

6.0 Traffic

The information used in the following sections has been extracted from the *SR 417 Extension Traffic Technical Memorandum* (December 2005) prepared by Florida's Turnpike Enterprise. Please refer to this memorandum for more detailed traffic data, traffic analysis and traffic projections.

The Highway Capacity Software (HCS 2000) version 4.1d and Synchro/SimTraffic version 6.0 were utilized to evaluate the existing and future conditions within the area of influence. HCS was utilized primarily to determine Level of Service (LOS) along Interstate 4 (I-4) and SR 417 for basic freeway segments, ramp merge/diverge junctions and weaving segments. Synchro Version 6.0 traffic analysis software was used to analyze the intersections along Rinehart Road, SR 46, CR 46A and International Parkway. In addition to Synchro analysis, SimTraffic simulation was used to identify potential bottlenecks and/or congestion along arterials in the project area.

This chapter evaluates the traffic operations for existing (2005) conditions and for design year (2030) under No Build and Build conditions. The Build conditions were analyzed without tolls at the proposed SR 417 ramps to International Parkway.

6.1 Existing Traffic Conditions

6.1.1 Network Configuration

The project influence area includes two limited access facilities and four arterials. The limited access facilities are SR 417 and I-4, which are four-lane and eight-lane facilities respectively. The four arterial facilities are SR 46, CR 46A, Rinehart Road and International Parkway which are all four-lane roadways. **Figure 6-1** shows the existing roadway network and lane configuration for the freeways, ramps, arterials and intersections within the project area of influence.

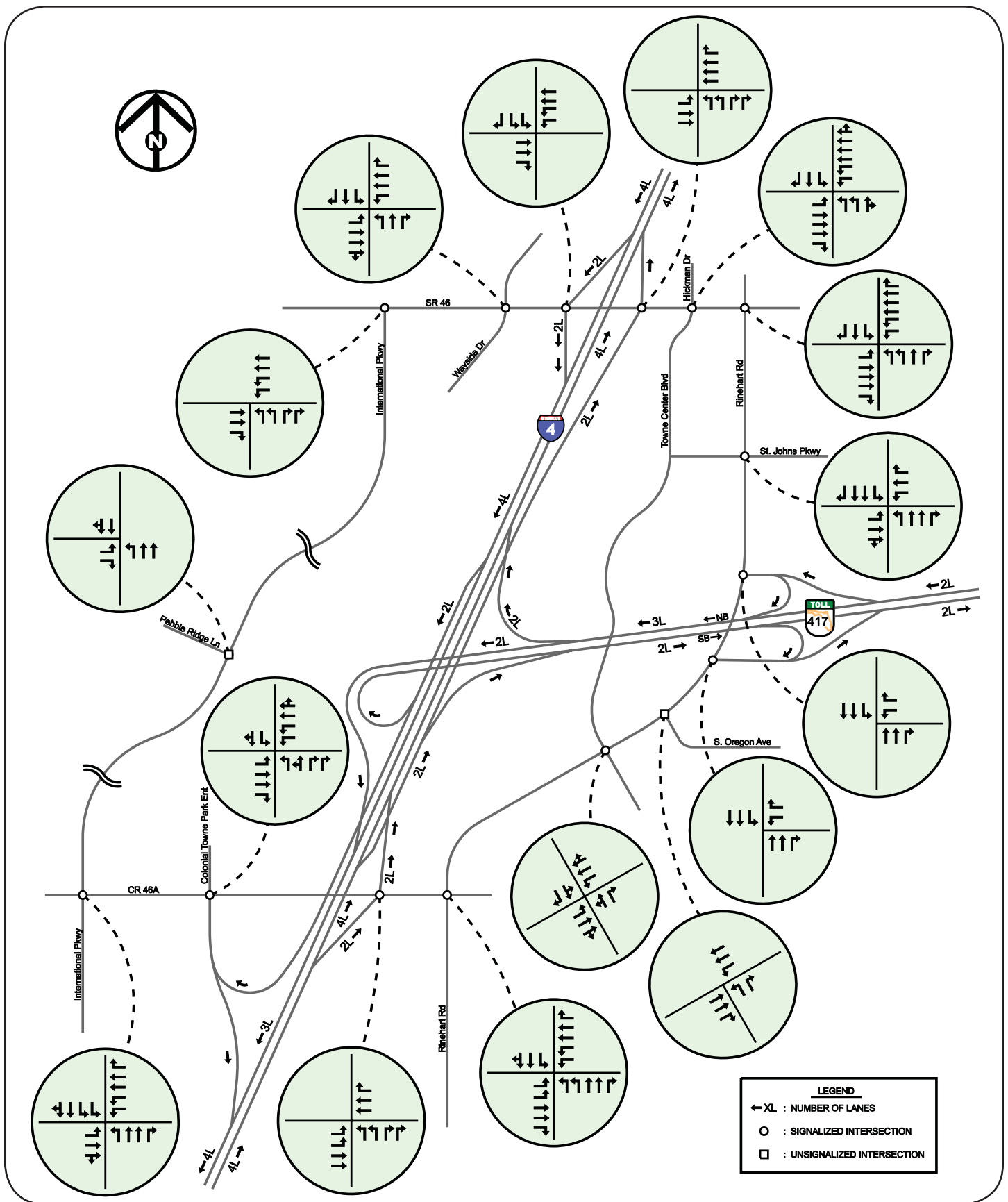
6.1.2 Traffic Data Collection

A traffic data collection effort was undertaken in November 2004 and between January and July of 2005. Three-day weekday, twenty-four hour directional machine counts were conducted on I-4 ramps, SR 417 mainline and ramps, and all arterials. Six-hour intersection Turning Movement Counts (TMCs) were also conducted for AM and PM peak periods at sixteen (16) signalized and unsignalized intersections in the project area.

Seasonal and Axle adjustment factors were used to convert the machine counts (three-day average of Tuesday, Wednesday and Thursday counts) to Annual Average Daily Traffic (AADT). Seasonal adjustment factors and balancing were applied to the peak hour TMCs to develop the existing AM and PM peak hour volumes. These peak hour volumes are depicted in **Figure 6-2** and **Figure 6-3** for AM and PM respectively.

6.1.3 Existing Traffic Operations

Currently, International Parkway does not have a direct connection to SR 417. Traffic from International Parkway uses SR 46, Rinehart Road and CR 46A to access SR 417. Increased growth in commuter traffic has occurred along CR 46A in recent years due to new developments and the opening of the I-4/CR 46A interchange.



International Parkway / SR 417 Interchange PD&E Study
Financial Project ID: 415587-1-22-01



Existing (2005) - Roadway Network & Lane Configuration

SR 417 Extension from SR 417 (I-4) to International Parkway



Figure 6-1

6.1.3.1 Field Observations

AM Peak – Traffic along CR 46A between Rinehart Road and International Parkway is generally heavy due to commuter traffic and closely spaced intersections. Long queues were observed for the westbound to southbound (left turn) movement at the International Parkway and CR 46A intersection. This heavy volume of traffic intermittently blocked the through lanes on CR 46A.

Congestion was also observed in the eastbound direction along CR 46A, between I-4 EB ramps and on Rinehart Road due to heavy eastbound traffic and closely spaced intersections. Traffic operations along SR 46 and Rinehart Road were satisfactory with no major backups. No delay or congestion was observed along International Parkway due to low traffic volumes. These observations were replicated in the SimTraffic simulation developed for existing conditions.

Along I-4 and SR 417, no congestion or delays were observed on mainline segments and/or ramps. Traffic was flowing with satisfactory level of operations.

PM Peak – Heavy eastbound traffic was observed along CR 46A. At the intersection of CR 46A and International Parkway, long queues were observed due to heavy northbound right turn movements. Due to the appropriate signal timing at this location, these queues however, cleared in each signal cycle. SimTraffic simulation replicated the presence of long queues at this location. Along SR 46, heavy left turn traffic (I-4 on ramp traffic) was observed between the I-4 ramps in both directions of travel with queues occasionally blocking access to through lanes. Rinehart Road and International Parkway operate satisfactorily with little or no delays due to low volumes.

No major backups or congestion were observed along the I-4 and SR 417 mainline or ramps.

6.1.3.2 Operational Analysis

The existing operational analyses include evaluation of the freeway elements (basic freeway segments, ramp merge/diverge junctions and weaving sections) and the signalized/unsignalized intersections along SR 46, CR 46A, Rinehart Road and International Parkway.

The lane configuration depicted in **Figure 6-1** was used for the analyses. The freeway elements were analyzed using HCS 2000 and the intersections were analyzed using the Synchro 6.0 analysis software. The Synchro intersection analysis for existing conditions was conducted based on existing signal timing data obtained from Seminole County.

Results of the AM and PM peak hour intersection analyses are summarized in **Table 6-1** and **Table 6-2**, respectively. The Level of Services (LOSs) for intersection and freeway elements during AM and PM peak periods are also shown in **Figures 6-2** and **6-3**.

Table 6-1 shows that the intersection of Rinehart Road and CR 46A operates at capacity during AM and PM peak periods due to heavy volumes at the intersection. The intersection of CR 46A with International Parkway operates at capacity with LOS “E” during the PM peak period. All other intersections operate at LOS “D” or better during AM and PM peak periods.

From the Synchro analysis and SimTraffic simulation it was observed that CR 46A is operating close to capacity with heavy volumes during peak periods. Although, the LOS analysis shows a level of service “F” at the unsignalized intersection of Rinehart and S. Oregon Ave., no long queues were observed in the field.

Table 6-1 Existing (2005) Intersection LOS Summary

Intersection	AM Peak		PM Peak	
	LOS	Control Delay ³ (sec/veh)	LOS	Control Delay ³ (sec/veh)
SR 46 Intersections				
International Parkway	B	11.2	B	13.0
Oregon Ave/Wayside Dr	B	20.0	C	29.0
I-4 WB Ramps	C	27.4	B	19.7
I-4 EB Ramps	B	15.4	C	22.7
Hickman Dr/Towne Center Blvd	B	13.9	C	26.7
Rinehart Road	C	20.1	C	27.5
Rinehart Road Intersections				
St. Johns Parkway	B	11.4	B	16.7
SR 417 NB Ramps/WP Ball Rd	B	17.0	B	10.8
SR 417 SB Ramps	A	7.2	B	10.1
South Oregon Avenue ¹	D	34.6	F	173.0
Towne Center Blvd	B	10.3	B	17.7
CR 46A Intersections				
Rinehart Road	E	58.1	E	57.5
I-4 EB Ramps	C	20.7	C	29.7
I-4 WB Ramps/Colonial Towne Park	C	29.5	D	35.4
International Parkway	D	47.5	E	73.3
International Parkway Intersection				
Pebble Ridge Lane ²	B	13.5	B	12.8

Notes:

1. Unsignalized intersection. The delay corresponds to the westbound approach from S. Oregon Ave. which is the critical approach.

2. Unsignalized intersection. The delay corresponds to the eastbound approach from Pebble Ridge Lane which is the critical approach.

3. Highway Capacity Manual (HCM) Average Control Delay

Table 6-2 shows that the segments of I-4 and SR 417 in the project area operate at LOS “D” or better during AM and PM peak periods.

It should be noted that the existing traffic volumes represent peak 15-minutes flow rates in vehicles per hour. Therefore, a PHF of 1.00 was used for Synchro and HCS analysis for existing conditions.

Table 6-2 Existing (2005) Freeway/Ramps LOS Summary

	Accel/Decel Lengths (ft)	Profile With No. of Lanes	Accel/Decel Lengths (ft)	AM PEAK				PM PEAK			
				Volume		LOS		Volume		LOS	
				SB	NB	SB	NB	SB	NB	SB	NB
I-4				5,330	4,148	C	B	4,160	5,345	B	C
SR 46	000'		000'	895	426	B ⁶	B	703	1,037	B ⁶	B
	000'		NA	1,070	NA	C ⁵	NA	1,013	NA	C ⁵	NA
I-4				5,505	3,722	C	B	4,470	4,308	C	B
SR 417 ²	000'		NA	1,494	471	B ⁶	B ⁵	844	663	B ⁶	B ⁵
	600'		000'	206	977	C	B ⁶	260	1,059	C	B ⁶
I-4⁷				4,217	3,251	C	C	3,886	3,645	C	C
CR 46A	NA		1500'	NA	120	NA	B	NA	502	NA	B
	000'		1500'	931	976	C ⁵	A	1,093	946	C ⁵	A
				5,148	5,084	C	C	4,979	5,148	C	C
I-4	NA		NA	813	206	UC	UC	634	260	UC	UC
	NA		NA	258	471	A ⁵	A ⁶ (UC)	299	663	A ⁵	A ⁶ (UC)
SR 417				1,071	677	A	A	933	923	A	A
Rinehart Road	000'		NA	80	58	B	A ⁵	84	120	B	A ⁵
	000'		000'	356	841	B	B	653	588	B	B
SR 417				1,347	1,460	B	B	1,502	1,391	B	B

Notes:

1. The shaded rows represent the mainline segments.
2. The SB off ramp from I-4 to SR 417 serves traffic to SR 417 and CR46A. Similarly the NB off ramp from I-4 serves traffic to SR 417 and SR 46 and exits before the merge point of CR 46A NB On ramp.
3. NA = Not Applicable
4. UC = Ramp Roadway Under Capacity; OC=Ramp Roadway Over Capacity
5. The merge is a lane addition, only downstream basic freeway segment is analyzed (Pg 25-9, HCM 2000)
6. A two lane off ramp is considered a Major Diverge and qualifies for a special condition and formula. (Eqn 25-12, HCM 2000)
7. This section is downstream of the SR 417 NB On ramp and downstream of CR 46A NB On ramp in the SB and NB respectively.
8. NB- Off ramp to I-4 EB; SB- On ramp from I-4 EB
9. NB- Off ramp to I-4 WB; SB- On ramp from I-4 WB

6.2 Future Conditions

6.2.1 Future Network

In addition to the roadway and lane configuration depicted in **Figure 6-1**, the following improvements were assumed to be in place for the analysis of future conditions for the year 2030:

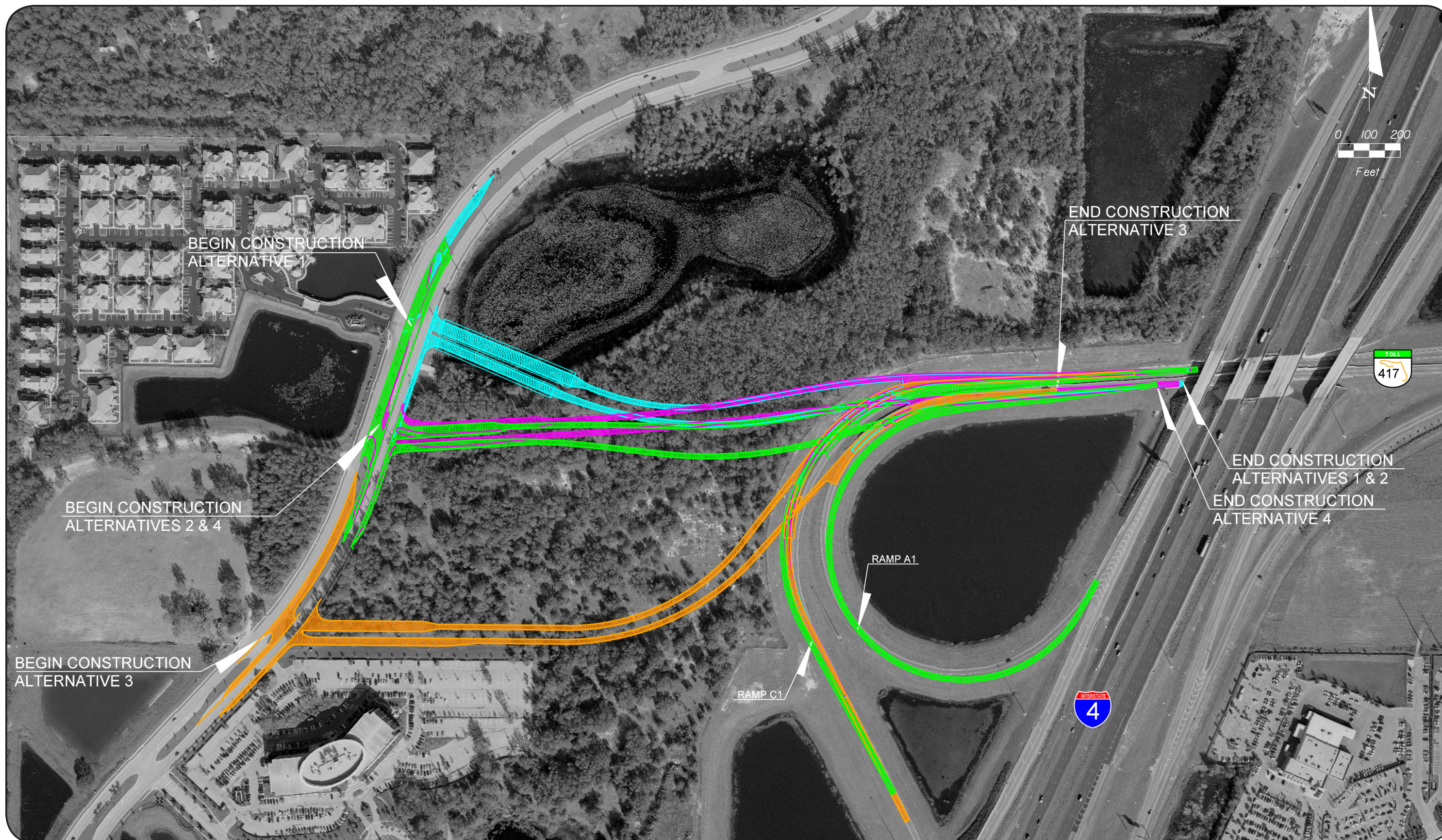
- A. Mainline SR 417 would be widened from a four-lane facility to a six-lane facility (Turnpike project).
- B. Currently, the intersection of Rinehart Road and SR 417 northbound ramps operate as a three legged intersection. The fourth leg approach of this intersection along with the additional lanes on the existing three approaches is already there but is blocked from traffic. The future lane configuration at this intersection would be as follows:
 - Northbound Approach (Rinehart Road): two left, two through and one right turn lane.
 - Southbound Approach (Rinehart Road): one left, two through and one right turn lane.
 - Eastbound Approach (W. P. Ball Road): one left, one through and one right turn lane.
 - Westbound Approach (SR 417 NB ramps): two left, one shared through and right, and one exclusive right turn lane.

6.2.2 Future Alternatives

The future analysis was conducted for design year 2030 only with the network as discussed in the previous section. The alternatives analyzed include:

- A. No Build – No ramp extensions at the SR 417 and I-4 interchange.
- B. Build Condition - SR 417 ramps at the SR 417 and I-4 interchange extended westbound to International Parkway. Four alternatives evaluated for the build condition are described below:
 - Alternative 1: The proposed SR 417 ramp extension is aligned to create a fourth (east) leg of the existing intersection of Pebble Ridge Lane and International Parkway.
 - Alternative 2: The proposed SR 417 ramp extension is aligned to create a new intersection approximately 400 feet south of the existing intersection of Pebble Ridge Lane and International Parkway with the closing of the existing median and the construction of a directional median opening approximately 200 feet north to provide access.
 - Alternative 3: The proposed SR 417 ramp extension would intersect International Parkway about 1,000 feet south of the Pebble Ridge Lane and just north of the FISERV facility.
 - Alternative 4: Similar to Alternative 2, but with a different ramp alignment between International Parkway and the existing SR 417 ramps.

Figure 6-4 depicts the layout of these four alternatives. Although the four alternatives differ based on the location where the SR 417 ramp extensions intersect with International Parkway, the variation in the intersection traffic demand is so low that the same traffic volumes are used for all Build alternatives.



6.2.3 Design Traffic Factors

The factors used for the design traffic analysis include the K_{30} , D_{30} , and T_f factors. The K_{30} factor is the proportion of the AADT occurring during the 30th highest hour of the design year. The D_{30} factor is the proportion of the 30th highest hour traffic that is traveling in the peak direction. The application of the K_{30} and D_{30} factors to the AADT volume produces the Directional Design Hour Volume (DDHV) which is the traffic volume for which a facility should be designed. The T_{24} factor is the estimated percent of truck traffic of the AADT. The T_f factor is the percentage of truck traffic during the design hour, and can be estimated as half of the T_{24} factor. The T_f is used in the Highway Capacity Software (HCS) level of service analysis.

Table 6-3 summarizes the traffic factors used for this project. Data sources include Telemetered Traffic Monitoring Sites (TTMS), Portable Traffic Monitoring Sites (PTMS), Mainline Toll Plaza data and the I-4 System Access Modification Report (SAMR) dated January 2000.

Table 6-3 Design Traffic Factors

FDOT Count Site	Description	Year	K ₃₀ (%)	D ₃₀ (%)	T ₂₄ (%)	T _f (%)
SR 417						
NA	Lake Jesup Toll Plaza	2002	12.80	50.47	4.00	2.0
Interstate-4						
770343 T	I-4, 1.6 miles East of SR 434	2003	8.08	51.21	6.18	3.09
NA	SAMR ⁽¹⁾	2000	9.00	55.00	5.00	3.00
Arterials (SR 46)						
770002 P	0.15 mile West of CR 15	2003	8.83	54.03	8.37	
770287 P	0.34 mile West of I-4	2003	8.83	54.03	10.47	
770073 P	0.11 mil East of Lake Forest Drive	2003	8.83	54.03	10.35	
770288 P	0.10 mile East of I-4	2003	8.83	54.03	8.37	
Average for Arterials			8.83	54.03	9.39	4.70
FDOT Acceptable Range of Values for Urban Freeway						
	Low		9.40	50.40		
	Average		9.70	55.80		
	High		10.00	67.10		
FDOT Acceptable Range of Values for Urban Arterial						
	Low		9.20	50.80		
	Average		10.20	57.90		
	High		11.50	67.10		
Factors Used						
SR 417			12.80	50.47	4.00	2.00
Interstate-4			9.00	55.00	5.00	3.00
Arterials and other Roadways			9.20	54.03	9.39	4.70

1. System Access Modification Report (SAMR) approved by FHWA in June 2000. The factors were taken from Table 3.7.1 under the category of North Residential & Outlying Business Districts – Lee Road to US 17-92:

2. T= Telemetry Site; P=Portable Site

In addition to the above factors, a Peak Hour Factor (PHF) of 0.95 and Model Output Conversion Factor (MOCF) of 0.97 were used for the future year analysis.

Due to the absence of Telemetered Traffic Monitoring Sites on the SR 417, site specific design traffic factors were not available from the Transportation Statistics Office of the FDOT. K_{30} factor for the SR 417 is based on data received for the Lake Jesup Toll Plaza for the year 2002 from the Division of Toll Operations (DTO).

As is often the case with toll roads, the K_{30} for the SR 417 is not within the FDOT's acceptable range of 9.4 – 10.0 %. Many drivers elect to make off-peak trips on parallel facilities to avoid tolls, but use the toll facility during peak periods when there is congestion on the parallel and surface streets. This decision pattern results in a higher K factor for tolled urban freeways.

6.3 Traffic Volume Projections

Travel demand forecasts for the project were developed utilizing the Orlando Urban Area Transportation Study (OUATS) Model as the foundation. Since the 2000 base year of the current version did not include the portion of the SR 417 from US Highway 17-92 to I-4, these road segments were coded into the OUATS base year model. Socio-Economic data for the project area of influence and surrounding region were updated based on available data provided by Seminole County. A validation effort at the project level was conducted on the Seminole Expressway utilizing traffic profiles from the Turnpike's Traffic Engineer's Annual Report (TEAR) for FY2002 and FY2003. This exercise verified that a reasonable level of traffic volumes were being replicated by the model based on the available data utilized for the network model updates. The model's performance within the influence area at the individual roadway segment level was also verified based on a link-by-link analysis. The results of this project level validation were used as a basis for developing the future year travel demand forecasts.

An OUATS forecast model was developed for the year 2025. Minor revisions from the base year project level validation were incorporated into the forecast model for consistency. This included extending the network representing International Parkway, north of CR 46A to SR 46. Both No Build and Build scenarios were run with the 2025 OUATS Model. The Build scenario included an extension of SR 417 from the I-4 interchange west to International Parkway without a toll on the SR 417 ramps. No other changes to the network were made. The AADT volumes were derived by applying the MOCF to the model output. The AADT volumes were then balanced throughout the system for consistency.

The 2000 base year and the 2025 model forecasts were interpolated to estimate the existing year (2004) demand. The resulting volumes were lower than the 2004 AADT volumes derived from count data. It was determined that the known 2004/2005 AADT volumes and the 2025 model forecast AADT should be the basis for extrapolating the design year 2030 forecasts for the project.

6.3.1 No Build Condition

Results of the AM and PM peak hour LOS analyses of the freeway segments and intersections for the No Build condition are summarized in **Table 6-4** and **Table 6-5** and also depicted in **Figure 6-5** and **Figure 6-6**.

Table 6-4 shows that eight out of the sixteen intersections in the project area operate at LOS "D" or better whereas the rest operate at LOS "E" or worse during AM and/or PM peak periods. All intersections along CR 46A would fail during the AM and PM peak periods primarily due to heavy traffic volumes. Along SR 46, both intersections at the I-4 ramps would operate at LOS "E" or worse

















Table 6-4 No Build (2030) Intersection LOS Summary

Intersection	AM PEAK		PM PEAK	
	LOS	Control Delay ³ (sec/veh)	LOS	Control Delay ³ (sec/veh)
SR 46 Intersections				
International Parkway	B	19.6	B	18.9
Oregon Ave/Wayside Dr	C	26.8	D	42.6
I-4 WB Ramps	E	69.2	C	34.3
I-4 EB Ramps	D	40.0	F	81.1
Hickman Dr /Towne Center Blvd	C	24.0	C	27.3
Rinehart Road	C	30.9	C	31.5
Rinehart Road Intersections				
St. Johns Parkway	C	26.1	C	23.4
SR 417 NB Ramps /WP Ball Road	E	56.2	D	49.1
SR 417 SB Ramps	C	24.7	B	17.9
South Oregon Avenue ¹	F	> 1 hour	F	> 1 hour
Towne Center Blvd	C	28.8	C	23.9
CR 46A Intersections				
Rinehart Road	F	359.3	F	332.1
I-4 EB Ramps	F	161.7	F	207.4
I-4 WB Ramps/Colonial Towne Park	F	223.2	F	237.4
International Parkway	F	225.4	F	260.9
International Parkway Intersection				
Pebble Ridge Lane ²	D	32.1	C	24.5

NOTES:

1. Unsignalized Intersection. The delay corresponds to the westbound approach from S. Oregon Ave. which is the critical approach.
2. Unsignalized Intersection. The delay corresponds to the eastbound approach from Pebble Ridge Lane which is the critical approach.
3. Highway Capacity Manual Average Control Delay

Table 6-5 No Build (2030) Freeway and Ramp Merge/Diverge LOS Summary

	Accel/Decel Lengths (ft)	2030 Profile With No. of Lanes	Accel/Decel Lengths (ft)	AM PEAK HOUR				PM PEAK HOUR			
				Volume		LOS		Volume		LOS	
				SB	NB	SB	NB	SB	NB	SB	NB
I-4				6,170	5,050	D	C	5,050	6,440	C	D
SR 46 Ramps	000'		000'	1,310	1,070	B ⁶	B	1,070	1,310	B ⁶	B
	000'		NA	1,990	NA	D ⁵	NA	1,630	NA	C ⁵	NA
I-4				6,850	3,980	D	B	5,610	5,130	C	C
SR 417 Ramps ²	000'		NA	3,130	1,750	B ⁶	B ⁵	2,850	1,780	B ⁶	C ⁵
	600'		000'	890	2,530	C	B ⁶	900	2,880	C	B ⁶
I-4 ⁷				4,610	2,230	D	B	3,660	3,350	C	C
CR 46A Ramps	NA		1500'	NA	1,100	NA	B	NA	1,350	NA	B
	000'		1500'	1,980	1,620	D ⁵	A	1,790	1,930	C ⁵	A
I-4				6,590	5,280	D	C	5,450	6,810	C	D
I-4	NA		NA	1,780	890	UC	UC	1,750	900	UC	UC
				900	1,750	B ⁵	B ⁶ (UC)	890	1,780	B ⁵	B ⁶ (UC)
SR 417 ⁸				2,680	2,640	B	B	2,640	2,680	B	B
Rinehart Road	000'		NA	740	720	C	B ⁵	720	740	C	B ⁵
	000'		000'	990	1,010	C	C	1,010	990	C	C
SR 417				2,930	2,930	B	B	2,930	2,930	B	B

Notes:

1. The shaded rows represent the mainline segments.

2. The SB off ramp from I-4 to SR 417 serves traffic to SR 417 and CR46A. Similarly the NB off ramp from I-4 serves traffic to SR 417 and SR 46 and exits before the merge point of CR 46A NB On ramp.

3. NA = Not Applicable

4. UC = Ramp Roadway Under Capacity; OC=Ramp Roadway Over Capacity

5. The merge is a lane addition, only downstream basic freeway segment is analyzed (Pg 25-9, HCM 2000)

6. A two lane off ramp is considered a Major Diverge and qualifies for a special condition and formula. (Eqn 25-12, HCM 2000)

7. This section is downstream of the SR 417 NB On ramp and downstream of CR 46A NB On ramp in the SB and NB respectively.

8. SR 417 is considered to be a six-lane facility in 2030.

9. NB- Off ramp to I-4 EB; SB- On ramp from I-4 EB

10. NB- Off ramp to I-4 WB; SB- On ramp from I-4 WB

during AM and PM peak periods respectively. The NB ramp intersection of SR 417 and Rinehart Road would operate at LOS “E” during the AM peak. The unsignalized intersection of Rinehart Road and S. Oregon Avenue would operate at LOS “F” during AM and PM peak periods.

SimTraffic simulation confirmed the LOS failures and capacity deficiencies along CR 46A. Due to these failure conditions, I-4 off ramps to CR 46A showed long queues. The back of the queue at the I-4 eastbound off ramp would spill onto the I-4 through lanes. The SimTraffic simulation also showed long queues on the I-4 eastbound off ramp to SR 46 due to heavy northbound left turns from the ramps. At the intersection of SR 417 northbound ramps with Rinehart Road heavy southbound left turns were observed in SimTraffic creating long queues and thereby blocking the through lanes.

Table 6-5 shows that all of the segments along I-4 and SR 417 within the area of influence would operate at LOS “D” or better during AM and PM peak periods. Although the table shows acceptable LOS along I-4, the SimTraffic simulation showed heavy congestion with failing conditions, especially due to overcapacity conditions along CR 46A.

6.3.2 Build Condition

The Build scenario was considered without ramp tolls and was analyzed for the proposed SR 417 extension ramps. **Table 6-6** and **Table 6-7** summarize the analyses results of the intersection and freeway elements for the Build scenario during AM and PM peak periods. The DDHVs and LOSs are shown in **Figure 6-7** through **Figure 6-11** for the two scenarios.

Table 6-7 shows that all of the freeway elements along I-4 and SR 417 would operate at LOS “D” or better during AM and PM peak periods. Similar to the No Build conditions, however, the SimTraffic simulation showed heavy congestion with failing conditions along I-4 especially due to the ramp queue spillback caused by the overcapacity conditions at CR 46A intersections.

Table 6-6 compares the intersection LOSs for the Build scenario. For the Build scenario, all the intersections along SR 46 and Rinehart Road, except at the I-4 ramps and South Oregon Avenue unsignalized intersection would operate at LOS “D” or better. All the intersections along CR 46A would fail to meet the acceptable LOS requirements due to over capacity conditions.

The SR 46 and I-4 ramp intersections would operate at capacity with LOS “E” primarily due to heavy westbound left turns and northbound left turns at the west and east intersections respectively. The unsignalized intersection between Rinehart Road and South Oregon Avenue would operate at LOS “F” during AM and PM peak periods due to heavy left turn traffic from the South Oregon Avenue.

In general, the delays under the Build condition are lower as compare to the No Build condition. Comparing the Build scenario, the results show lower delays without tolls, although the difference is insignificant along SR 46 and Rinehart Road. **Table 6-6** also shows significant decrease in delays along CR 46A, but the facility would still be overcapacity and would fail before the year 2030. SimTraffic simulation confirmed the above results showing failure conditions along CR 46A and long queues on I-4 off ramps to CR 46A.

Table 6-6 Build (2030) Intersection LOS Summary

Intersection	WITHOUT TOLLS			
	AM PEAK		PM PEAK	
	LOS	Control Delay ³ (sec/veh)	LOS	Control Delay ³ (sec/veh)
SR 46 Intersections				
International Parkway	C	26.7	C	26.6
Oregon Ave/Wayside Dr	B	18.1	C	24.6
I-4 WB Ramps	E	67.0	C	34.4
I-4 EB Ramps	C	27.4	D	45.8
Hickman Dr /Towne Center Blvd	B	19.3	C	26.6
Rinehart Road	C	22.4	C	24.5
Rinehart Road Intersections				
St. Johns Parkway	C	25.3	C	24.1
SR 417 NB Ramps /WP Ball Road	D	47.4	D	37.9
SR 417 SB Ramps	C	25.3	B	15.1
South Oregon Avenue ¹	F	3509	F	6392.0
Towne Center Blvd	C	20.8	B	19.1
CR 46A Intersections				
Rinehart Road	F	261.1	F	255.0
I-4 EB Ramps	F	147.9	F	178.8
I-4 WB Ramps/Colonial Towne Park	F	196.2	F	191.5
International Parkway	F	201.4	F	244.0
International Parkway Intersection				
Pebble Ridge Lane ²	C	30.6	D	35.6


















NOTES:

1. Unsignalized Intersection. The delay corresponds to the westbound approach from S. Oregon Ave, which is the critical approach.

2. Unsignalized Intersection. The delay corresponds to the eastbound approach from Pebble Ridge Lane which is the critical approach.

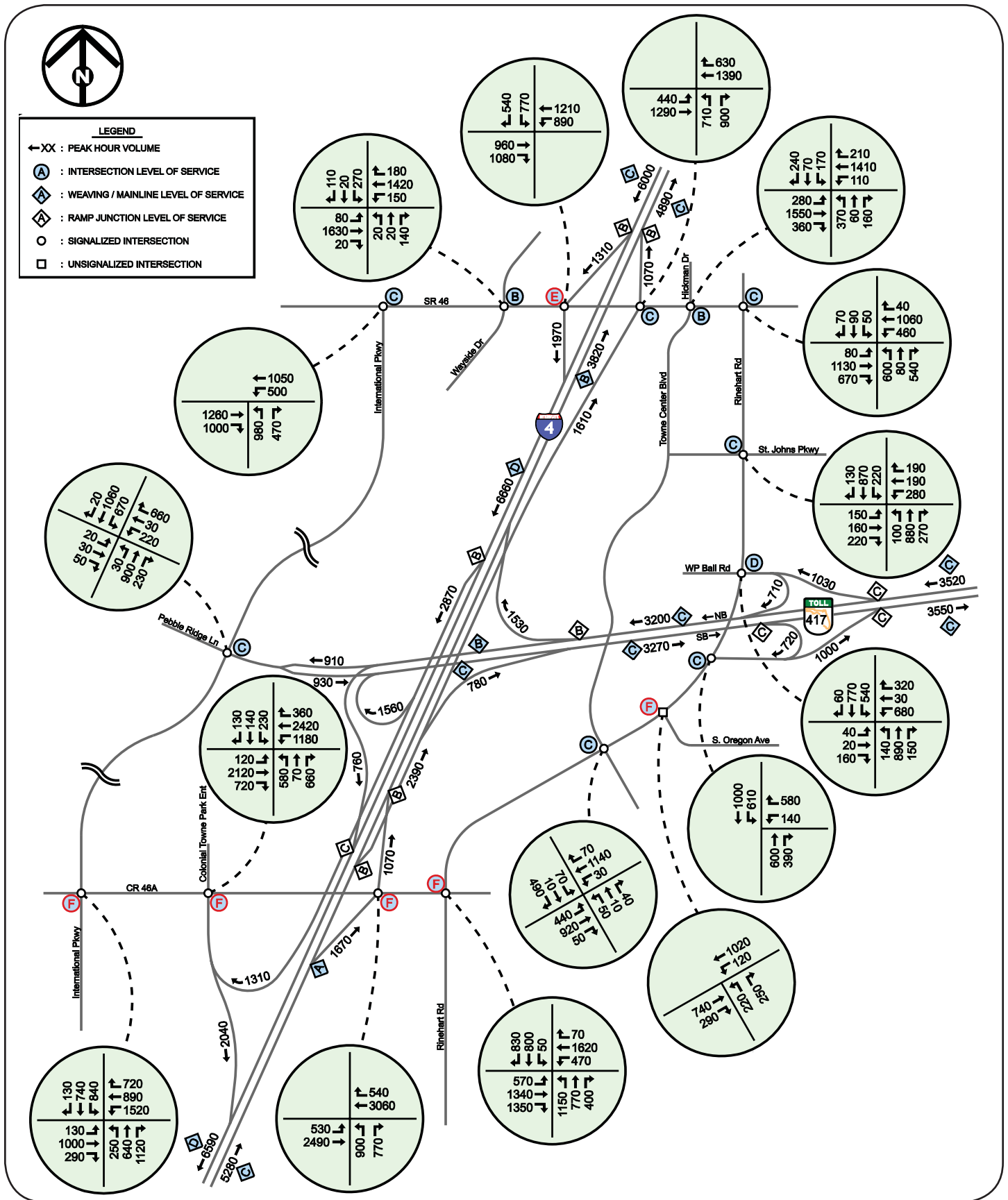
3. Highway Capacity Manual Average Control Delay

Table 6-7 Build Without-Tolls (2030) Freeway/Ramps LOS Summary

	Accel/Decel Lengths (ft)	2030 Profile With No. of Lanes	Accel/Decel Lengths (ft)	AM PEAK HOUR				PM PEAK HOUR			
				Volume		LOS		Volume		LOS	
				SB	NB	SB	NB	SB	NB	SB	NB
I-4				6,000	4,890	C	C	4,890	6,270	C	D
SR 46 Ramps	000'		000'	1,310	1,070	B ⁶	B	1,070	1,310	B ⁶	B
	000'		NA	1,970	NA	D ⁵	NA	1,610	NA	C ⁵	NA
I-4				6,660	3,820	D	B	5,430	4,960	C	C
SR 417 Ramps ²	000'		NA	2,870	1,530	B ⁶	B ⁵	2,600	1,560	B ⁶	C ⁵
	600'		000'	760	2,390	C	B ⁶	780	2,730	C	B ⁶
I-4 ⁷				4,550	2,290	D	B	3,610	3,400	C	C
CR 46A Ramps	NA		1500'	NA	1,070	NA	B	NA	1,310	NA	B
	000'		1500'	2,040	1,670	D ⁵	A	1,840	1,990	C ⁵	A
I-4				6,590	5,280	D	C	5,450	6,810	C	D
International Pkwy (proposed ramps)	NA		NA	930	910	UC	UC	910	930	UC	UC
I-4	NA		NA	2,490	1,670	C	B	2,440	1,710	C	B
	NA		NA	780	1,530	C ⁵	B ⁶	760	1,560	B ⁵	B ⁶
SR 417 ⁸				3,270	3,200	C	C	3,200	3,270	B	C
Rinehart Road	000'		NA	720	710	C	C ⁵	710	720	C	C ⁵
	000'		000'	1,000	1,030	C	C	1,030	1,000	C	C
SR 417				3,550	3,520	C	C	3,520	3,550	C	C

Notes:

1. The shaded rows represent the mainline segments.
2. The SB off ramp from I-4 to SR 417 serves traffic to SR 417 and CR46A. Similarly the NB off ramp from I-4 serves traffic to SR 417 and SR 46 and exits before the merge point of CR 46A NB On ramp.
3. NA = Not Applicable; UC = Ramp Roadway Under Capacity; OC=Ramp Roadway Over Capacity
4. UC = Ramp Roadway Under Capacity; OC=Ramp Roadway Over Capacity
5. The merge is a lane addition, only downstream basic freeway segment is analyzed (Pg 25-9, HCM 2000)
6. A two lane off ramp is considered a Major Diverge and qualifies for a special condition and formula. (Eqn 25-12, HCM 2000)
7. This section is downstream of the SR 417 NB On ramp and downstream of CR 46A NB On ramp in the SB and NB respectively.
8. SR 417 is considered as a six-lane facility in 2030.
9. NB- Off ramp to I-4 EB; SB- On ramp from I-4 EB
10. NB- Off ramp to I-4 WB; SB- On ramp from I-4 WB



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Figure 6-7

6.4 Proposed Intersection Layout

The proposed intersection between the SR 417 ramps and International Parkway would operate at LOS “D” or better under both the tolled and untolled scenarios during both AM and PM peak periods. The recommended lane configuration for the proposed intersection for Alternative 1 is displayed in **Table 6-8**.

Table 6-8 Recommended Lane Configuration for Alternative 1

Approach	Configuration
Northbound (International Parkway)	One left, two through and one right.
Eastbound (Pebble Ridge Lane)	One shared left through and one right
Southbound (International Parkway)	Two left, one through and one shared through right
Westbound (SR 417 Ramps)	One left, one shared through right and one right

The proposed intersection for Alternatives 2, 3 and 4 would operate as a three-legged intersection. The north and south approaches would be similar to the configuration in Alternative 1. The westbound approach would have one left and two right turn lanes.

6.5 Future Ramp Merge Considerations

An analysis was performed to examine the effects of the traffic demand on the proposed merge between Ramp A1 and Ramp A1E. The analyses were performed by taking certain percentages of the 2030 peak hour traffic demand without tolls and applying each of them to a traffic simulation of the proposed ramp conditions. The analyses show that the merge condition will create a delay queue by the year 2020 (75% of 2030 demand traffic). By the year 2023 (80% of 2030 demand traffic), the queue will extend the length of Ramp A1 to the westbound CD road and by the year 2025 (85% of the 2030 demand traffic), the queue will cause significant delay on both the CD road and the ramp extension.

There are several alternatives to reduce the anticipated traffic delay on the ramp. The installation of either tolls or ramp metering for the ramp extension would reduce the future traffic demand, therefore reducing the traffic delay. Reconstruction of the I-4 bridges to allow more length for the merge to occur or to allow a second lane would reduce the length of the queue and accommodate the future traffic demand. The construction of a flyover ramp from the westbound CD road to cross over I-4 and merge to the existing Ramps A1 and B1 would remove the proposed merge condition and reduce delay by providing more lanes for the system-to-system interchange.

6.6 Conclusion and Recommendations

The proposed alternatives to extend the SR 417 ramps at I-4 westward to connect to International Parkway would provide SR 417 traffic with a direct connection to International Parkway. The Build condition without tolls attracts significant traffic to the proposed ramps, with more relief for the traffic congestion along local arterials in comparison to the No Build condition. The Build condition without tolls would have higher diversion of traffic from the local arterials to the proposed ramps, which would cause the reduction in delays along SR 46 and Rinehart Road. CR 46A, however, would remain over-capacity. Although International Parkway would have an increase in traffic primarily north of the proposed SR 417 intersection, the arterial would operate satisfactorily at LOS “D” or better.

There would not be significant difference in traffic operations among the four alternatives for the proposed intersection of the SR 417 ramps with International Parkway. The recommended lane geometry for the proposed intersections in all the four alternatives would operate satisfactorily at LOS "D" or better.