)	YR 2013 (AADT) ¹	YR 2040 (PSWADT)	YR 2040 (AADT) ¹	
Mainline (SR 429)					
East of Wekiva River Road ⁽²⁾	26,624	25,000	77,592	73,000	7.1%
East of EB Off/WB On Slip Ramps	26,486	25,500	77,100	75,000	7.2%
East of EB On/WB Off Slip Ramps	29,841	29,000	84,854	82,500	6.8%
West of Orange Boulevard	17,275	17,000	61,957	60,000	9.4%
Side Streets					
SR 429 Ramps					
EB Off/WB On Slip Ramps	138	150	491	500	8.6%
EB On/WB Off Slip Ramps	3,355	3,300	7,755	7,500	4.7%
EE and FF Ramps	12,566	12,000	22,897	22,000	3.1%
Frontage Roads/SR 46					
East of Wekiva River Road ⁽²⁾	8,391	7,900	15,374	14,500	3.1%
East of EB Off/WB On Slip Ramps	8,529	8,300	15,866	15,500	3.2%
East of Longwood Markham Road	7,813	7,600	14,481	14,000	3.1%
East of EB On/WB Off Slip Ramps	4,458	4,300	6,727	6,500	1.9%
East of Lake Markham Road	5,902	5,700	8,238	8,000	1.5%
West of Orange Boulevard	17,789	17,500	30,402	29,500	2.5%
East of Orange Boulevard	22,128	21,500	29,950	29,000	1.3%
Longwood-Markham Road					
South of SR 429 (Wekiva Parkway)	716	700	1,336	1,300	3.2%
Lake Markham Road					
South of SR 429 (Wekiva Parkway)	2,089	2,000	2,362	2,300	0.6%
Orange Boulevard					
North of SR 46	7,092	6,900	12,225	12,000	2.7%
South of SR 46	6,770	6,600	8,487	8,200	0.9%

Note:

1. PSWADT volumes from the model were multiplied by a Seminole County MOCF of 0.97 to derive the model AADT with the exception of the segments of SR 429 and the Frontage Road East of the Wekiva River Road.
2. PSWADT model volumes along the segments of SR 429 and the Frontage Road (East of Wekiva River Road) were converted to AADT using the Lake County MOCF of 0.94.

As seen in **Table 14**, the CFRPM model predicts that the SR 429 (Wekiva Parkway) corridor would sustain an annual growth rates ranging from 6.8% to 9.4% from the year 2013 to the year 2040 under the Build Alternative.

5.5 Recommended Future Traffic Forecasts

The growth rates obtained from the trend analysis, and the BEBR population growth rates were compared against the travel demand model future traffic forecasts for the SR 429 (Wekiva Parkway) including its frontage road and the side streets intersecting the corridor.

5.5.1 SR 429 (Wekiva Parkway)

Based on the comparison of the three (3) methodologies examined, we recommend the use of the year 2040 future traffic projections obtained from the CFRPM model for the development of future traffic forecasts along the SR 429 (Wekiva Parkway) corridor, including its frontage road, for the Build Alternative.

The use of the CFRPM model traffic projections to develop the SR 429 (Wekiva Parkway) traffic volumes for the Build Alternative is appropriate based on the fact that the CFRPM model is a district-wide model and includes the entire planned SR 429 (Wekiva Parkway) corridor. This is a critical consideration when developing the future traffic volume forecasts since the planned SR 429 (Wekiva Parkway) corridor is coded in the CFRPM 2035 cost feasible network as a tolled facility and is anticipated to serve as major route connecting the Lake, Seminole and Orange Counties.

In addition, the traffic forecasts from the year 2040 CFRPM were checked against the future traffic forecasts obtained from the Wekiva Parkway/SR 46 Realignment PD&E Study Final Preliminary Engineering Report (PER) prepared on December 2011 which were developed using the Year 2025 Orlando Urban Area Transportation Study (OUATS) Model.

Table 15: Future Traffic Forecasts Reasonableness Check

Roadway Segment	YR 2040 CFRPM AADT	YR 2032 AADT (Wekiva Parkway PER)
SR 429 (Wekiva Parkway)		
East of Wekiva River Road	73,000	71,600
West of Orange Boulevard	60,000	62,400
Service Road		
East of Wekiva River Road	14,500	16,400
Frontage Road/SR 46		
West of Orange Boulevard	29,500	31,500

As seen in **Table 15**, the future traffic projections obtained from the 2040 CFRPM are very close to the projections obtained from the Wekiva Parkway PER.

Based on the above mentioned facts, the use of the year 2040 CFRPM traffic projections are recommended in the development of future traffic forecasts along the SR 429 (Wekiva Parkway) corridor including its frontage road for the opening year 2020, mid-design year 2030, and design year 2040 traffic volumes under the Build Alternative.

5.5.2 Side Streets

The year 2040 CFRPM traffic projections are recommended in the development of future traffic forecasts for Orange Boulevard (north and south of SR 46) for the opening year 2020, mid-design year 2030, and design year 2040 traffic volumes for the Build Alternative.

Furthermore, we recommend growing the existing year 2013 AADT volumes along the remaining side streets using the historical annual growth rate of 3.3% (obtained from FDOT count location site #770074) to develop the opening year 2020, mid-design year 2030, and design year 2040 Build Alternative future traffic forecasts. It is to be noted that for the purpose of this study a 2013 AADT of 100 was assumed for side streets exhibiting year 2013 AADTs lower than 100 vehicles in order to be conservative.

5.6 Build Future AADT Volumes

The design year 2040 daily traffic volumes for the Build Alternative were derived using the recommended methodologies included in Section 5.5. In addition, the opening year 2020 and mid-design year 2030 traffic volumes were derived using interpolation of traffic volumes between 2013 and 2040. It is to be noted that the future AADTs along the SR 429 (Wekiva Parkway) and the ramps to the frontage road were balanced. The future year AADT volumes for the Build Alternative are summarized in **Table 16** and shown in **Figures 6-1** through **6-3**.

Table 16
SR 429 / SR 46 Design Traffic Technical Memorandum
Build Alternative Future AADT Volumes

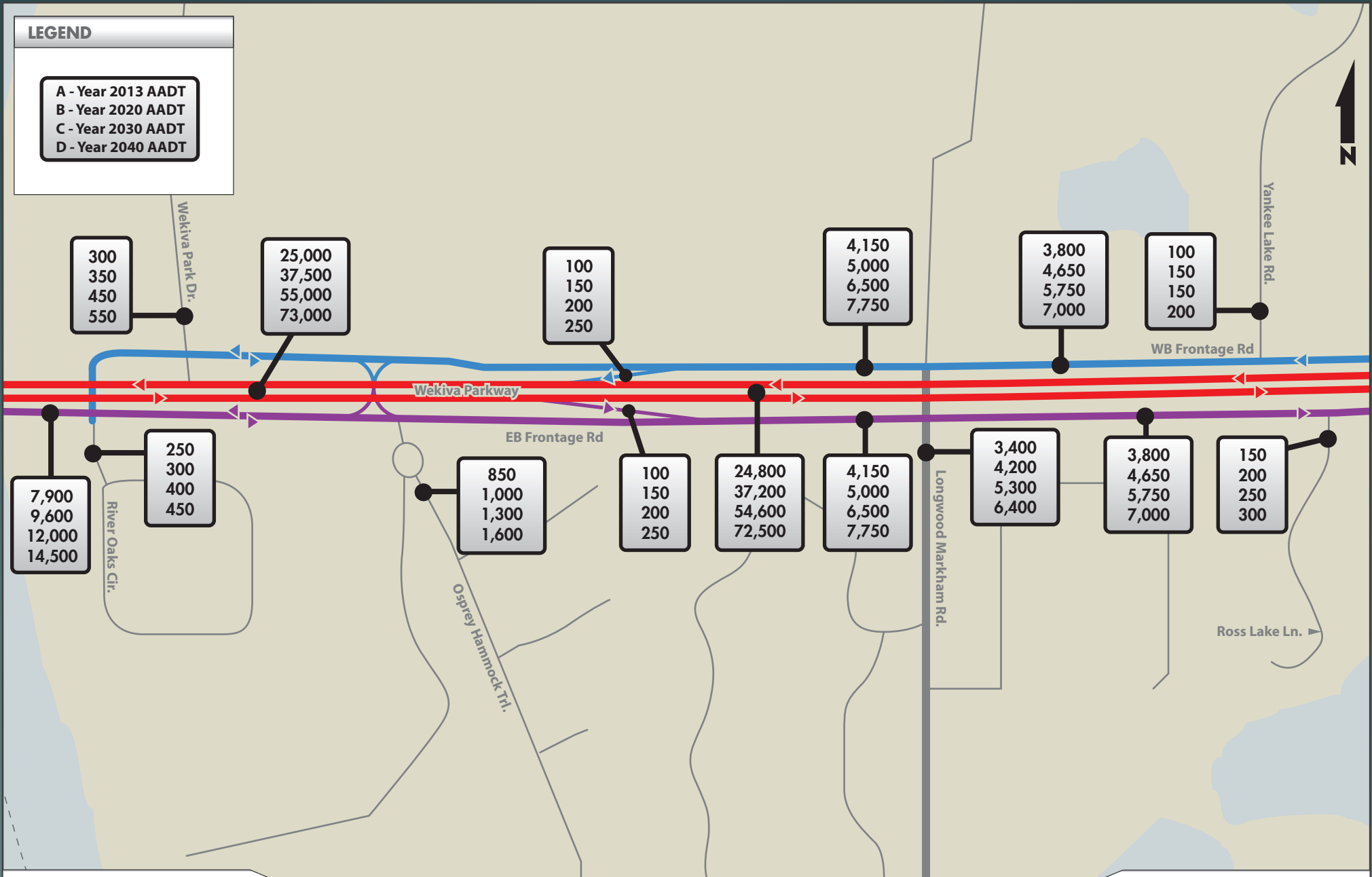
Roadway Segment	Recommended Growth Source	Build Alternative			
		YR 2013 AADT	YR 2020 AADT	YR 2030 AADT	YR 2040 AADT
Mainline (SR 429)					
East of Wekiva River Road	CFRPM	25,000	37,500	55,000	73,000
East of EB Off/WB On Slip Ramps	CFRPM	24,800	37,200	54,600	72,500
East of EB On/WB Off Slip Ramps	CFRPM	29,000	43,000	62,500	82,500
West of Orange Boulevard	CFRPM	17,000	28,000	44,000	60,000
Side Streets					
SR 429 Ramps					
EB Off/WB On Slip Ramps	CFRPM	200	300	400	500
EB On/WB Off Slip Ramps	CFRPM	4,200	5,800	7,900	10,000
EE and FF Ramps	CFRPM	12,000	15,000	18,500	22,500
Service/Frontage Roads					
East of Wekiva River Road	CFRPM	7,900	9,600	12,000	14,500
East of EB Off/WB On Slip Ramps	CFRPM	8,300	10,000	13,000	15,500
East of Longwood Markham Road	CFRPM	7,600	9,300	11,500	14,000
East of EB On/WB Off Slip Ramps	CFRPM	3,600	4,000	4,500	5,000
East of Lake Markham Road	CFRPM	5,600	6,000	6,600	7,200
West of Orange Boulevard	CFRPM	17,500	20,500	25,000	29,500
East of Orange Boulevard	CFRPM	21,500	23,500	26,000	29,000
Orange Boulevard					
North of SR 46	CFRPM	6,900	8,200	10,000	12,000
South of SR 46	CFRPM	6,600	7,000	7,600	8,200
River Oak Circle					
South of Service Road 1	Historical Growth Rate	250	300	400	450
Wekiva Park Drive					
North of Service Road 1	Historical Growth Rate	300	350	450	550
Osprey Hammock Trail					
South of EB Frontage Road	Historical Growth Rate	850	1,000	1,300	1,600
Longwood-Markham Road					
South of EB Frontage Road	Historical Growth Rate	3,400	4,200	5,300	6,400
Yankee Lake Road					
North of WB Frontage Road	Historical Growth Rate	100	150	150	200
Ross Lake Lane					
South of EB Frontage Road	Historical Growth Rate	150	200	250	300
Bella Foresta Place					
South of EB Frontage Road	Historical Growth Rate	300	350	450	550
Lake Markham Road					
South of EB Frontage Road	Historical Growth Rate	1,200	1,500	1,900	2,300
Maureen Drive					
South of EB Frontage Road	Historical Growth Rate	150	200	250	300
Glade Road					
South of EB Frontage Road	Historical Growth Rate	100	150	150	200
Glade View Drive					
South of EB Frontage Road	Historical Growth Rate	300	350	450	550
Twelve Oaks Place					
North of WB Frontage Road	Historical Growth Rate	200	250	350	400
Orange Avenue					
North of WB Frontage Road	Historical Growth Rate	250	300	400	450
Wayside Drive					
East of Orange Boulevard	Historical Growth Rate	1,600	2,000	2,500	3,000
Center Road					
North of SR 46	Historical Growth Rate	100	150	150	200
South of SR 46	Historical Growth Rate	100	150	150	200

Note:

1. AADTs along the SR 429 and its ramps to the frontage road have been balanced for the Build Alternative Conditions.

LEGEND

- A - Year 2013 AADT
- B - Year 2020 AADT
- C - Year 2030 AADT
- D - Year 2040 AADT



DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

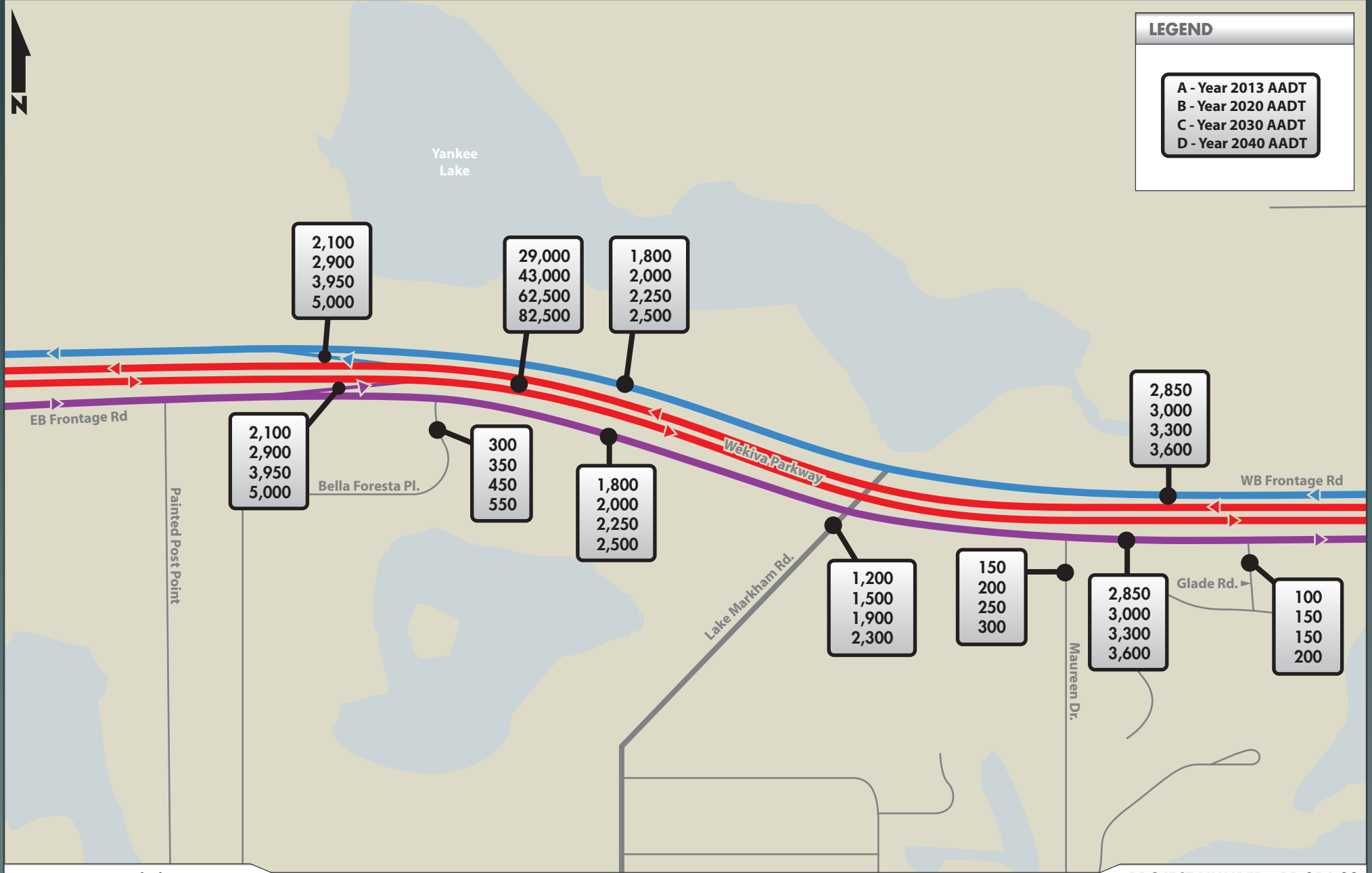
FIGURE 6-1

Future AADT Volumes - Build Alternative



LEGEND

- A - Year 2013 AADT
- B - Year 2020 AADT
- C - Year 2030 AADT
- D - Year 2040 AADT



DATE CREATED: 8/7/2013

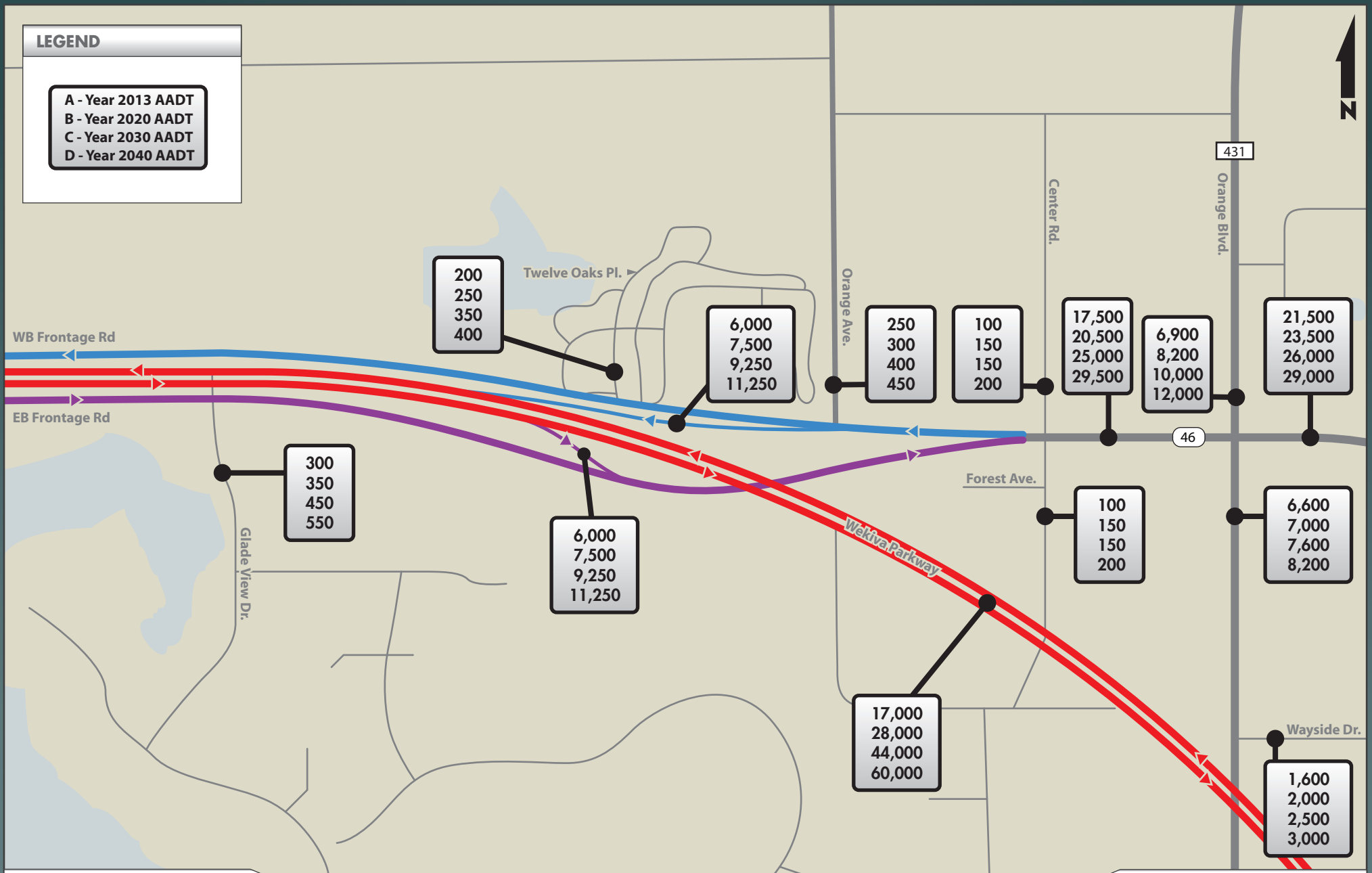
PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 6-2
 Future AADT Volumes - Build Alternative

LEGEND

- A - Year 2013 AADT
- B - Year 2020 AADT
- C - Year 2030 AADT
- D - Year 2040 AADT



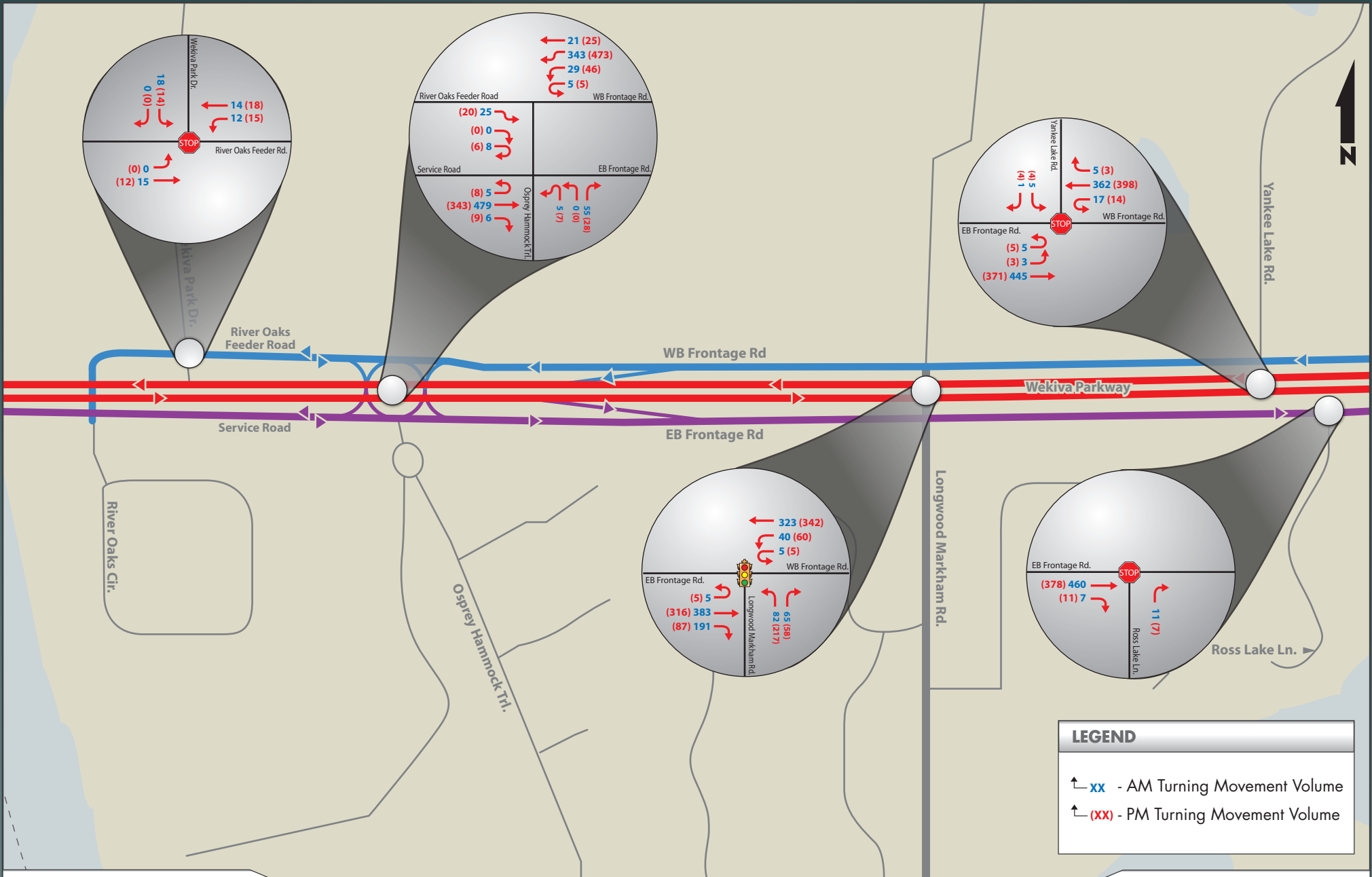
DATE CREATED: 8/13/2013 PROJECT NUMBER: 11-016.33

5.7 Intersection Design Hour Volumes

The year 2013 and future year AADTs for the Build Alternative along with the recommended traffic characteristics were used to develop the design hour volumes (DHVs) for both the a.m. and p.m. design hours at the intersections for the opening, mid-design, and design years.

The DHVs for the intersections were developed using the TURNS5 spreadsheet, which balances AADTs and calculates DHVs based on Standard K and D factors used as input into the program. The estimated design hour volumes for the a.m. and p.m. design hours from TURNS5 spreadsheet were assessed and adjusted for reasonableness. These adjustments are necessary because accepting an estimated volume that is unrealistically large may lead to over design and accepting an estimated volume that is too small may result in an inadequate design. The adjustments that were made are reported in the TURNS5 output sheets included in **Appendix J**.

The future year a.m. and p.m. design hour turning movement volumes for the Build Alternative are shown in **Figures 7, 8, and 9** for years 2020, 2030 and 2040, respectively.



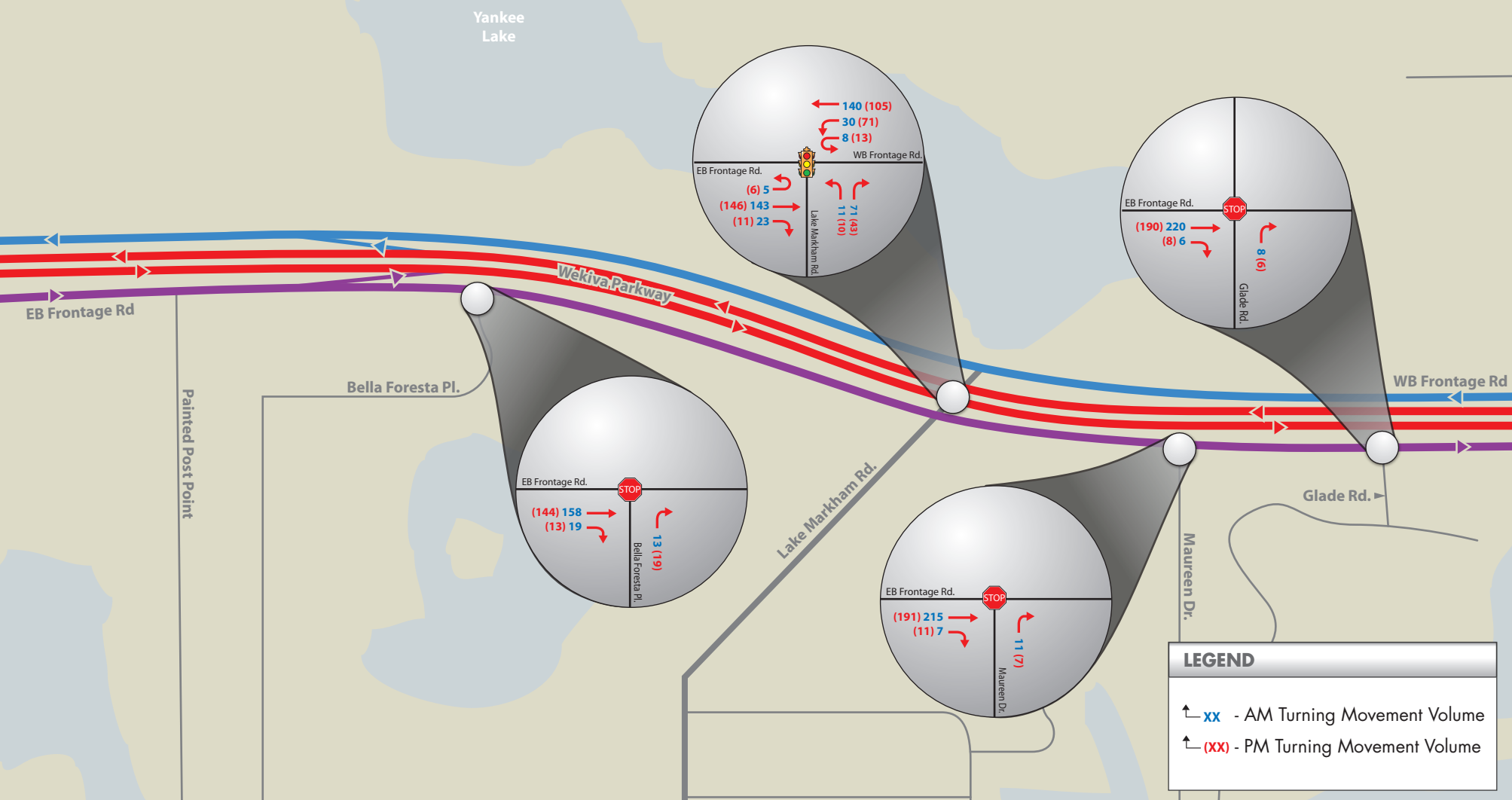
DATE CREATED: 9/9/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 7-1
Year 2020 Design Hour Turning Movement Volumes
Build Alternative

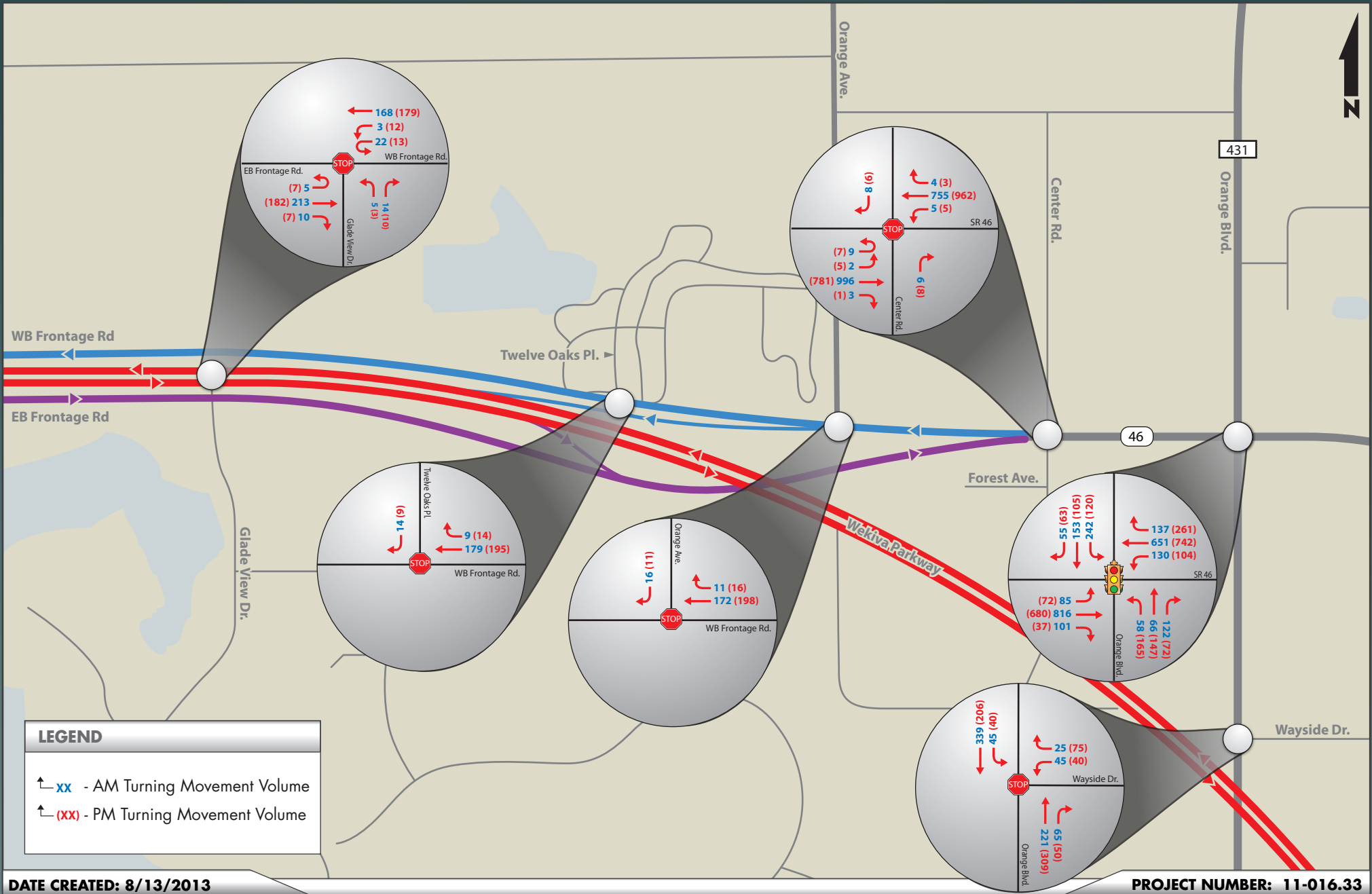


DATE CREATED: 9/9/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 7-2
 Year 2020 Design Hour Turning Movement Volumes
 Build Alternative



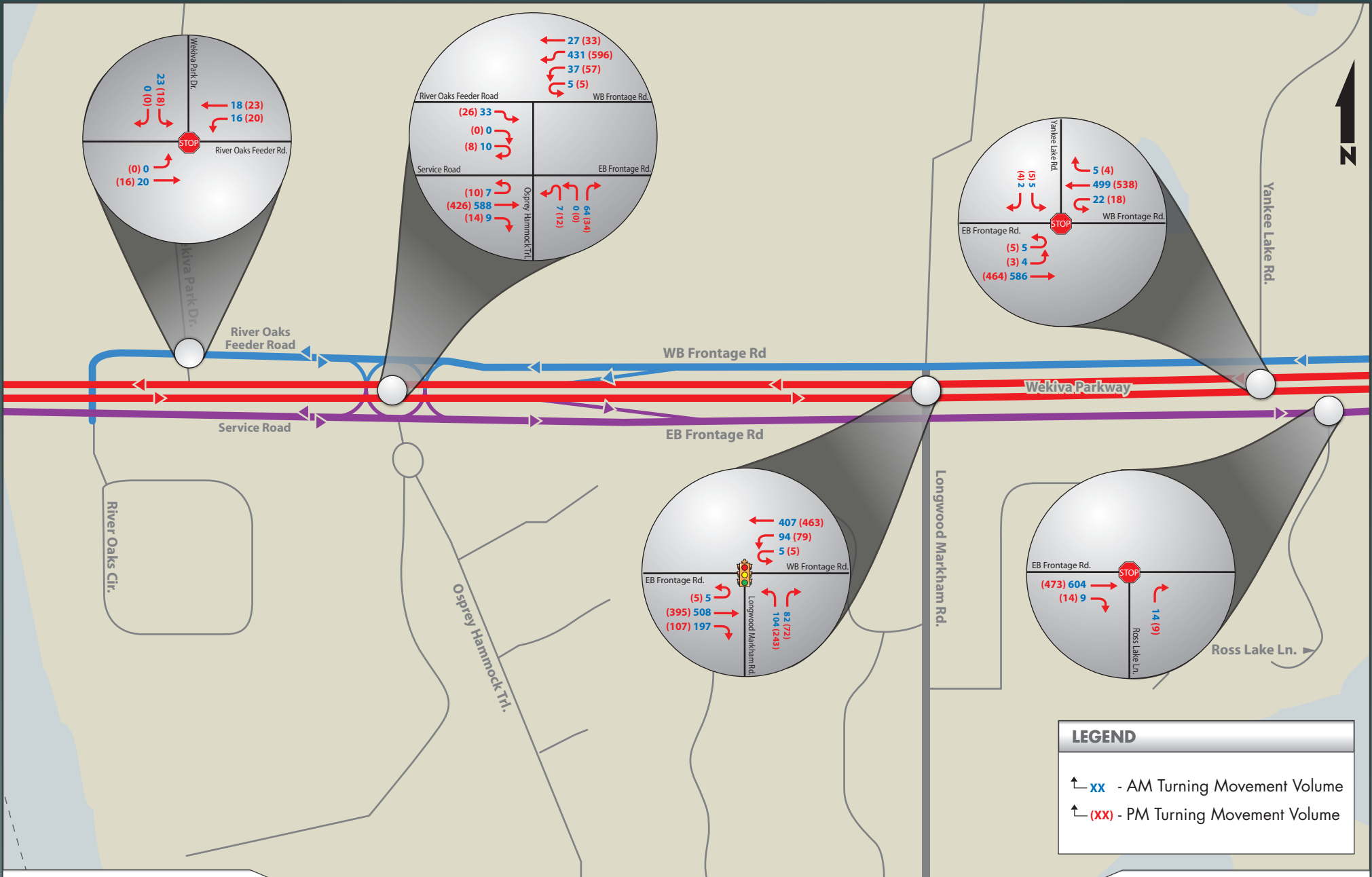
DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 7-3
Year 2020 Design Hour Turning Movement Volumes
Build Alternative



DATE CREATED: 9/9/2013

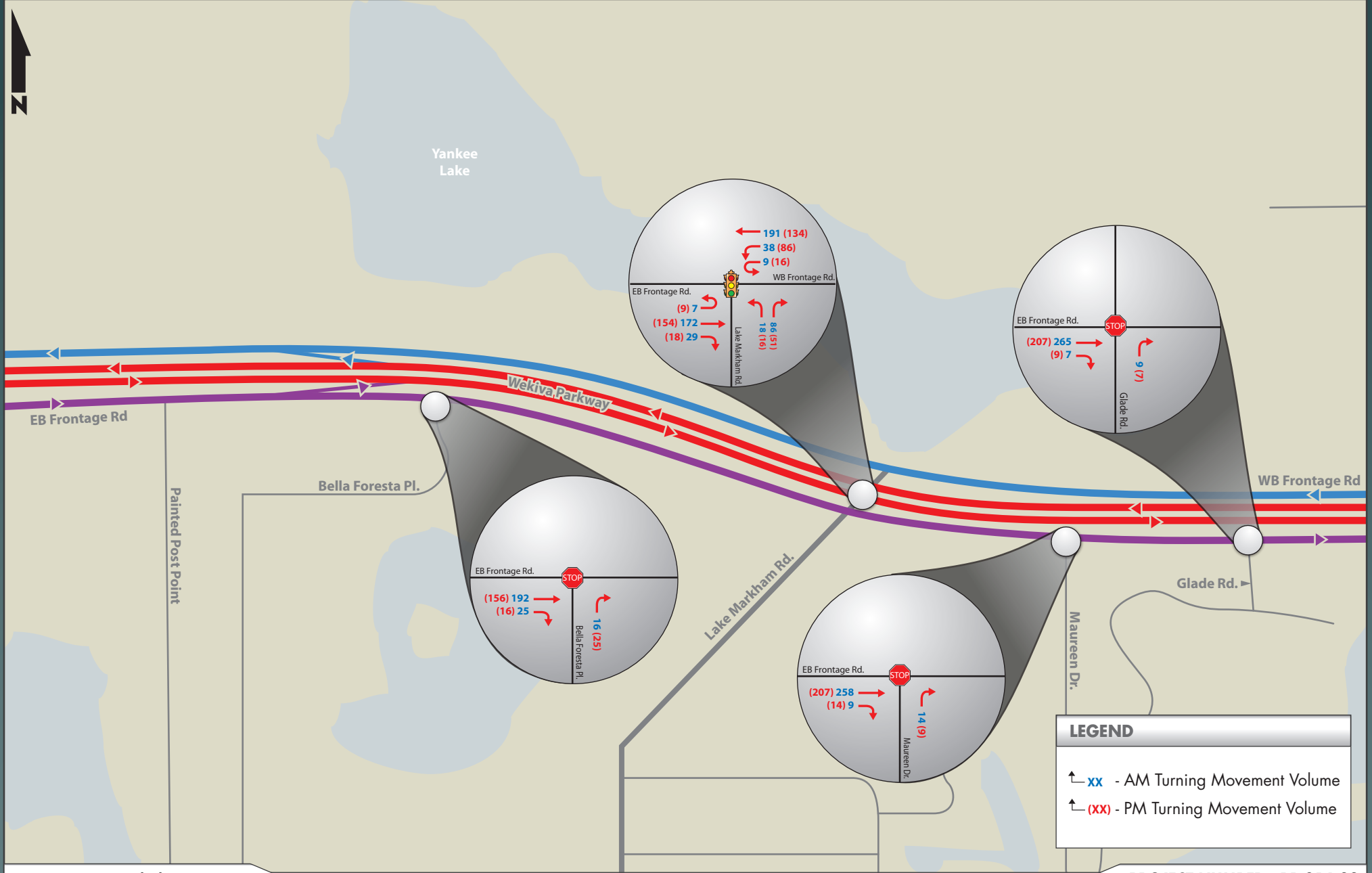
PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 8-1

Year 2030 Design Hour Turning Movement Volumes
 Build Alternative



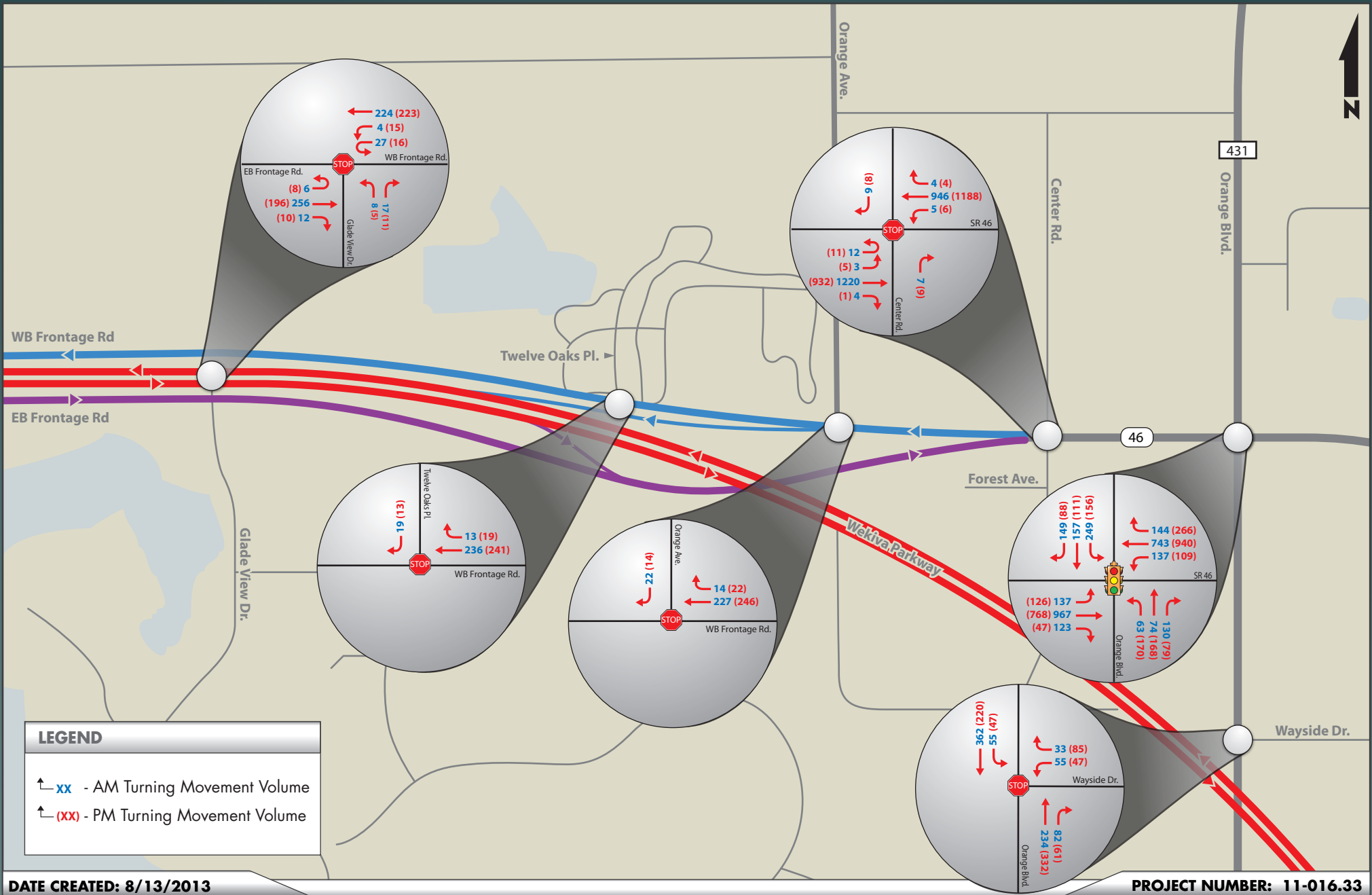
DATE CREATED: 9/9/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 8-2
Year 2030 Design Hour Turning Movement Volumes
Build Alternative



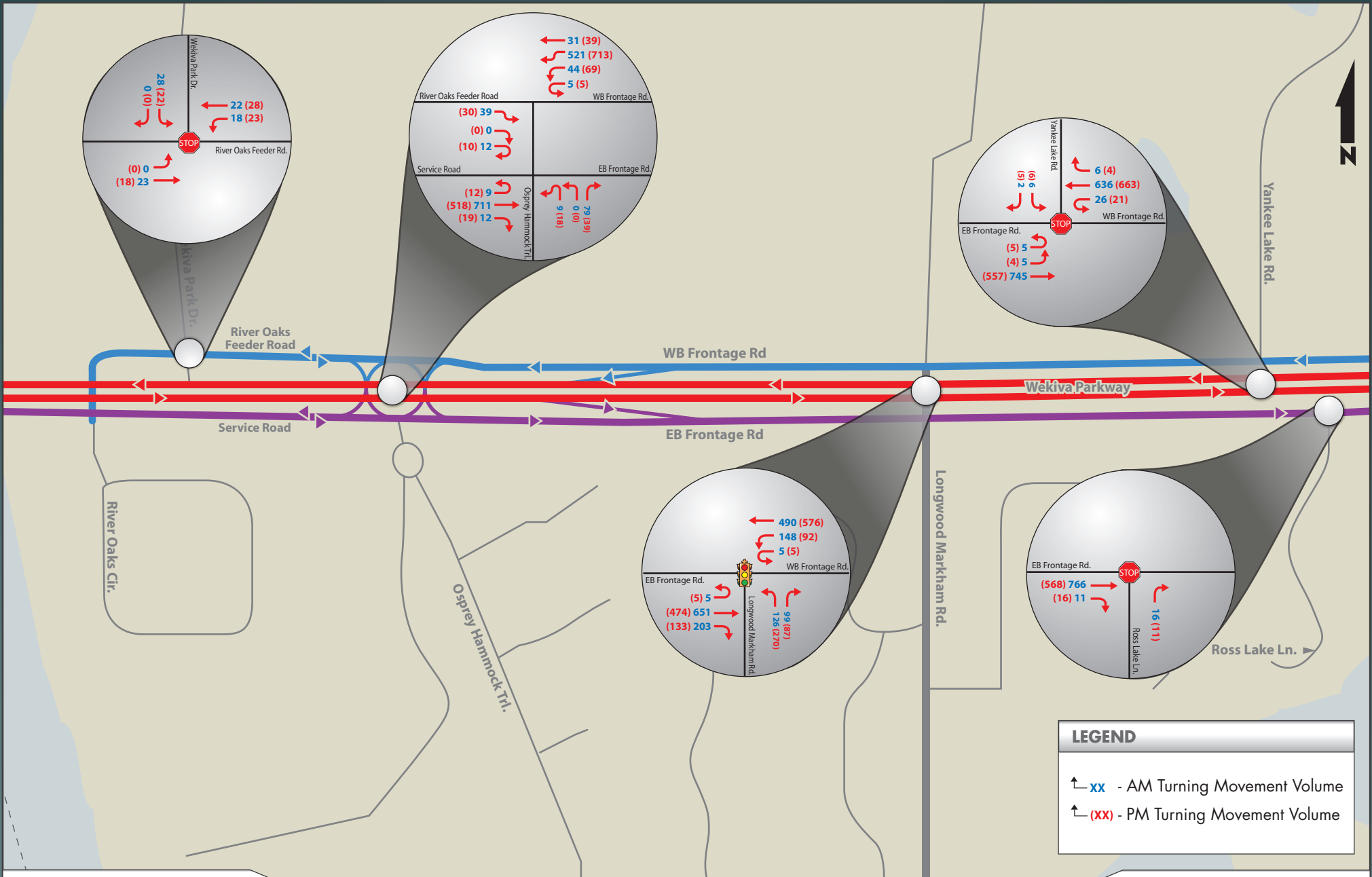
DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 8-3
Year 2030 Design Hour Turning Movement Volumes
Build Alternative



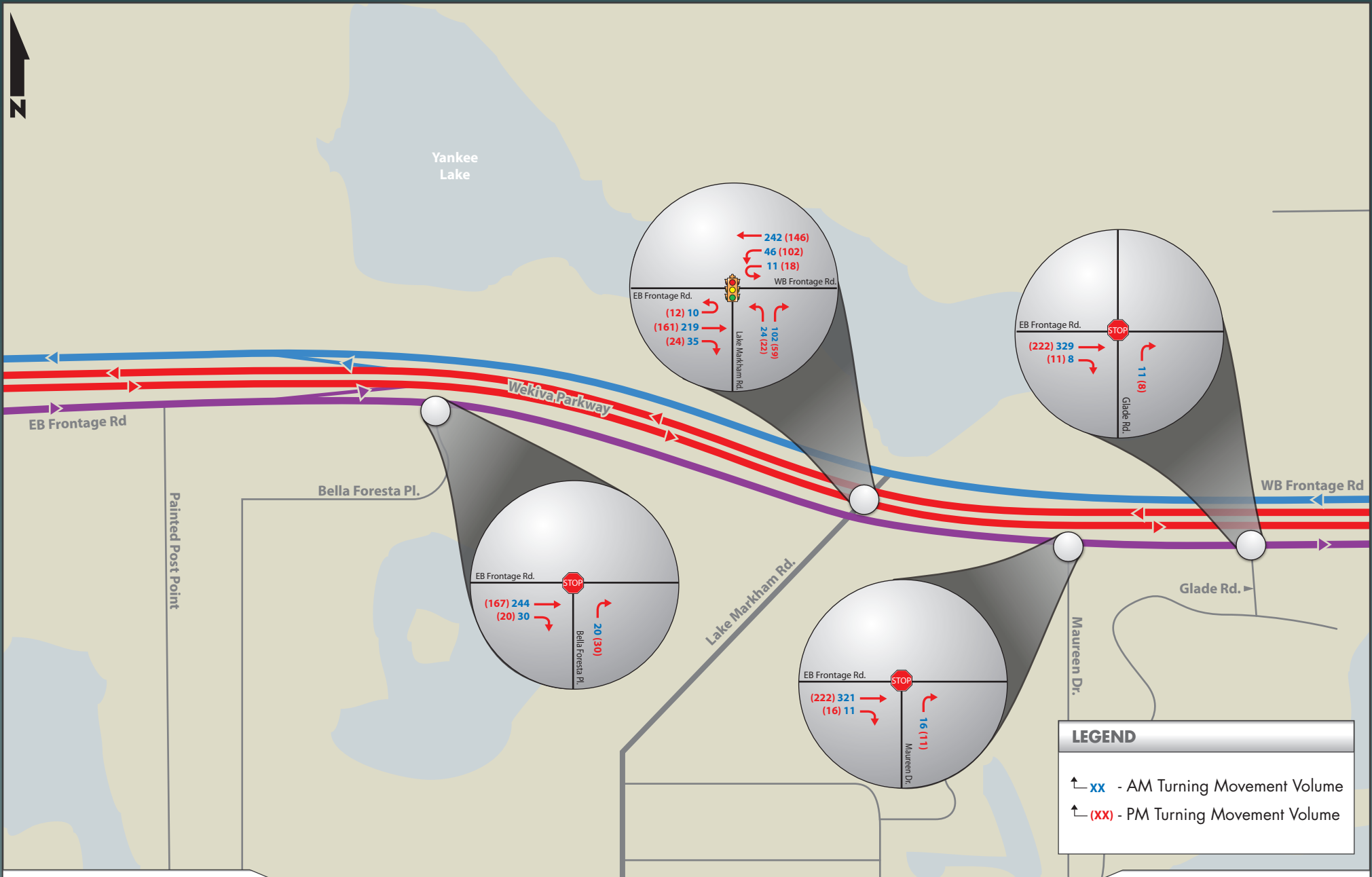
DATE CREATED: 9/9/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 9-1
 Year 2040 Design Hour Turning Movement Volumes
 Build Alternative



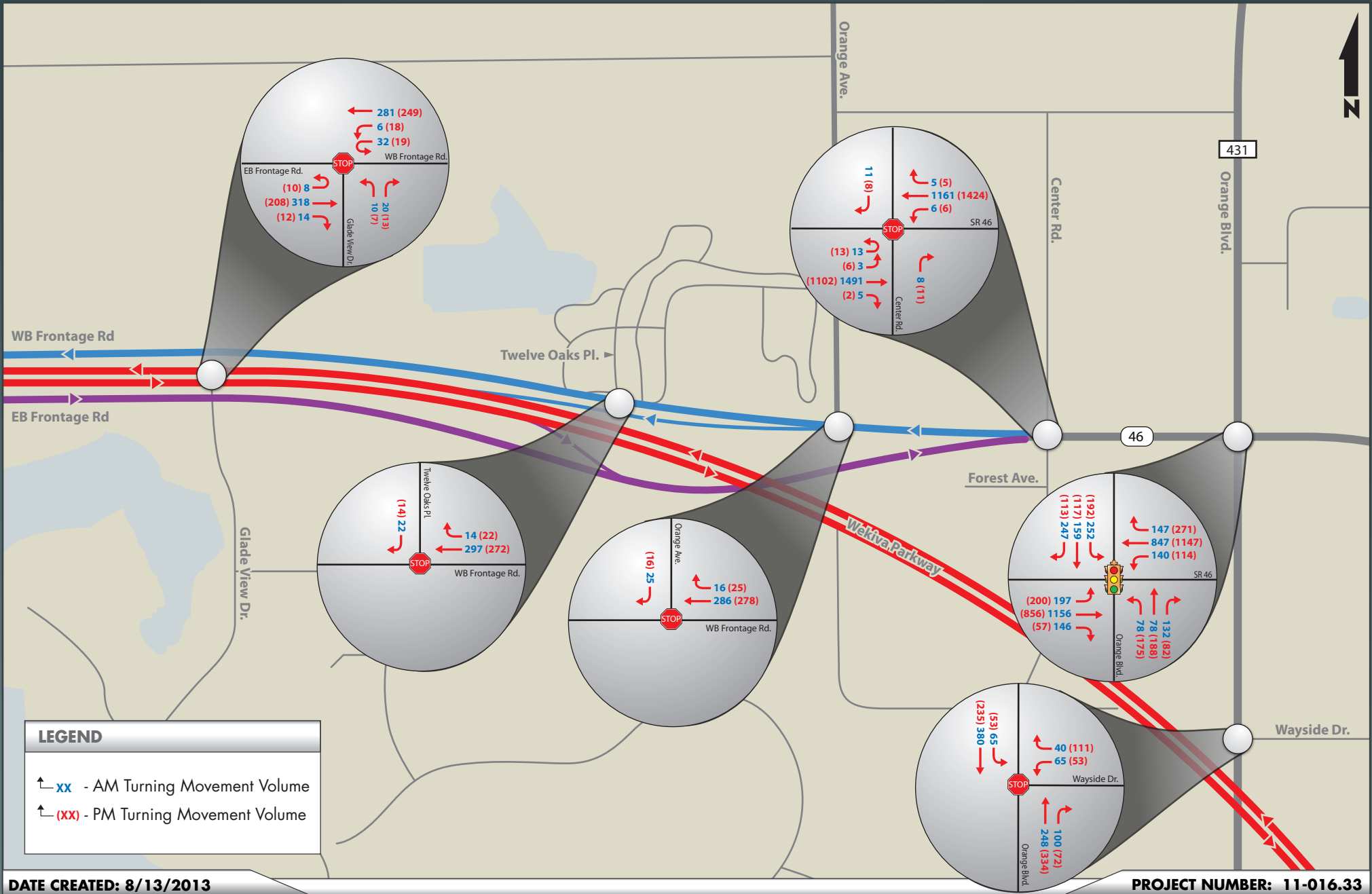
DATE CREATED: 9/9/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 9-2
Year 2040 Design Hour Turning Movement Volumes
Build Alternative



Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 9-3
Year 2040 Design Hour Turning Movement Volumes
Build Alternative

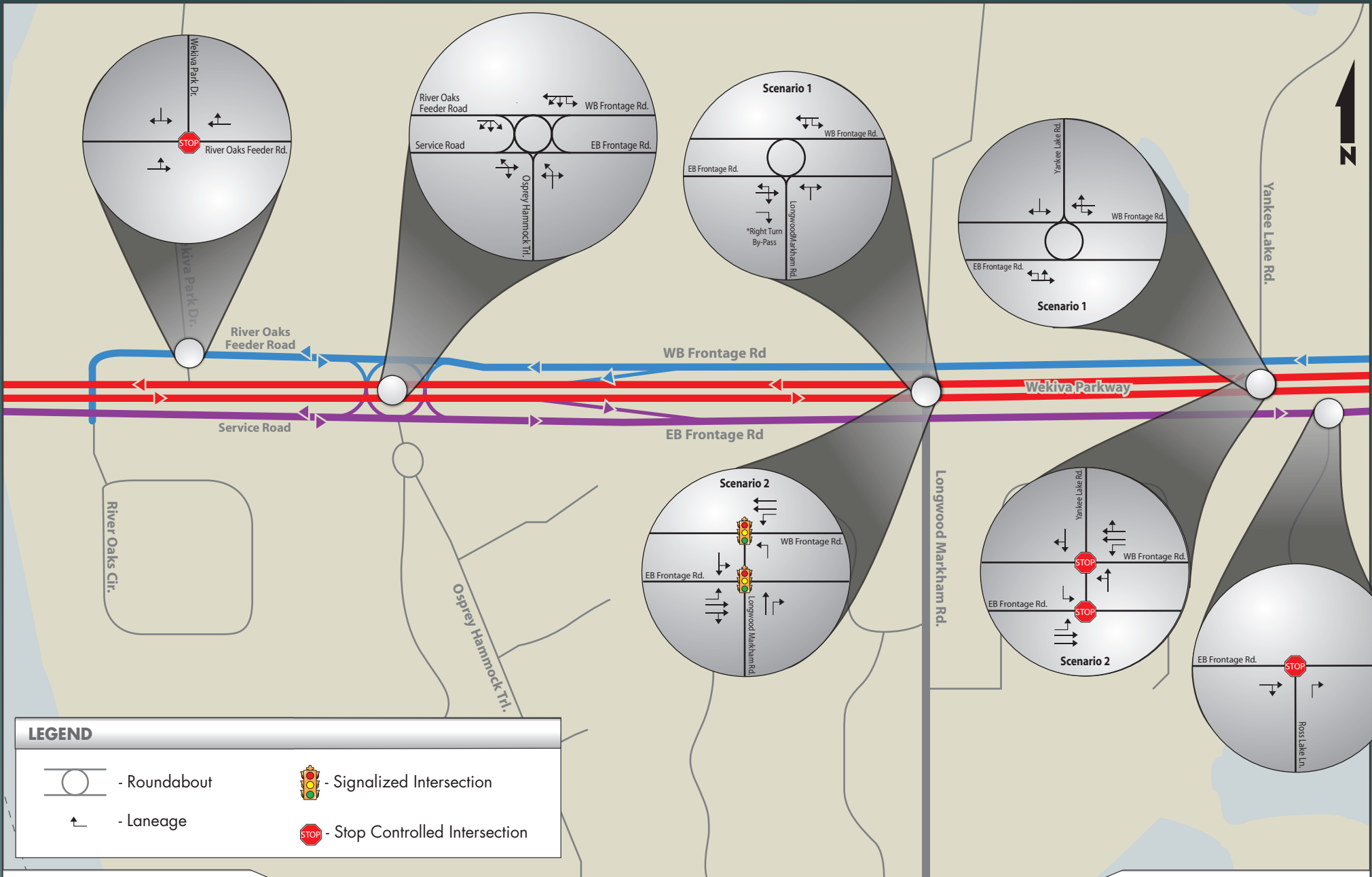
6 Future Build Alternative Operational Analysis

This section presents the results of the LOS operational analysis for the Build Alternative. The Build Alternative was designed to examine traffic operations of the new four (4) lane divided controlled access/tolled SR 429 (Wekiva Parkway) and its two (2) lane frontage road. Specific analysis techniques utilized in the study include signalized and unsignalized intersections, roundabouts, ramps, freeway, and arterial analyses. The outputs of Synchro 7 were presented as results for the intersection LOS analysis. Since Synchro calculates arterial LOS only between signalized intersections, the DDHVs along the SR 429 (Wekiva Parkway) were analyzed using the latest HCS 2010™ Freeway Software (version 6.5) and the DDHVs for the frontage roads were compared against the latest Generalized Peak Hour Directional Service Volumes (dated December 18, 2012) from 2012 FDOT Quality/Level of Service Handbook to obtain the arterial LOS. The merge/diverge analyses for the six (6) ramps along the SR 429 (Wekiva Parkway), Section 7A, were performed using the HCS 2010™ Ramp Software (version 6.5). In addition, roundabouts along the frontage road were analyzed using the HCS 2010™ Roundabout Software (version 6.5).

6.1 Build Alternative Geometry

The proposed build geometry for the SR 429 (Wekiva Parkway) corridor includes the construction of a new four (4) lane divided limited access toll road facility generally following the existing SR 46 alignment. The project will also include designing a two (2)-lane non-tolled, service/frontage road for local travel, slip ramps to enter and exit the Wekiva Parkway, and several bridges over side streets (**see Appendix A**).

Per the request of FDOT staff and the design team, the Frontage Road was analyzed under two (2) scenarios. For the first scenario, the Frontage Road was analyzed as a two (2)-lane road (one lane on each direction) with roundabouts at the intersections of Osprey Hammock Trail, Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road. The second scenario was similar to the first scenario. However, for this second scenario, the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road were analyzed as “T intersections” with two (2) through lanes along the eastbound and westbound approaches of the intersections (four lanes total along the Frontage Road through the intersections). The Build Alternative Geometry can be seen in **Figures 10-1 through 10-3**.



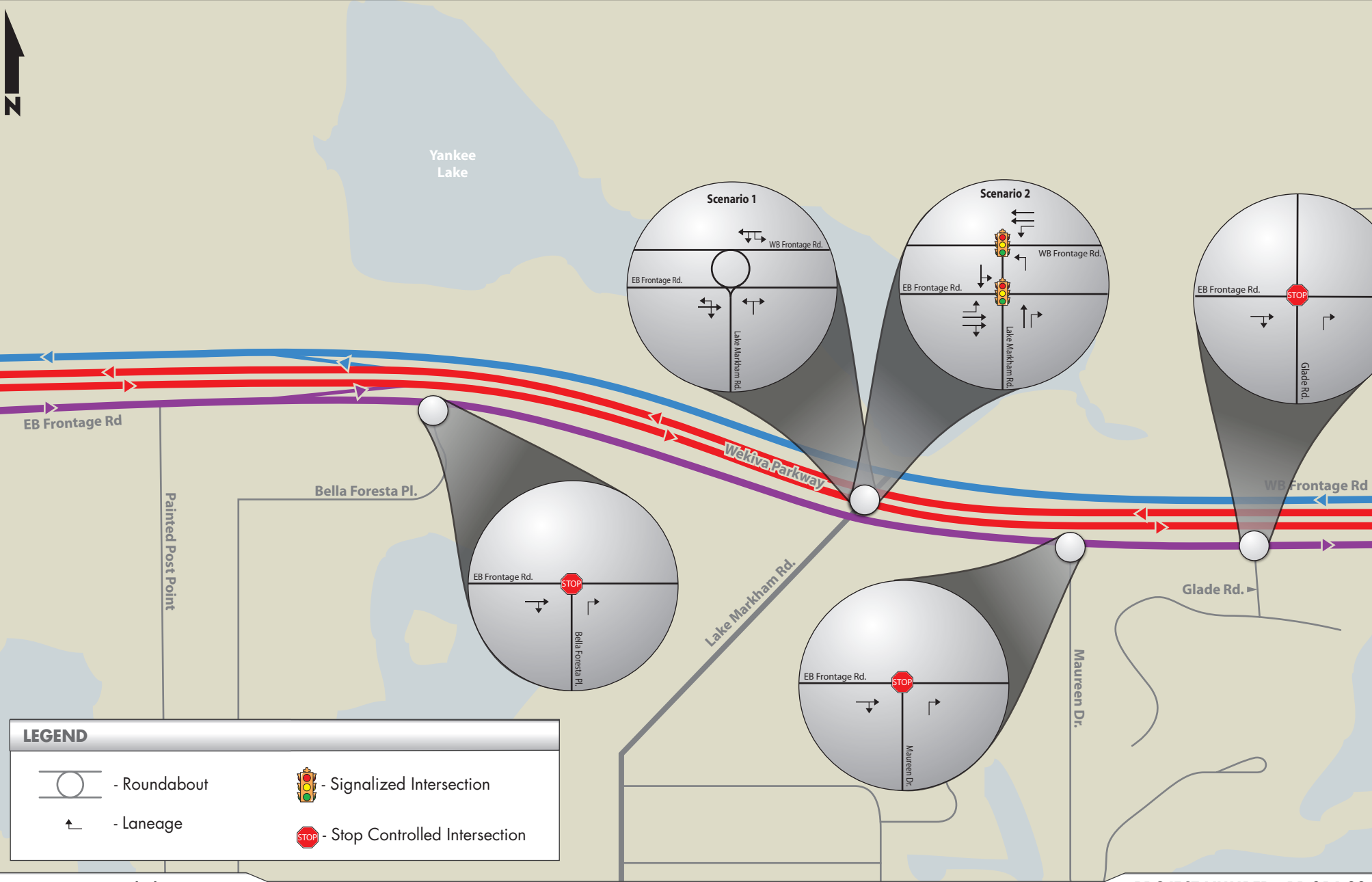
DATE CREATED: 9/9/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 10-1
Build Geometry



LEGEND

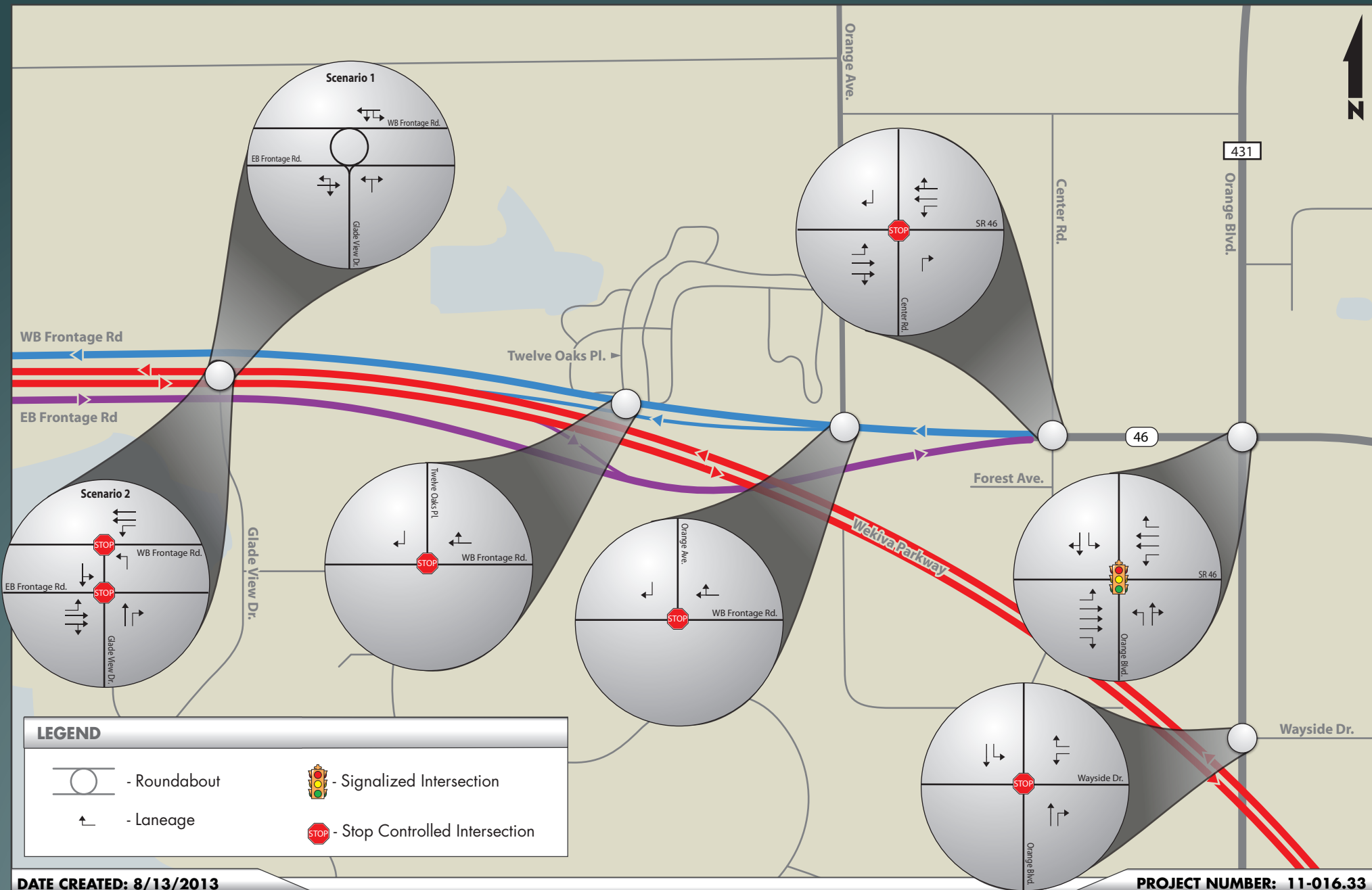
 - Roundabout	 - Signalized Intersection
 - Laneage	 - Stop Controlled Intersection

DATE CREATED: 8/7/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)
 Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 10-2
 Build Geometry



DATE CREATED: 8/13/2013

PROJECT NUMBER: 11-016.33

Design Traffic for SR 429 / SR 46 (Wekiva Parkway)

Financial Project ID: 240200-2 Roadway ID: 77320000

FIGURE 10-3
Build Geometry

6.2 Intersection Operational Analysis – Build Alternative

Intersection operational analyses were performed for the opening, mid-design and design years for two (2) scenarios of the Build Alternative (for the a.m. and p.m. design hours). The two (2) scenarios of the Build Alternative are described in detail in the following sub-sections.

6.2.1 Build Alternative – Scenario 1

For the purpose of the Build Alternative – Scenario 1, the Frontage Road was analyzed as a two (2)-lane road (one lane on each direction) with roundabouts at the intersections of Osprey Hammock Trail, Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road. The results of the Build Alternative – Scenario 1 intersection analysis are summarized in **Table 17**.

As shown in **Table 17**, under the Build Alternative – Scenario 1, all the intersections are projected to operate at an acceptable LOS during the opening year 2020, mid-design year 2030, and design year 2040 a.m. and p.m. design hour traffic conditions. The Synchro Intersection analysis and HCS Roundabout analysis outputs for the Build Alternative – Scenario 1 can be found in **Appendix K**.

6.2.2 Build Alternative – Scenario 2

Build Alternative – Scenario 2 was similar to the Build Alternative – Scenario 1. However, for the second scenario, the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road were analyzed as “T intersections” with two (2) lanes through the intersection along the eastbound and westbound approaches of the Frontage Road (four lanes total along the Frontage Road through the intersections). The results of the Build Alternative – Scenario 2 intersection analysis are summarized in **Table 18**.

As shown in **Table 18**, under the Build Alternative – Scenario 2, the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road are projected to operate at an acceptable LOS during the opening year 2020, mid-design year 2030, and design year 2040 a.m. and p.m. design hour traffic conditions. The Synchro Intersection analysis outputs for the Build Alternative – Scenario 2 can be found in **Appendix K**.

Table 17
SR 429 / SR 46 Design Traffic Technical Memorandum
Future Intersection LOS Summary – Build Alternative (Scenario 1)

Study Intersection	Traffic Control	FDOT Adopted LOS	YR 2020		YR 2030		YR 2040	
			Delay	LOS	Delay	LOS	Delay	LOS
AM Peak Hour								
River Oaks Feeder Road @ Wekiva Park Drive	Stop	D	0.0/8.8	A/A	0.0/8.8	A/A	0.0/8.9	A/A
Frontage Road @ Osprey Hammock Trail/River Oaks Feeder Road	Roundabout	D	8.94	A	11.60	B	16.69	C
Frontage Road @ Longwood-Markham Road	Roundabout	D	7.68	A	10.76	B	17.50	C
Frontage Road @ Yankee Lake Road	Roundabout	D	8.30	A	11.14	B	16.70	C
EB Frontage Road @ Ross Lake Lane	Stop	D	0.0/11.3	A/B	0.0/12.8	A/B	0.0/14.9	A/B
EB Frontage Road @ Bella Foresta Road	Stop	D	0.0/9.2	A/A	0.0/9.4	A/A	0.0/9.8	A/A
Frontage Road @ Lake Markham Road	Roundabout	D	5.13	A	5.71	A	6.49	A
EB Frontage Road @ Maureen Drive	Stop	D	0.0/9.5	A/A	0.0/9.8	A/A	0.0/10.3	A/B
EB Frontage Road @ Glade Road	Stop	D	0.0/9.5	A/A	0.0/9.8	A/A	0.0/10.3	A/B
Frontage Road @ Glade View Road	Roundabout	D	5.53	A	6.16	A	7.03	A
WB Frontage Road @ Twelve Oaks Place	Stop	D	0.0/9.3	A/A	0.0/9.7	A/A	0.0/10.1	A/B
WB Frontage Road @ Orange Avenue	Stop	D	0.0/9.3	A/A	0.0/9.7	A/A	0.0/10.1	A/B
SR 46 @ Center Road	Stop	D	10.5/12.3	B/B	11.7/13.8	B/B	13.7/16.0	B/C
SR 46 @ Orange Boulevard	Signal	D	32.0	C	34.7	C	41.5	D
Orange Boulevard @ Wayside Drive	Stop	E	8.0/13.2	A/B	8.1/14.1	A/B	8.2/15.2	A/C
PM Peak Hour								
River Oaks Feeder Road @ Wekiva Park Drive	Stop	D	0.0/8.7	A/A	0.0/8.8	A/A	0.0/8.9	A/A
Frontage Road @ Osprey Hammock Trail/River Oaks Feeder Road	Roundabout	D	9.40	A	12.81	B	19.33	C
Frontage Road @ Longwood-Markham Road	Roundabout	D	9.20	A	13.13	B	21.99	C
Frontage Road @ Yankee Lake Road	Roundabout	D	7.86	A	10.29	B	13.10	B
EB Frontage Road @ Ross Lake Lane	Stop	D	0.0/10.6	A/B	0.0/11.4	A/B	0.0/12.4	A/B
EB Frontage Road @ Bella Foresta Road	Stop	D	0.0/9.1	A/A	0.0/9.2	A/A	0.0/9.4	A/A
Frontage Road @ Lake Markham Road	Roundabout	D	5.28	A	5.72	A	6.08	A
EB Frontage Road @ Maureen Drive	Stop	D	0.0/9.3	A/A	0.0/9.5	A/A	0.0/9.6	A/A
EB Frontage Road @ Glade Road	Stop	D	0.0/9.3	A/A	0.0/9.4	A/A	0.0/9.5	A/A
Frontage Road @ Glade View Road	Roundabout	D	5.40	A	5.81	A	6.13	A
WB Frontage Road @ Twelve Oaks Place	Stop	D	0.0/9.4	A/A	0.0/9.7	A/A	0.0/9.9	A/A
WB Frontage Road @ Orange Avenue	Stop	D	0.0/9.4	A/A	0.0/9.8	A/A	0.0/10.0	A/B
SR 46 @ Center Road	Stop	D	9.6/11.2	A/B	10.3/12.0	B/B	11.3/13.0	B/B
SR 46 @ Orange Boulevard	Signal	D	32.7	C	35.9	D	47.7	D
Orange Boulevard @ Wayside Drive	Stop	E	8.1/11.9	A/B	8.3/12.5	A/B	8.3/12.8	A/B

Notes:

1. HCM 2000-based outputs are presented for the unsignalized and signalized intersections.
1. HCM 2010-based outputs are presented for the roundabout intersections.
3. For unsignalized intersections, worst-case results (delay and LOS) are reported for movements in both the major and minor approaches.

Table 18
SR 429 / SR 46 Design Traffic Technical Memorandum
Future Intersection LOS Summary – Build Alternative (Scenario 2)

Study Intersection	Traffic Control	FDOT Adopted LOS	YR 2020		YR 2030		YR 2040	
			Delay	LOS	Delay	LOS	Delay	LOS
AM Peak Hour								
WB Frontage Road @ Longwood-Markham Road	Signal	D	12.5	B	15.1	B	17.6	B
EB Frontage Road @ Longwood-Markham Road	Signal	D	15.8	B	18.2	B	20.5	C
WB Frontage Road @ Yankee Lake Road	Stop	D	7.2/11.6	A/B	7.2/12.6	A/B	7.2/14.4	A/B
EB Frontage Road @ Yankee Lake Road	Stop	D	7.2/10.2	A/B	7.2/10.9	A/B	7.2/11.8	A/B
WB Frontage Road @ Lake Markham Road	Signal	D	13.3	B	13.5	B	13.8	B
EB Frontage Road @ Lake Markham Road	Signal	D	16.4	B	21.2	C	22.9	C
WB Frontage Road @ Glade View Road	Stop	D	7.2/9.4	A/A	7.3/9.7	A/A	7.3/10.1	A/B
EB Frontage Road @ Glade View Road	Stop	D	7.2/9.7	A/A	7.2/10.1	A/B	7.2/10.6	A/B
PM Peak Hour								
WB Frontage Road @ Longwood-Markham Road (Scenario 2)	Signal	D	15.5	B	17.6	B	17.9	B
EB Frontage Road @ Longwood-Markham Road (Scenario 2)	Signal	D	23.0	C	23.8	C	24.6	C
WB Frontage Road @ Yankee Lake Road (Scenario 2)	Stop	D	7.2/11.1	A/B	7.2/12.3	A/B	7.2/13.8	A/B
EB Frontage Road @ Yankee Lake Road (Scenario 2)	Stop	D	7.2/9.9	A/A	7.2/10.3	A/B	7.2/10.7	A/B
WB Frontage Road @ Lake Markham Road (Scenario 2)	Signal	D	20.1	C	20.6	C	20.9	C
EB Frontage Road @ Lake Markham Road (Scenario 2)	Signal	D	13.6	B	14.2	B	21.5	B
WB Frontage Road @ Glade View Road (Scenario 2)	Stop	D	7.2/9.4	A/A	7.3/9.7	A/A	7.3/10.0	A/A
EB Frontage Road @ Glade View Road (Scenario 2)	Stop	D	7.2/10.0	A/A	7.2/10.1	A/B	7.2/10.3	A/B

Notes:

1. HCM 2000-based outputs are presented for the unsignalized and signalized intersections.
2. For unsignalized intersections, worst-case results (delay and LOS) are reported for movements in both the major and minor approaches.

6.2.3 Recommended Build Alternative Scenario

Based on this analysis, it was concluded that the intersections of the Frontage Road at Longwood-Markham Road, Yankee Lake Road, Lake Markham Road, and Glade View Road are anticipated to generate similar delays under both the Build Alternative Scenarios through the design year 2040.

It is important to note that roundabouts eliminate unsafe left turns across opposing traffic lanes and virtually eliminate high-speed right-angle and head-on crashes and therefore are safer than traditional signalized and stop-controlled intersections. In addition, roundabouts often have lower operating and maintenance costs than signalized intersections. They can have ongoing costs for lighting and maintaining the landscaping, but unlike a signalized intersection, there is no signal equipment to install, power, and maintain. Roundabouts have longer service lives than traditional intersections resulting in better economic value over the long term, especially when you factor in the reduction of fatal and injury crashes. Therefore, we recommend Scenario 1 as the preferred scenario for the SR 429/SR 46 (Wekiva Parkway – Section 7A) Build Alternative.