

State Road 7 Extension PD&E Study

Design Traffic Technical Memorandum

Palm Beach County, FL

October 2010

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Executive Summary

This Design Traffic Technical Memorandum (DTTM) documents the traffic projections and operations at intersection along State Road (SR) 7, as part of the SR 7 Corridor Extension PD&E Study. The study area focuses on the proposed SR 7 extension from Okeechobee Boulevard to Northlake Boulevard in northern Palm Beach County. The DTTM presents the forecasted opening (2020), interim (2030), and design year (2040) a.m. and p.m. peak hours and daily traffic volumes, and documents the base year (2009) and future operation conditions of the intersections along the corridor.

This study evaluated two scenarios:

- **No-Build Scenario:** SR 7 as a two-lane roadway from Okeechobee Boulevard to 60th Street and from Ibis Golf Club to Northlake Boulevard. The No-Build Scenario identifies possible intersection control improvements as needed, but it does not include widening SR 7 from two to four lanes or the connection of SR 7 between 60th Street and Ibis Golf Club.
- **Build Scenario:** SR 7 extension from Okeechobee Boulevard to Northlake Boulevard as shown in the Palm Beach County's 2035 Long Range Transportation Plan as a four-lane divided roadway, with intersection improvements (signalization or roundabouts) as needed to maintain operational performance standards.

Under the base year (2009) conditions, SR 7 is a six-lane divided roadway south of Okeechobee Boulevard. A two-lane roadway connection continues north to Persimmon Boulevard. The two intersections to the north of Okeechobee Boulevard (Porto SOL Entrance and Orange Grove Boulevard) are three-legged unsignalized intersections with stop control on the minor street.

The base year conditions were evaluated for the intersections of SR 7 at Okeechobee Boulevard and at Northlake Boulevard using the software package Traffix, which incorporates the Highway Capacity Manual 2000 methodologies. Turning movement counts and daily bidirectional counts were gathered from Palm Beach County and the Florida Department of Transportation. Overall, the intersection of SR 7 and Okeechobee Boulevard operates at LOS D, and the intersection of SR 7 and Northlake Boulevard operates at LOS F during both base year weekday a.m. and p.m. peak periods.

The 2035 Southeast Regional Planning Model (SERPM 6.5) was used to develop traffic projections. Several steps were performed to validate the projections in the study area vicinity. Upon the review of the model output and consultation with the project team, several adjustments were made to the model outputs to correct abnormalities and to better represent the expected traffic conditions.

The opening, interim, and design year daily volume projections were developed by applying growth rates. For roadways where 2009 base year counts were available, an annual growth was calculated between the base year count and the 2035 adjusted daily model output. For the remaining new roadways, an area-wide growth rate of 1.3% annually was applied based on the

anticipated growth associated with the change in social economic data from 2005 and 2035. All growth rates were applied linearly to develop the future traffic projections.

The TMTools spreadsheet was used to obtain hourly turning movement projections, as recommended by the FDOT District Four. Input data to the TMTools spreadsheet consists of any available turning movement counts, base year AADTs, projected link volumes, peak to daily (K) and directional distribution (D) factors. The peak hour traffic projections were assumed to be 9% of the daily traffic volumes. The “time-of-day” travel demand model was examined to determine the directionality of the SR 7 corridor and its cross streets during the peak hours.

Opening (2020), interim (2030), and design year (2040) intersection traffic operations analyses for the a.m. and p.m. peak hours were performed along the corridor. Under the No-Build Scenario, it was found that improvements beyond stop control (e.g., traffic signals or roundabouts) would likely be required at Roebuck Road, Porto SOL Entrance, and Orange Grove Boulevard by 2020 and at Persimmon Boulevard by 2030 to meet a LOS standard of D. Under the Build Scenario, improvements beyond stop control would be likely required at all intersections between Okeechobee Boulevard and Northlake Boulevard by 2020.

In addition to improving the control at individual intersections, the widening of SR 7 to a four-lane facility south of Persimmon Boulevard by 2030 under the No-Build Scenario was identified as a need in order to accommodate the expected traffic demand. Under the Build Scenario, improvements such as additional turning lanes, right-turn overlap, and cycle length increases were required to achieve LOS D.

All intersections, except for Okeechobee Boulevard, are expected to operate at LOS D or better during the a.m. and p.m. peak hours under both No-Build and Build Scenarios. The intersection of Okeechobee Boulevard is expected to perform at LOS F during the peak hours by 2030, even with triple left-turn and double right-turn lanes.

A traffic diversion analysis indicated that the SR 7 corridor extension is expected to alleviate traffic along other parallel corridors, such as Royal Palm Beach Boulevard/Coconut Boulevard and Seminole Pratt-Whitney Road to the west as well as Jog Road and the Turnpike to the east.

Roundabouts were considered as an intersection treatment at the following two intersections along SR 7: Ibis Golf Club and 60th Street. The operational analyses indicated that a two-lane roundabout would accommodate forecast traffic volumes through year 2040 for both a.m. and p.m. peak hours at both intersections.

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Section 1

Introduction

Introduction

PROJECT DESCRIPTION AND LOCATION

This Design Traffic Technical Memorandum (DTTM) documents the traffic projections and operations at intersection along State Road (SR) 7, as part of the SR 7 Corridor Extension PD&E Study. At the beginning of the study, SR 7 was a major arterial in northern Palm Beach County that ended at Okeechobee Boulevard. In 2008 and 2009, the County built a two-lane northern extension to Persimmon Boulevard that was opened to traffic in late March/early April 2009. Currently, the County is in the design phase for extending SR 7 from its current terminus to 60th Street. Figure 1 illustrates the site vicinity.

This DTTM presents the forecasted opening (2020), interim (2030), and design year (2040) a.m. and p.m. peak hour and daily traffic volumes prepared for the SR 7 Corridor Extension PD&E Study. The DTTM also documents the base year (2009) and future operating conditions of the intersections along the corridor.

SCENARIOS CONSIDERED

This study evaluated two scenarios:

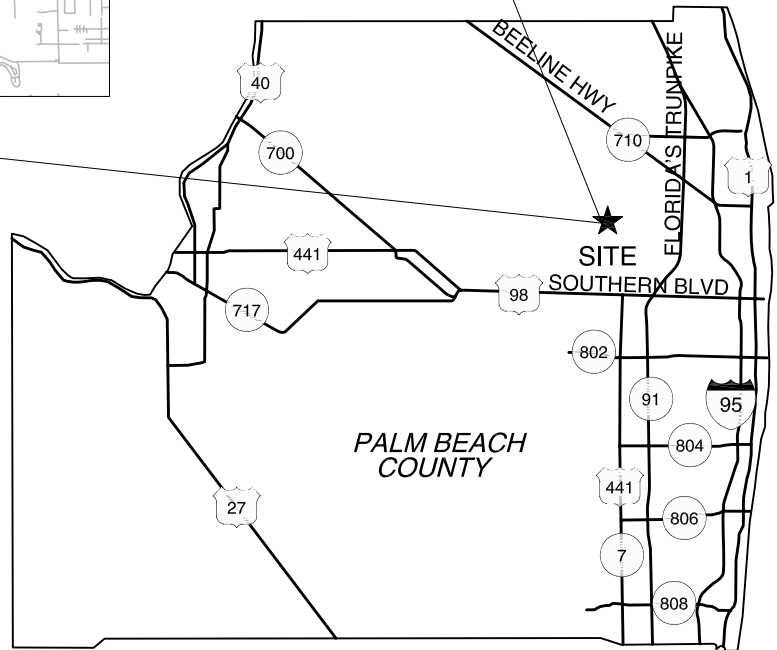
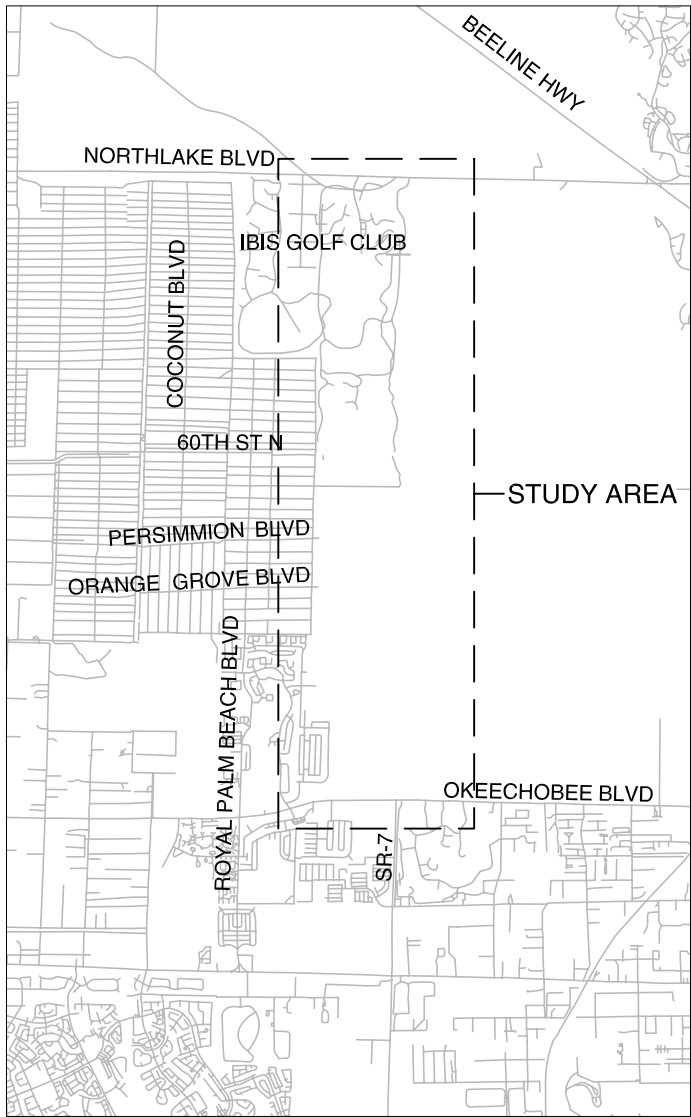
- **No-Build Scenario:** SR 7 as a two-lane roadway from Okeechobee Boulevard to 60th Street and from Ibis Golf Club to Northlake Boulevard. The No-Build Scenario identifies possible intersection control improvements as needed, but it does not include widening SR 7 from two to four lanes or the connection of SR 7 between 60th Street and Ibis Golf Club.
- **Build Scenario:** SR 7 extension from Okeechobee Boulevard to Northlake Boulevard as shown in the Palm Beach County's 2035 Long Range Transportation Plan as a four-lane divided roadway, with intersection improvements (signalization or roundabouts) as needed to maintain operational performance standards.

Figure 2 illustrates the No-Build and Build Scenario cross-sections as described above.

This DTTM summarizes the traffic data collection, traffic forecast methodology, and presents the results of base year and future condition analyses.



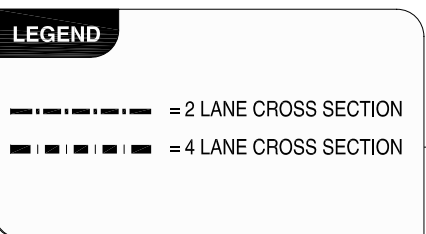
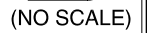
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SITE VICINITY MAP
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA

FIGURE

1



**NO-BUILD AND BUILD SCENARIO CROSS SECTIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA**

FIGURE

2

Section 2

Data Collection

Data Collection

Turning movement counts (TMC) were obtained from Palm Beach County (PBC) and the Florida Department of Transportation (FDOT) for the following two intersections:

- SR 7/Okeechobee Boulevard (PBC), collected in May 2009 after the opening of the northern extension of SR 7 to Persimmon Boulevard
- SR 7/Northlake Boulevard (FDOT), collected in 2008 but believed to be similar 2009 conditions and thus not recounted

Daily bidirectional counts were gathered at the locations listed below from either the FDOT or PBC:

- SR 7 south of Okeechobee (FDOT)
- Okeechobee Road west of SR 7 (PBC)
- Okeechobee Road east of SR 7 (FDOT)
- Northlake Boulevard east of SR 7 (PBC)
- Northlake Boulevard west of SR 7 (FDOT)

The “raw” daily traffic counts were adjusted to Average Annual Daily Traffic (AADT) volumes by applying a seasonal factor and an axle-correction factor based on the time of year when the counts were conducted. The seasonal factor takes into account the variation in traffic throughout the year, and the axle-correction factor takes into account the effect of multiple axles on heavy vehicles. The traffic counts are included in Appendix A-1. The base year AADT’s are summarized in Figure 4, which is shown in Section 4 of the report.

Historical traffic data along major facilities near the study area was gathered. Appendix A-2 summarizes the general traffic trends along SR 7, Okeechobee Boulevard, Northlake Boulevard and SR 710/Beeline Highway.

Section 3
Base Year (2009)
Conditions

Base Year (2009) Conditions

Under the 2009 base year conditions, SR 7 is a six-lane divided roadway that terminates at Okeechobee Boulevard. A two-lane roadway connection continues north to Persimmon Boulevard. The two intersections to the north of Okeechobee Boulevard (Porto SOL Entrance and Orange Grove Boulevard) are three-legged unsignalized intersections. The base year conditions were evaluated for the intersections of SR 7 at Okeechobee Boulevard and at Northlake Boulevard.

The lane configuration at the SR 7/Okeechobee Boulevard is generally consistent with the Palm Beach County intersection design plan, except for the southbound approach where there are three southbound through lanes instead of two.

Level of Service (LOS) analyses were performed at the intersections of SR 7 with Okeechobee Boulevard and Northlake Boulevard using the software package Traffix, which incorporates the 2000 Highway Capacity Manual methodologies. Signal timing data were obtained from the Traffic Division of Palm Beach County and are included in Appendix A-3. An overall intersection truck percentage of 4% was used to model base year conditions. This value was estimated by averaging half of the daily truck factors reported in the 2008 FDOT FTI CD for sites within the study area. Appendix A-4 includes the supporting data. When available, peak hour factor (PHF) was used as collected. For the intersection of SR 7 and Okeechobee Boulevard, a PHF of 0.95 was assumed for the base year analysis as recommended by Palm Beach County (PBC). Appendix A-5 includes PBC recommended default input values.

Figure 3 summarizes the findings of the base year a.m. and the p.m. peak-hour intersection analyses. Overall, the intersection of Okeechobee Boulevard/SR 7 operates at LOS D, while the intersection of Northlake Boulevard/SR 7 operates at LOS F during both a.m. and p.m. peak periods. The Traffix output sheets are provided in Appendix B.



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EXISTING CONDITIONS

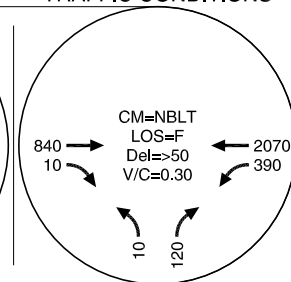
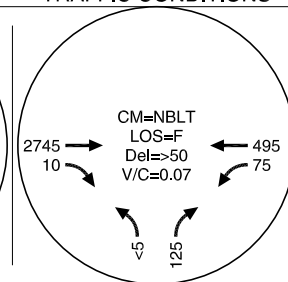
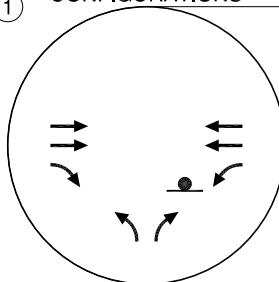


LANE CONFIGURATIONS

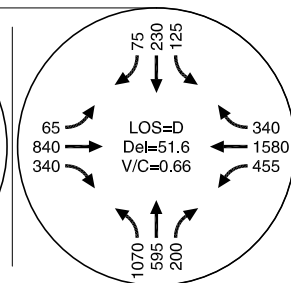
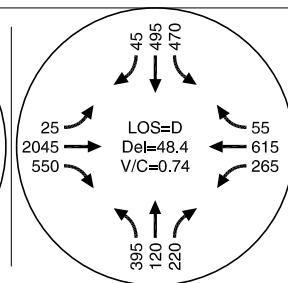
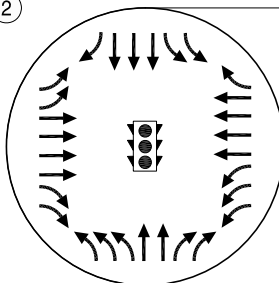
AM PEAK HOUR TRAFFIC CONDITIONS

PM PEAK HOUR TRAFFIC CONDITIONS

①



②



LEGEND

● = STOP SIGN

⬆ = TRAFFIC SIGNAL

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)

Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

EXISTING LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA

FIGURE
3

Section 4
Traffic Forecast
Methodology

Traffic Forecast Methodology

TRAVEL DEMAND MODEL

The 2035 Southeast Regional Planning Model (SERPM 6.5) was used to develop traffic projections. The model was developed using the cost-feasible components of the three recently-adopted Long Range Transportation Plans (LRTPs) from Palm Beach, Broward, and Miami-Dade Counties.

SUB-AREA VALIDATION

Several steps were performed to validate the projections in the study area vicinity. Input data such as posted speed limits, lane configurations, and population and employment data were confirmed to the extent possible. The changing development conditions, such as the removal of the Scripps development at Mecca Farms, were examined and reflected. In addition, the project team (including Palm Beach County and FDOT staff) closely examined the model outputs and advised on minor adjustments to better reflect anticipated conditions. Raw model outputs are provided in Appendix C-1.

Under the Build Scenario, SR 7 is shown as a four-lane road between Okeechobee Boulevard and Northlake Boulevard, consistent with the adopted Palm Beach LRTP roadway projects 5 and 6: widen SR 7 from two to four lanes between Okeechobee Boulevard and 60th Street; and build a new four-lane road between 60th Street and Northlake Boulevard. Other cost-feasible improvements identified in the LRTP within the vicinity of the study area include Northlake Boulevard, Pratt Whitney Road, Okeechobee Boulevard, 60th Street, and Roebuck Road and Royal Palm Beach Blvd. Appendix C-2 includes the 2035 Palm Beach County LRTP.

For the No-Build Scenario, the connection between 60th Street and Ibis Golf Club is removed and the connection from Okeechobee Boulevard and 60th Street is modeled as an existing two-lane road.

A “screen-line” analysis was performed to compare the total north-south traffic volumes between the No-Build and Build Scenarios, which were found to be within the acceptable 1%. This confirms that the model study area is sufficiently large to isolate the effect of the proposed improvements in the Build condition.

MODEL OUTPUT ADJUSTMENTS

Upon the review of the model output and consultations with the project team, several adjustments were made to the model outputs to correct any abnormality and to better represent the expected traffic conditions. To support the adjustments, the following factors were considered: the expected population and employment growth in the nearby areas, the potential “cut-through” traffic versus the “local” traffic, the connectivity provided by a new connection

(e.g. Roebuck Road), and the natural distribution of traffic from a certain roadway segments (link) or areas (zone). Supporting documentation is provided in Appendix C-3.

GROWTH RATES CALCULATION

For a typical corridor study, historical trends are examined to gain insights into the potential growth along the corridor. For this study, the travel demand model together with the social-economic data was used calculate growth rates, because this is a new corridor with limited historical data.

For roadways where 2009 base year counts were available, a linear annual growth was calculated between the base year count and the 2035 adjusted daily model output. For the remaining new roadways, an area-wide growth rate of 1.3% annually was calculated. This 1.3% was based on the anticipated growth associated with the socio-economic data from 2005 and 2035. The supporting documentation is provided in Appendix C-4. Table 1 summarizes the calculated growth rates.

Table 1 Calculated growth rates

Location	No-Build Scenario			Build Scenario		
	AADT		Annual Growth Rate	AADT		Annual Growth Rate
	2009	Adjusted 2035		2009	Adjusted 2035	
SR 7 south of Okeechobee Blvd	32,000	41,900	1.2%	32,000	47,800	1.9%
SR 7 south of Northlake Blvd	4,600	8,900	3.7%	4,600	20,300	3.7%
Okeechobee Blvd west of SR 7	39,400	85,500	4.5%	39,400	79,000	3.9%
Okeechobee Blvd east of SR 7	48,000	82,500	2.8%	48,000	75,700	2.2%
Ibis Golf Club west of SR 7	2,500	4,800	3.7%	2,500	4,800	3.7%
Northlake Blvd west of SR 7	24,600	47,600	3.6%	24,600	39,800	2.4%
Northlake Blvd east of SR 7	30,000	56,000	3.3%	30,000	58,700	3.7%
All other roadways ⁽¹⁾			1.3%			1.3%

1. Growth associated with 2005 and 2035 social economic data.

DAILY TRAFFIC PROJECTIONS

The growth rates presented above were used to develop opening (2020), interim (2030), and design year (2040) AADTs assuming linear growth. For new roadways with no base year traffic volume, the 2035 projections were factored down to determine the opening and interim year

volumes and factored up to project design year volumes. The projected 2020, 2030, and 2040 No-Build and Build AADTs are shown in Figure 4 and Figure 5, respectively.

PEAK HOUR DIRECTIONAL TRAFFIC PROJECTIONS

The peak hour traffic projection was assumed to be 9% of the daily traffic. This study is a part of the pilot program conducted by FDOT District 4 under the direction of FDOT Central Office. Under this program, a standard K-factor of 9% is assumed instead of the calculated K_{30} for design traffic. More information on this pilot study can be found under the Appendix C-5.

The “time-of-day” travel demand model was examined to determine the directionality of the SR 7 corridor and its cross streets during the peak hours. The peak hour directional percentages from the model are included in Appendix C-6. All directional factors (D) were checked and ensured to be within the recommended ranges based on the *Design Traffic Handbook* for an urban arterial. Figure 6 and Figure 7 summarize the D factors utilized in the study for the No-Build and Build Scenarios, respectively.



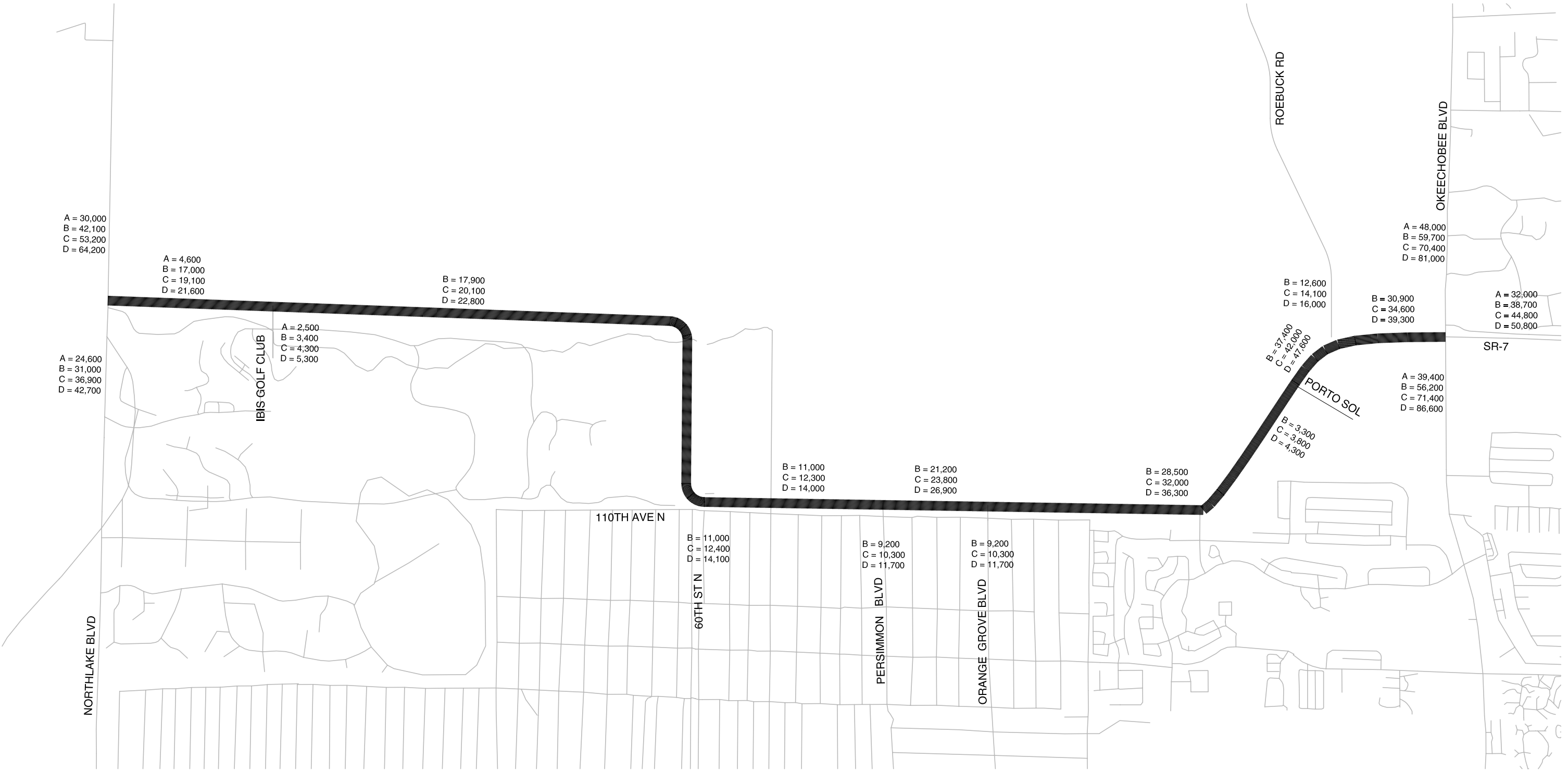
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EXISTING AADT AND 2020, 2030, 2040 LINK VOLUME PROJECTIONS
NO-BUILD SCENARIO
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



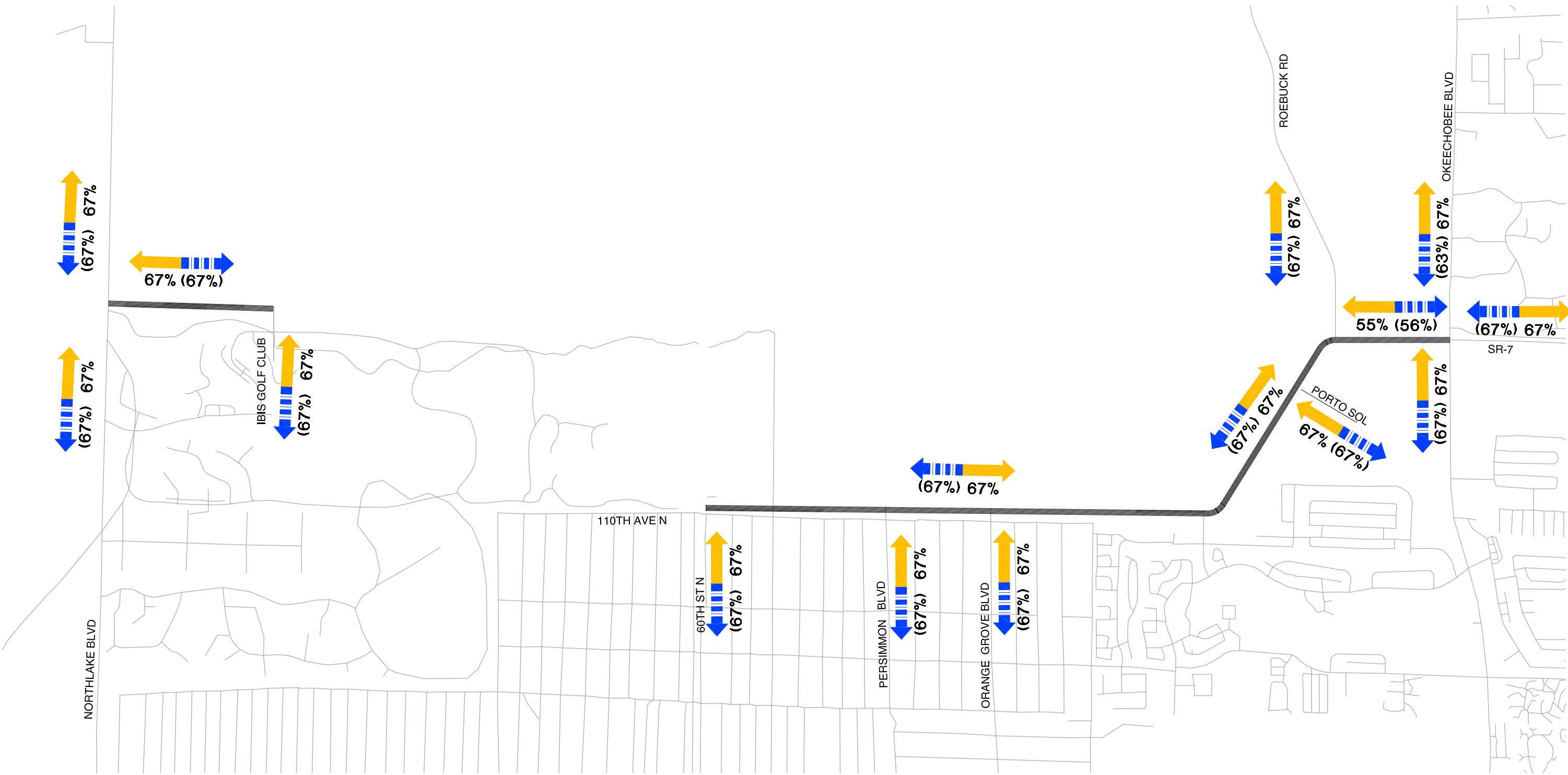
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EXISTING AADT AND 2020, 2030, 2040 LINK VOLUME PROJECTIONS
BUILD SCENARIO
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



(NO SCALE)



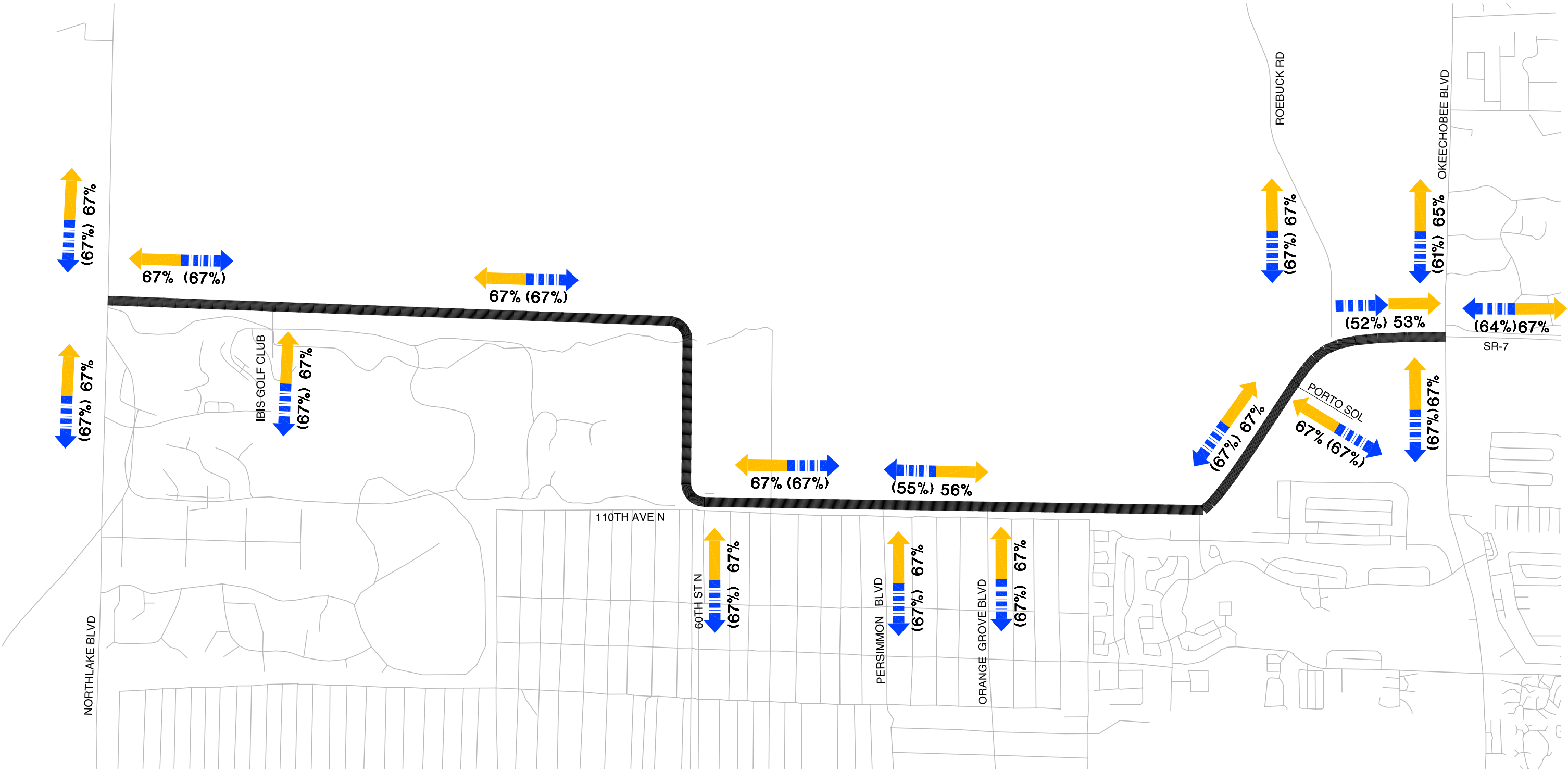
LEGEND

= AM PEAK HOUR DISTRIBUTION
###%
 = PM PEAK HOUR DISTRIBUTION
(###%)

LINK VOLUME DIRECTIONAL DISTRIBUTION
NO-BUILD SCENARIO
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



(NO SCALE)



LEGEND

= AM PEAK HOUR DISTRIBUTION

= PM PEAK HOUR DISTRIBUTION

LINK VOLUME DIRECTIONAL DISTRIBUTION
BUILD SCENARIO
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA

TURNING MOVEMENT PROJECTIONS

The TMTools spreadsheet was used to develop turning movement projections, as recommended by the FDOT District Four. Input data to the TMTools spreadsheet consists of any available turning movement counts, base year AADTs, projected link volumes, peak to daily (K) and directional distribution (D) factors. TMTools spreadsheets are included in Appendix D.

Using the TMTools spreadsheets, turning movement percentages were calculated based on a combination of approach volumes, K-factors, D-factors, and base year turning movement counts. These values were used to develop a.m. and p.m. peak-hour turning movement volumes for the years 2020, 2030 and 2040 at each intersection approach. These turning movement volumes were adjusted when declining projections were observed. Also, they are adjusted to best meet the calculated peak hour approach volumes and balance with the adjacent intersections. In most cases, the differences between the intersections are within 5%, and in a few cases, the differences are around 12%. The projected turning volumes are shown in Figure 8 through Figure 13 provided in Section 5 of the report.

Section 5

Future Conditions

Future Conditions

SCENARIOS

As discussed earlier, the following two scenarios were analyzed:

No-Build Scenario

The No-Build Scenario includes SR 7 as a two-lane facility from Okeechobee Boulevard to 60th Street and the existing northern two-lane connection between Ibis Golf Club and Northlake Boulevard. The following intersections along SR 7 were evaluated as part of the No-Build Scenario:

- Okeechobee Boulevard
- Roebuck Road
- Porto SOL Entrance
- Orange Grove Boulevard
- Persimmon Boulevard
- Northlake Boulevard

Build Scenario

The Build Scenario evaluates SR 7 as a four-lane divided facility from Okeechobee Boulevard to Northlake Boulevard. The following intersections along SR 7 were evaluated as part of the Build Scenario:

- Okeechobee Boulevard
- Roebuck Road
- Porto SOL Entrance
- Orange Grove Boulevard
- Persimmon Boulevard
- 60th Street
- Ibis Golf Club
- Northlake Boulevard

FUTURE CONDITIONS ANALYSIS

The 2020, 2030 and 2040 intersection traffic operations analyses for the a.m. and p.m. peak hours were performed along the corridor using the HCM2000 methodologies as represented in the software package Traffix. The analyses were based on the hourly turning movement volume projections shown in Figure 8 through Figure 13. A peak hour factor of 0.95 was assumed at all intersections as recommended by Palm Beach County. A truck percentage of 4% was used along SR 7, Okeechobee Boulevard, and Northlake Boulevard; 2% was used for all other east-west roadways studied. Signal timings were optimized for all intersections and analysis years. Figure 8 through Figure 13 also summarize the 2020, 2030, and 2040 No-Build and Build Scenarios intersection operational analyses along SR 7. Traffix output sheets are provided in Appendix E.

No-Build Scenario

Under the No-Build Scenario, traffic signals would likely be required at Roebuck Road, Porto SOL Entrance, and Orange Grove Boulevard by 2020 and at Persimmon Boulevard by 2030 to

meet the adopted LOS standard of D. In addition, SR 7 would have to become a four-lane facility south of Persimmon Boulevard by 2030, instead of a two-lane as described under the No-Build Scenario, in order to accommodate the expected traffic demand (as shown in Figure 9 and Figure 10). Table 2 summarizes the phasing of improvements at each of the study intersections.

Table 2 Phasing of Improvements No-Build Scenario

SR 7 Intersection	Improvement Required By ¹		
	2020	2030	2040
Northlake Blvd.	Signalization; 1 WB/1 EB through lane; NB/EB right-turn overlap	-	-
Persimmon Blvd.	-	Signalization	-
Orange Grove Blvd.	Signalization	1 SB through lane	-
Porto Sol Entrance	Signalization	1 SB/1 NB through lane	-
Roebuck Rd.	Signalization	1 SB/1 NB through lane	1 NB separate right-turn lane
Okeechobee Blvd.	SB/NB/WB/EB right-turn overlap	-	-

¹ 2020 improvements are compared to base year (2009) conditions, 2030 improvements are compared to 2020 conditions, and 2040 improvements are compared to 2030 conditions.

Overall, with these improvements all of the intersections, except for Okeechobee Boulevard, are expected to operate at LOS D or better during a.m. and p.m. peak hours. The intersection of Okeechobee Boulevard is expected to perform at LOS E during the a.m. peak hour by 2020 and LOS F during the a.m. and p.m. peak hours by 2030, even with triple left-turn and double right-turn lanes.

Build Scenario

All of the intersections would likely be required to be signalized or built as a roundabout under the Build Scenario by the opening year 2020 to meet the adopted LOS standard of D. Table 3 summarizes the phasing of improvements at each of the study intersections. Details of the roundabout evaluation are given in a later section of this technical memorandum.

Overall, with some recommended improvements such as additional turning lanes, right-turn overlap (as shown in Figure 11 through Figure 13) and cycle length increases, all of the intersections, except for Okeechobee Boulevard, are expected to operate at LOS D or better through year 2040. The intersection of Okeechobee Boulevard is expected to perform at LOS E during the a.m. and p.m. peak hours by 2020 and at LOS F by 2030, even with triple left-turn and double right-turn lanes.

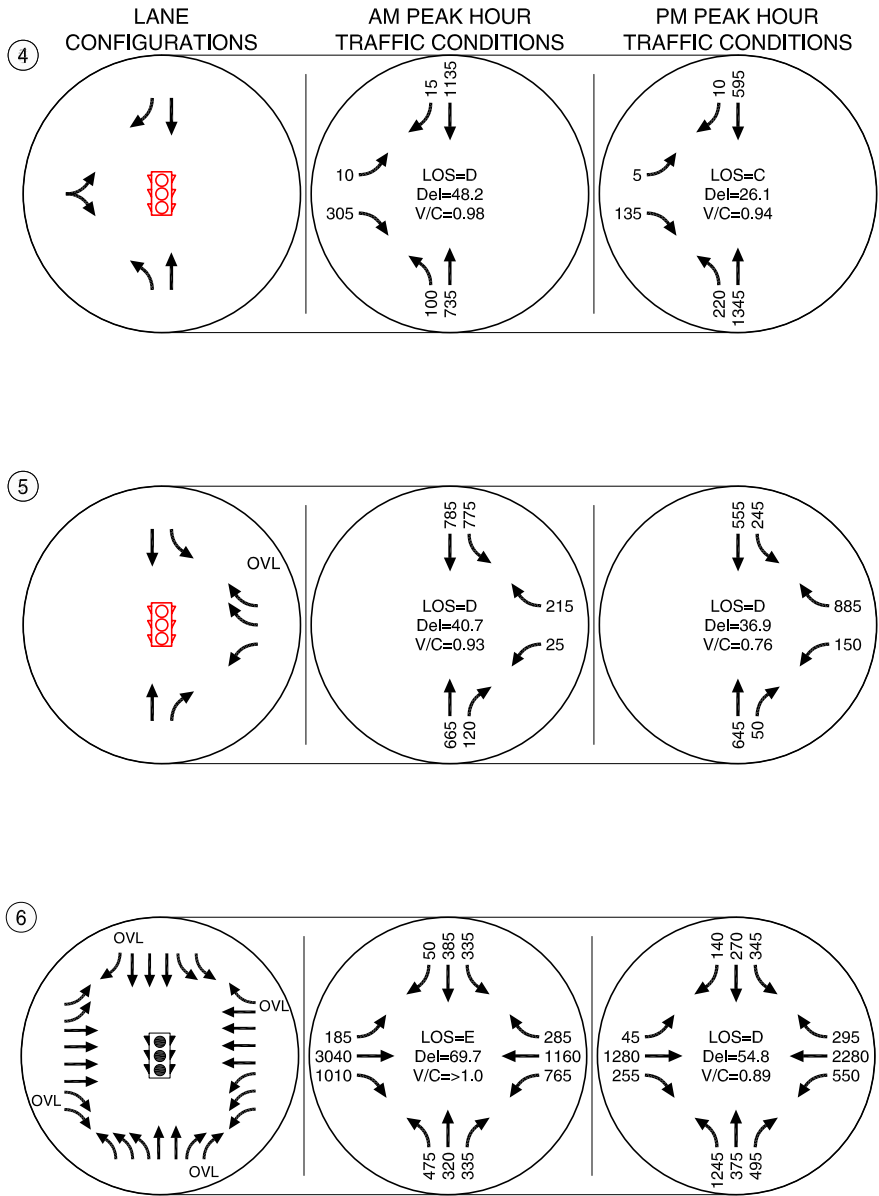
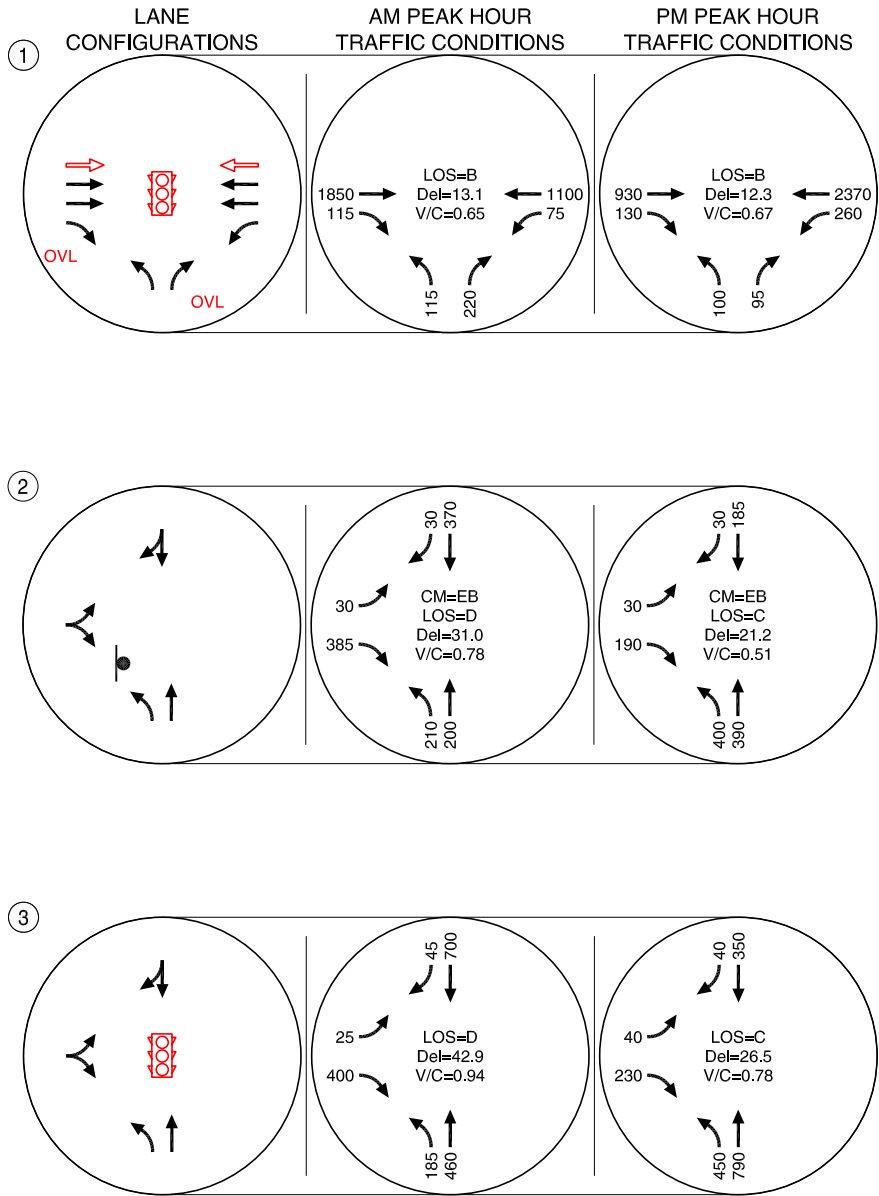
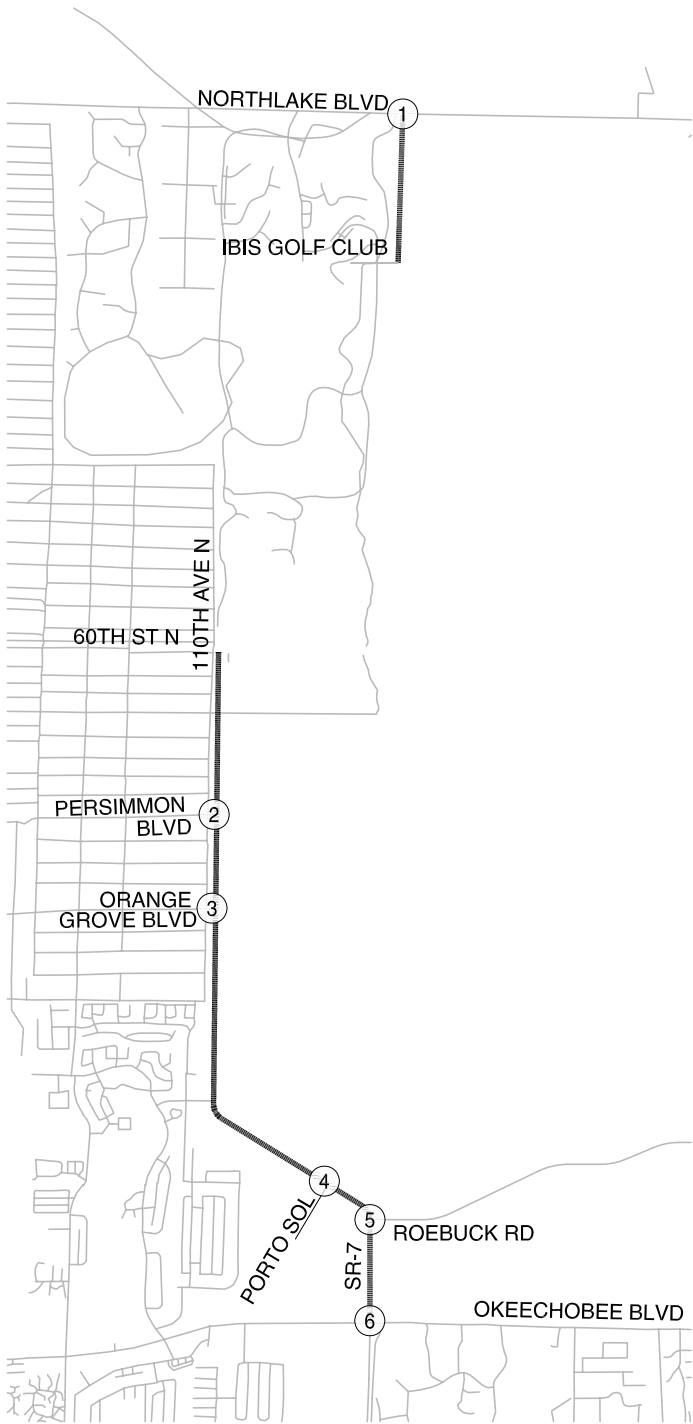
Table 3 Phasing of Improvements Build Scenario

SR 7 Intersection	Improvement Required By ¹		
	2020	2030	2040
Northlake Blvd.	1 WB/1 EB through lane; 1 WB left-turn lane; 1 NB right-turn lane; NB/EB right-turn overlap	1 NB right-turn lane	-
Ibis Golf Club	Signalization or roundabout	-	-
60 th St.	Signalization or roundabout	-	-
Persimmon Blvd.	Signalization	1 EB separate left-turn lane	-
Orange Grove Blvd.	Signalization	-	1 SB separate right-turn lane; 1 EB right-turn lane
Porto Sol Entrance	Signalization	1 EB separate right-turn lane; EB right-turn overlap	1 SB separate right-turn lane
Roebuck Rd.	Signalization	1 NB separate right-turn lane; NB right-turn overlap	1 NB through lane
Okeechobee Blvd.	SB/NB/WB/EB right-turn overlap	-	-

¹ 2020 improvements are compared to base year (2009) conditions, 2030 improvements are compared to 2020 Build conditions, and 2040 improvements are compared to 2030 Build conditions).



NO-BUILD SCENARIO



LEGEND

- | | |
|--|-------------------------------|
| CM = CRITICAL MOVEMENT (UNSIGNALIZED) | OVL = OVERLAP |
| LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED) | = STOP SIGN |
| Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED) | = TRAFFIC SIGNAL |
| V/C = CRITICAL VOLUME-TO-CAPACITY RATIO | = ADDED LANE* |
| | = EXISTING LANE CONFIGURATION |

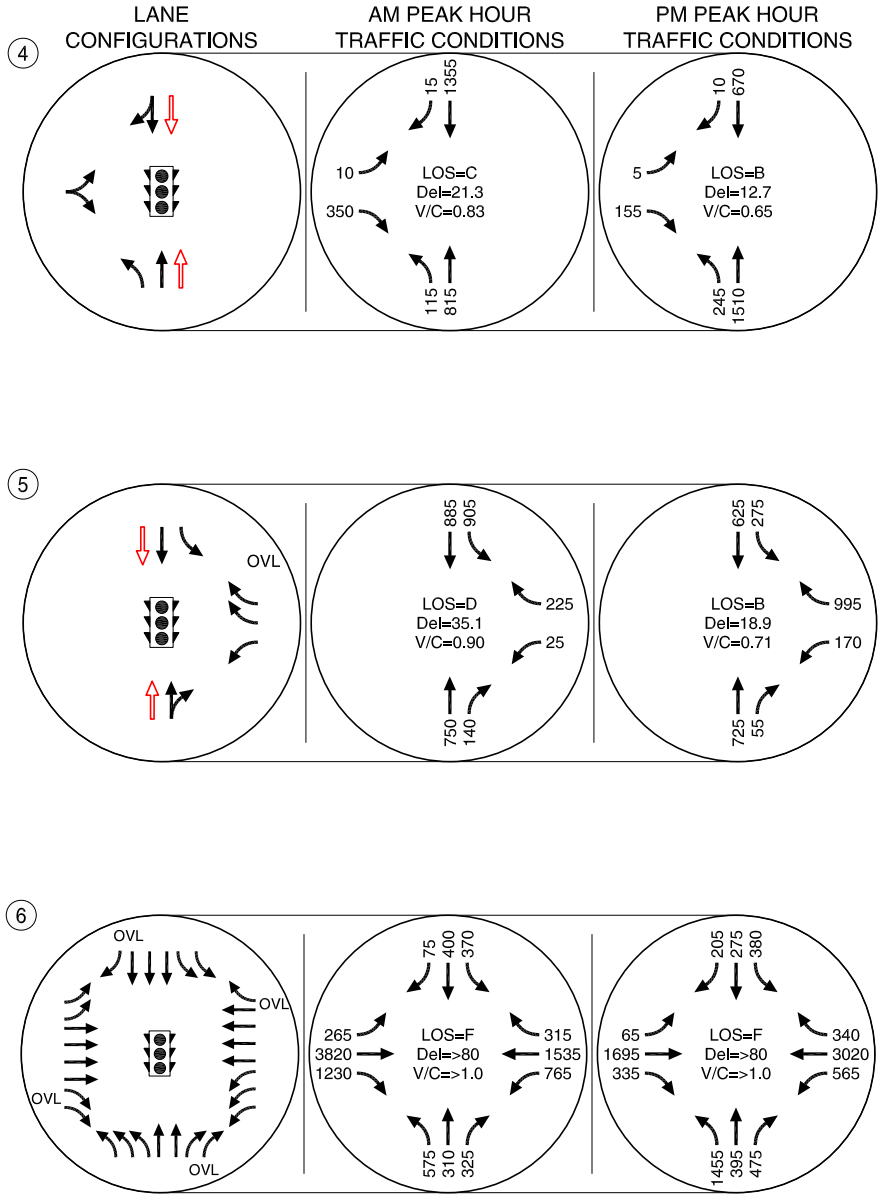
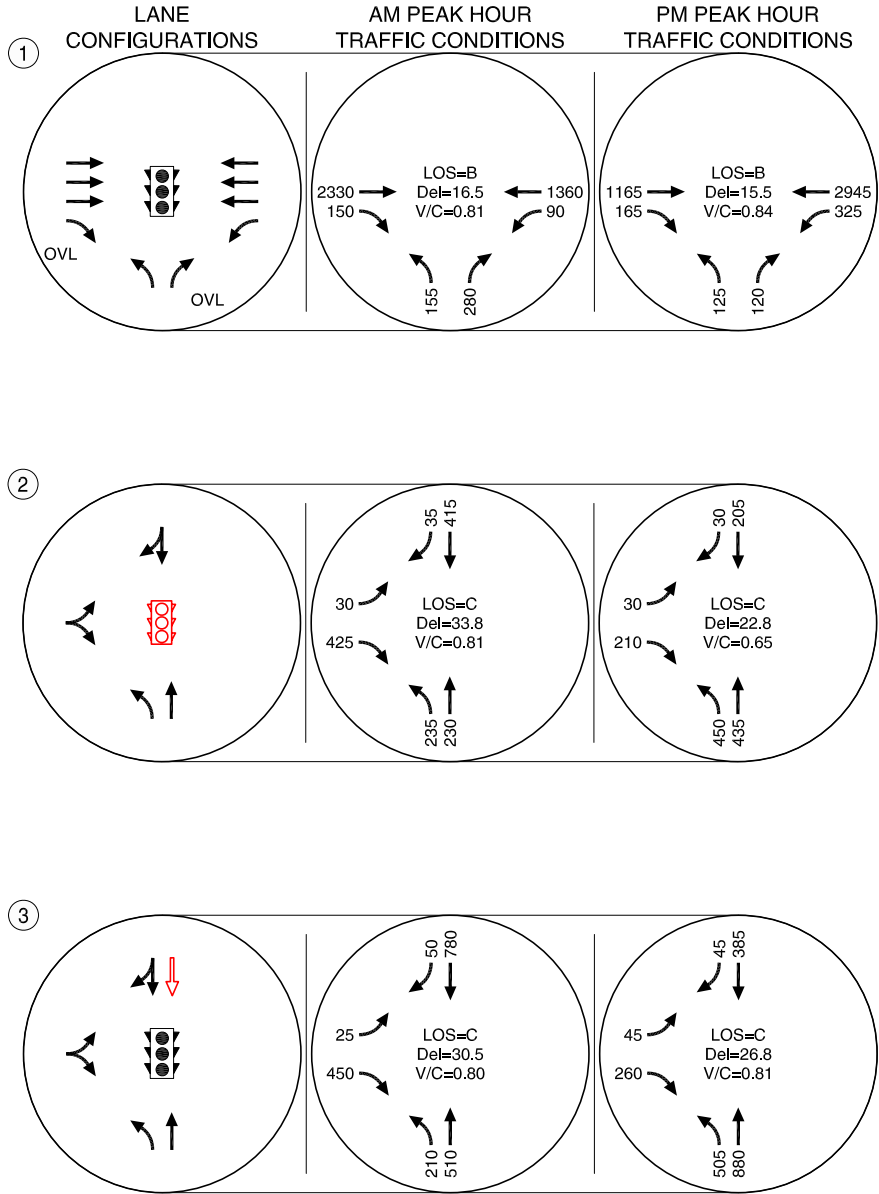
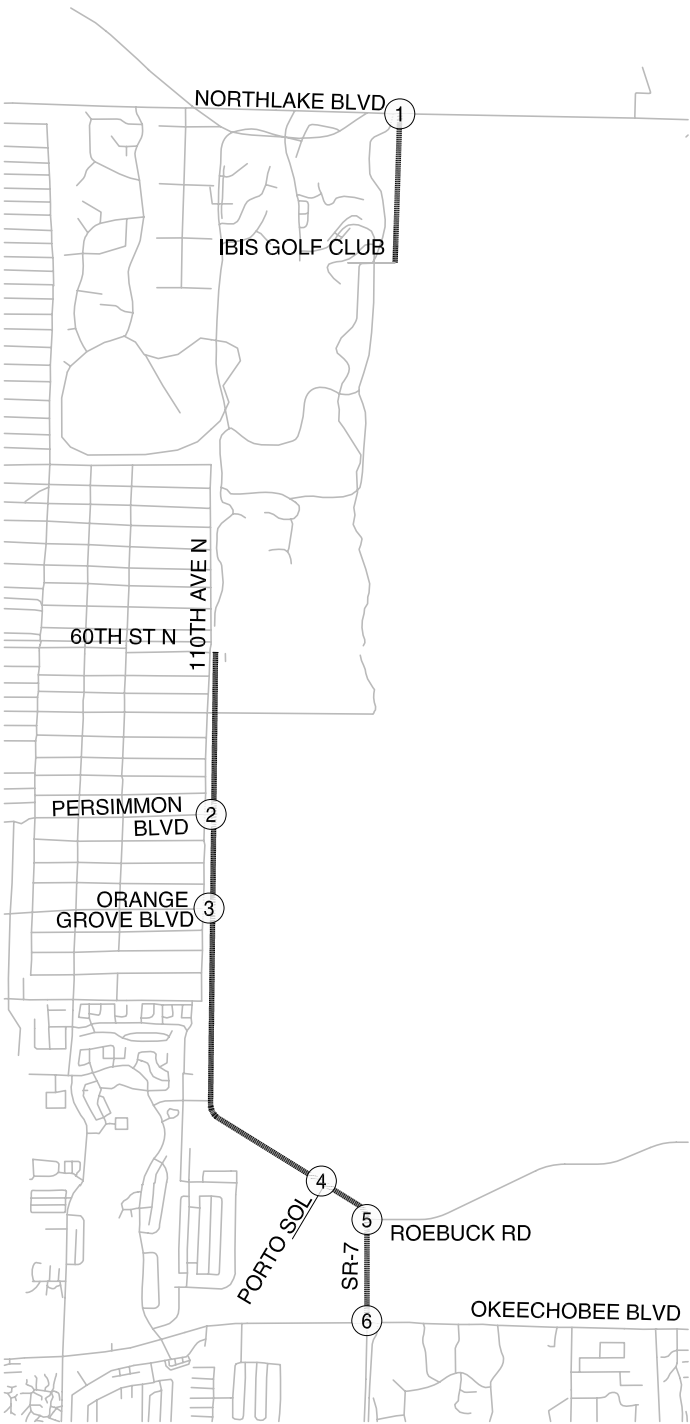
* COMPARED TO EXISTING TRAFFIC CONDITIONS

2020 NO-BUILD SCENARIO LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



(NO SCALE)

NO-BUILD SCENARIO



LEGEND

- CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)

Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)

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= STOP SIGN

= TRAFFIC SIGNAL

= ADDED LANE

= EXISTING LANE CONFIGURATION

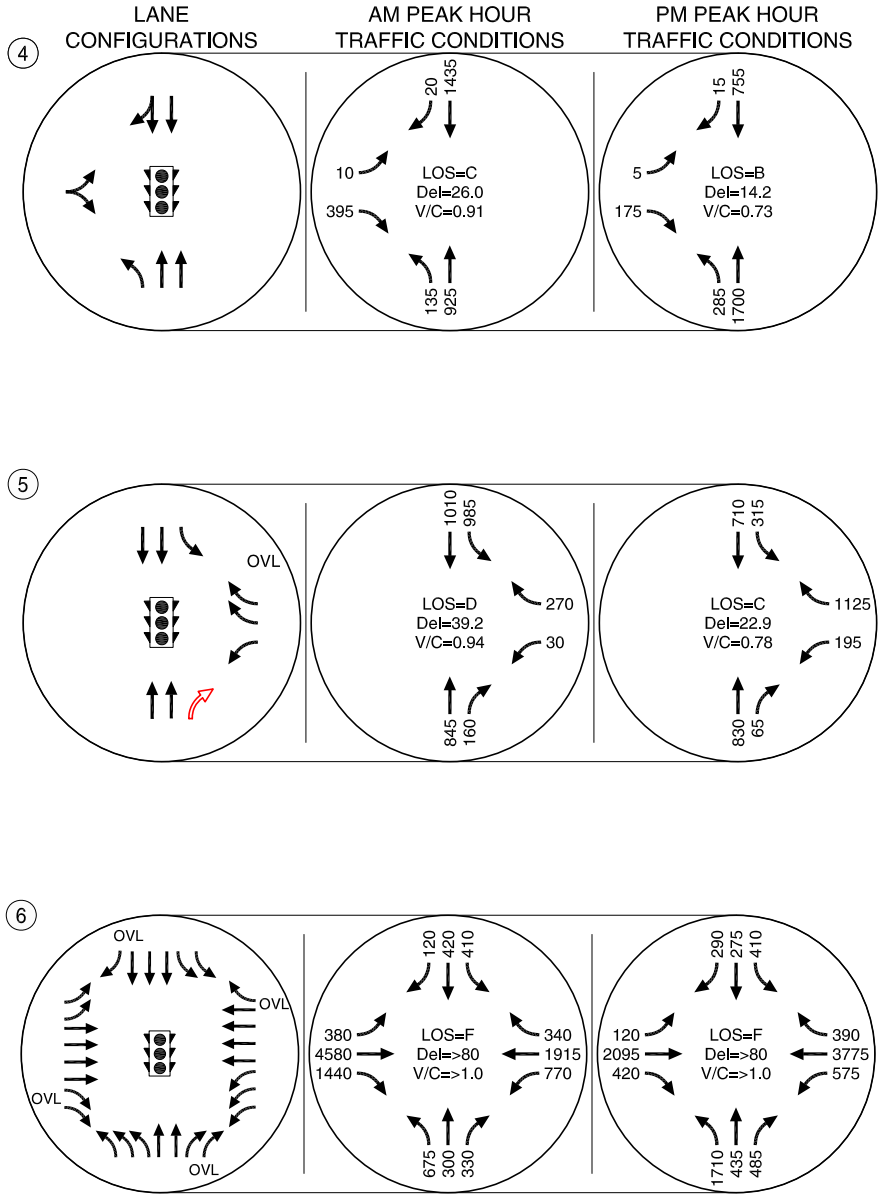
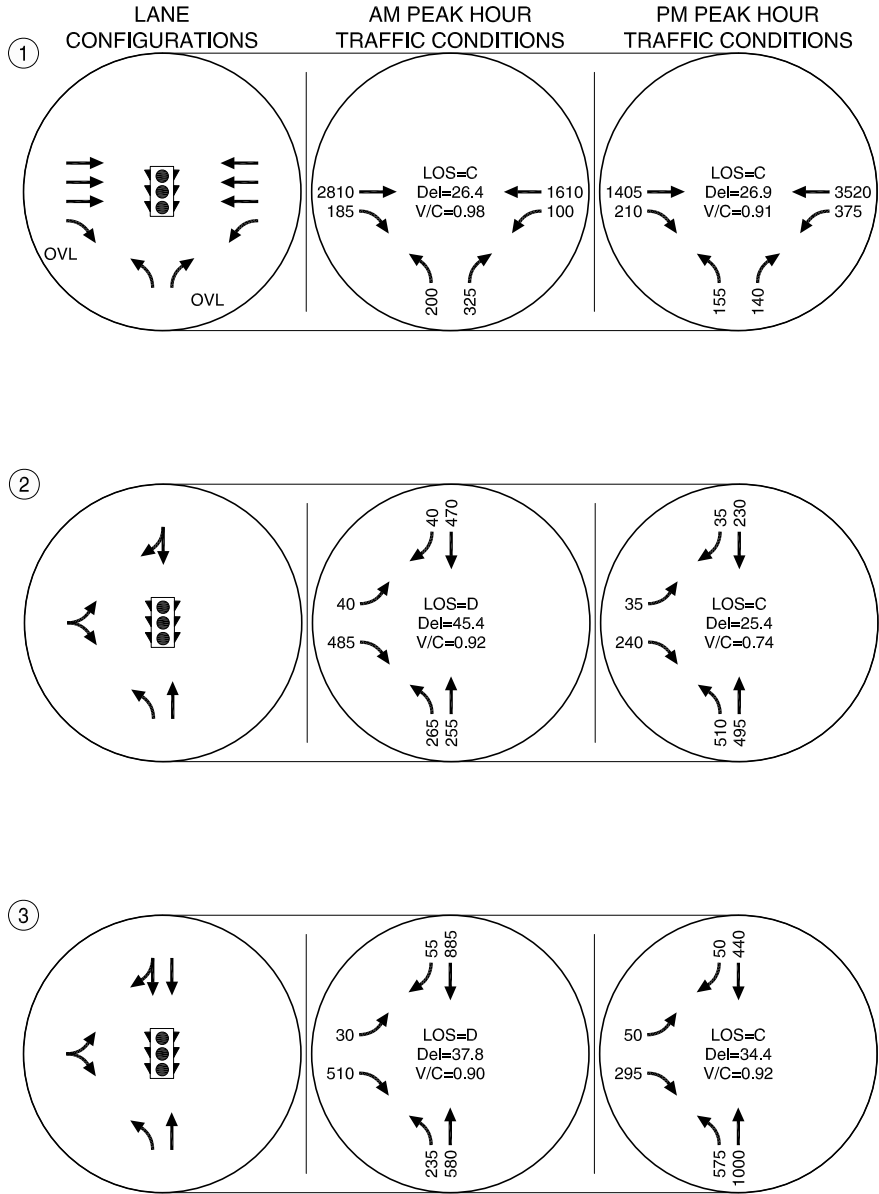
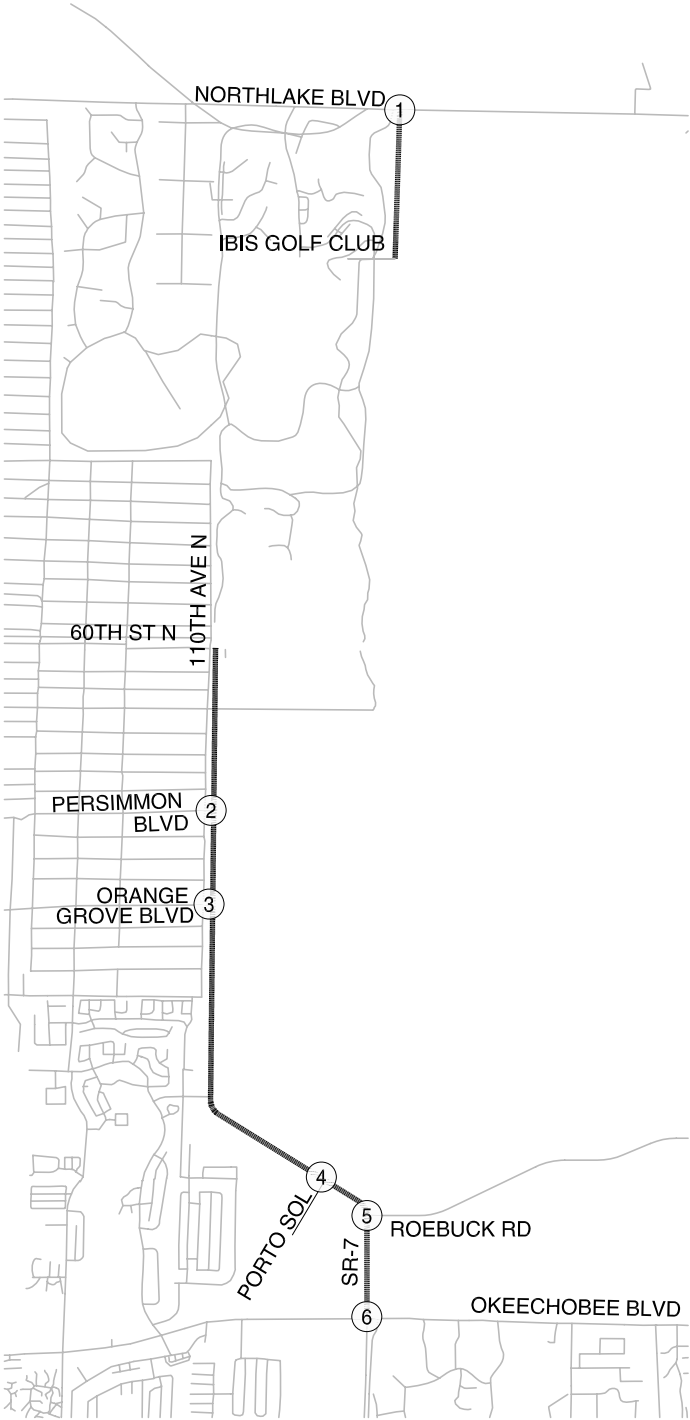
* COMPARED TO 2020 NO-BUILD SCENARIO

2030 NO-BUILD SCENARIO LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA

FIGURE
9



NO-BUILD SCENARIO



LEGEND

- CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)

Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- OVL = OVERLAP

= STOP SIGN

= TRAFFIC SIGNAL

= ADDED LANE

= EXISTING LANE CONFIGURATION

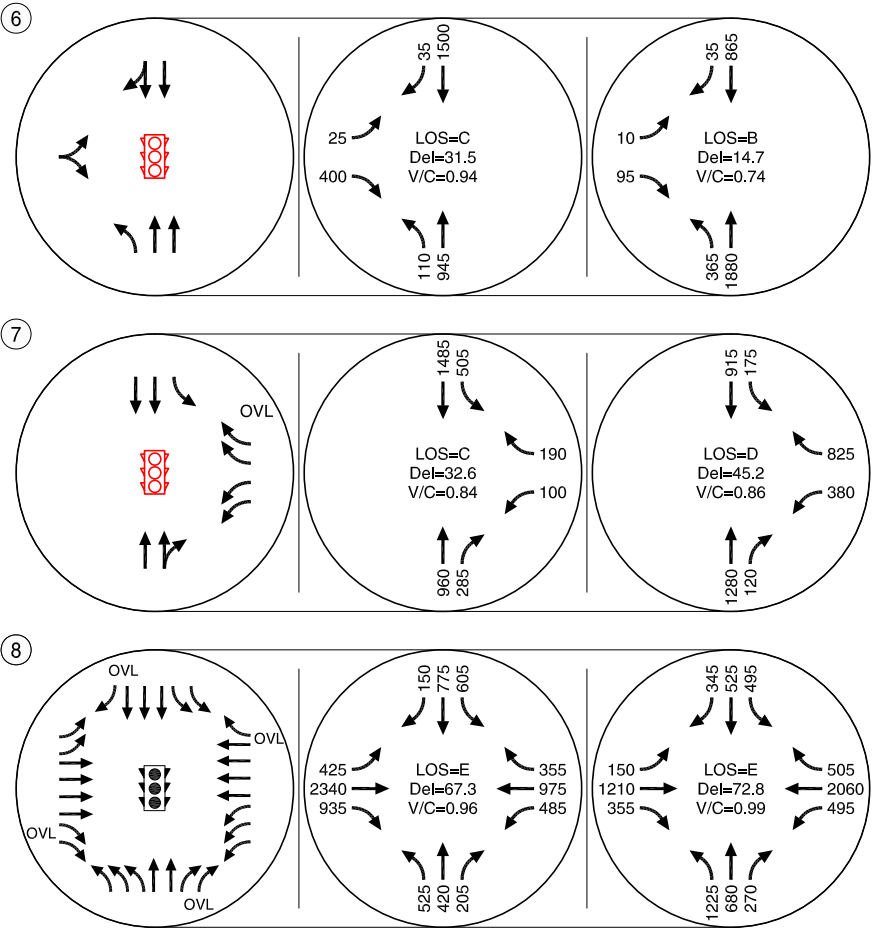
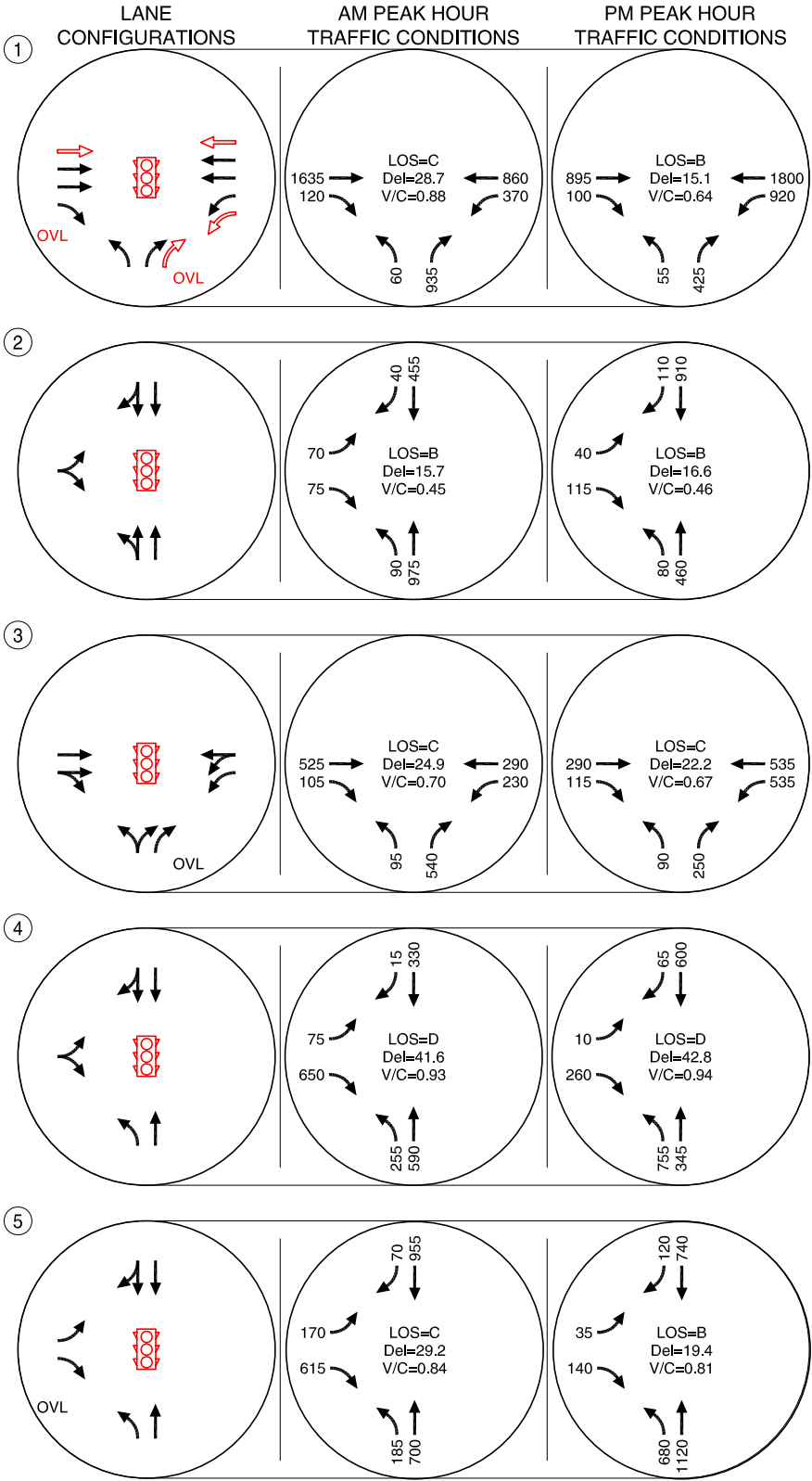
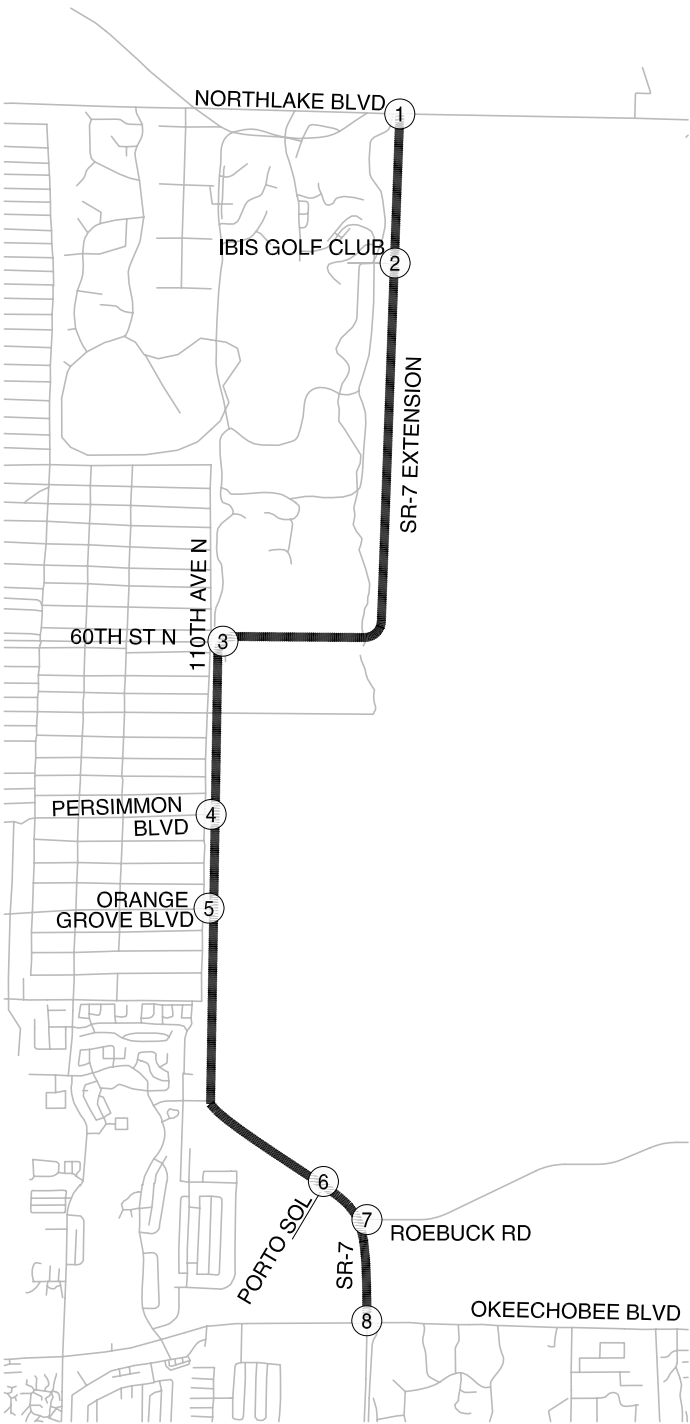
* COMPARED TO 2030 NO-BUILD SCENARIO

2040 NO-BUILD SCENARIO LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



(NO SCALE)

BUILD SCENARIO



LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)

Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

OVL = OVERLAP

= STOP SIGN

= TRAFFIC SIGNAL

= ADDED LANE*

= EXISTING LANE CONFIGURATION

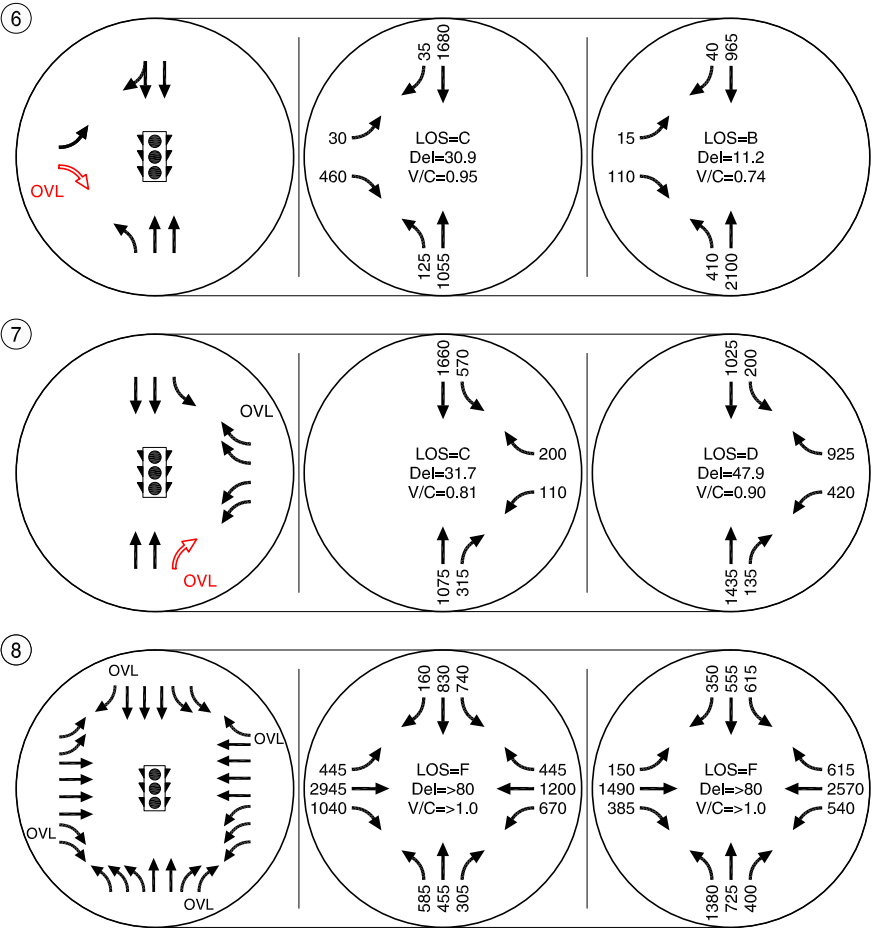
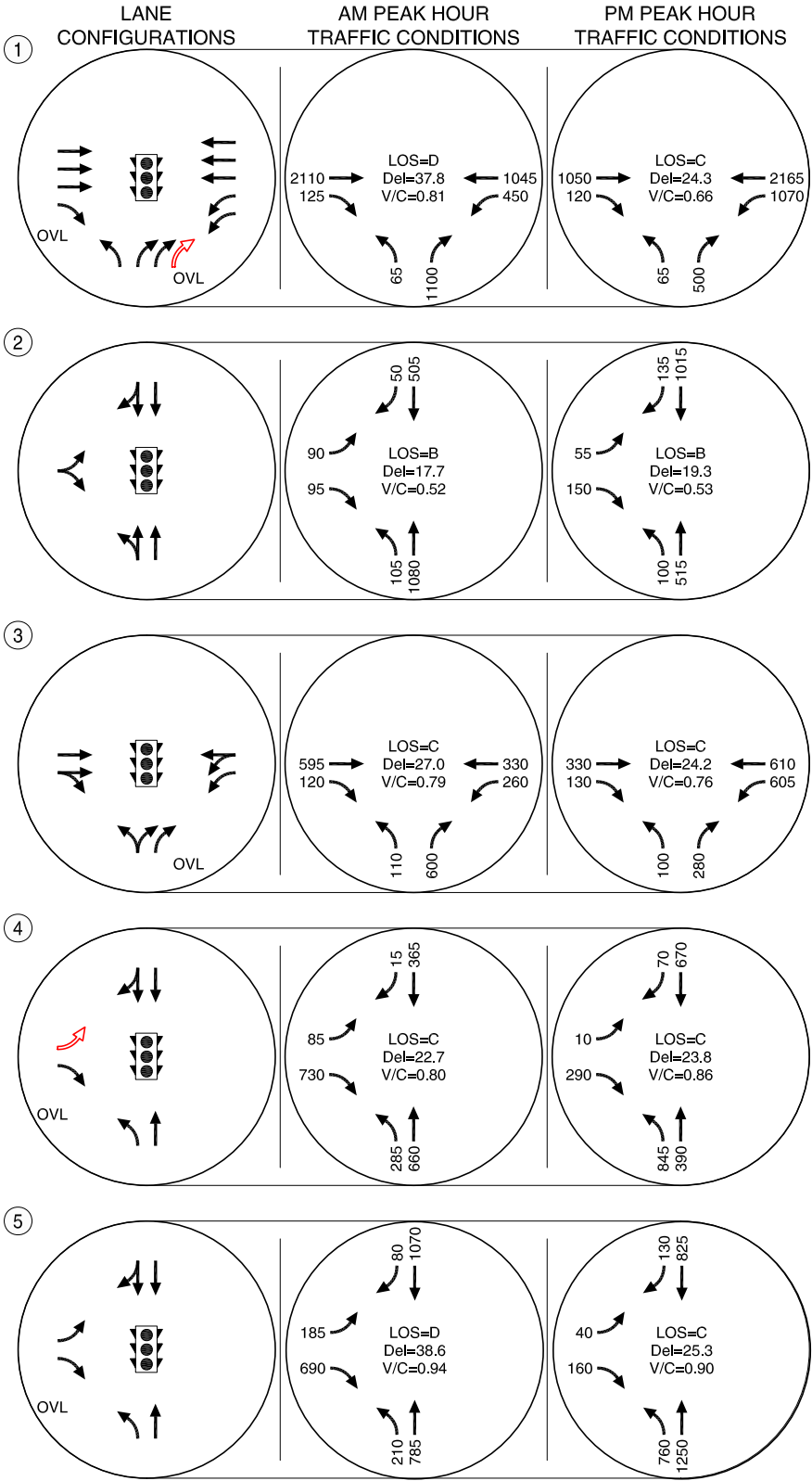
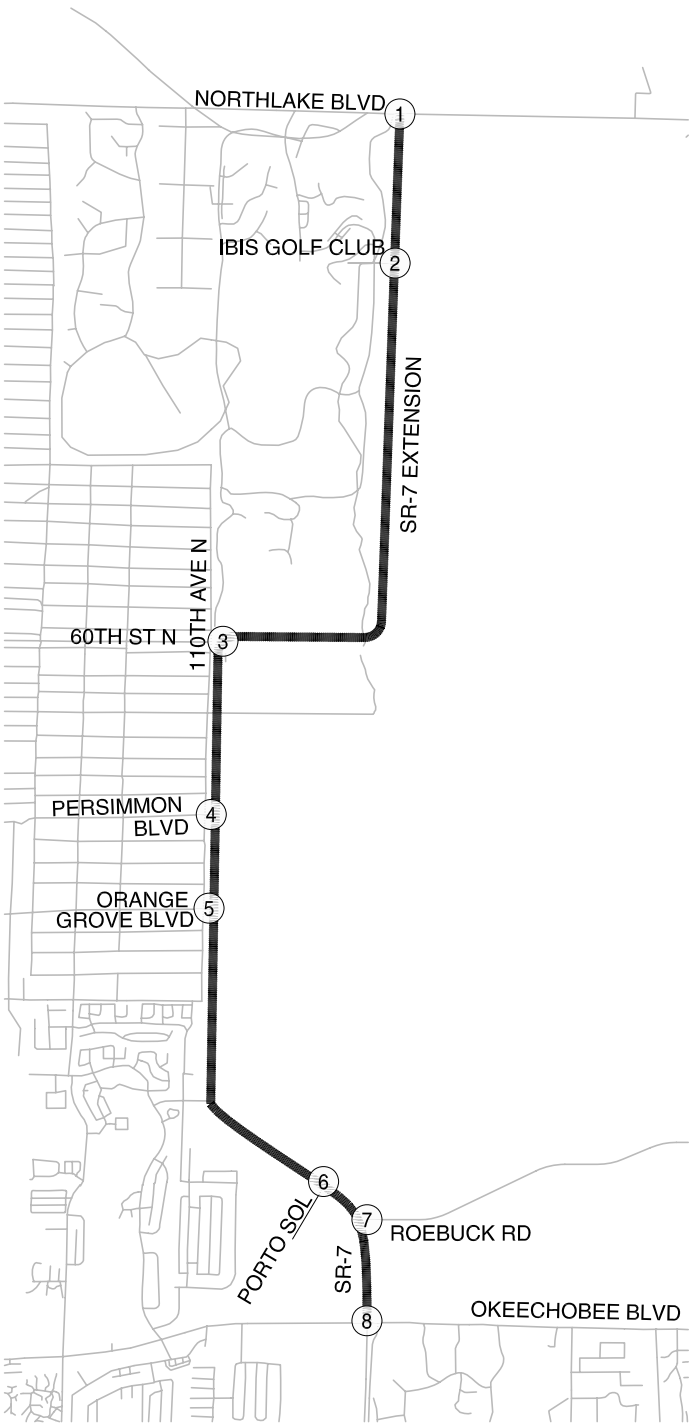
* COMPARED TO EXISTING TRAFFIC CONDITIONS

2020 BUILD SCENARIO LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



(NO SCALE)

BUILD SCENARIO



LEGEND

CM = CRITICAL MOVEMENT (UNSIGNALIZED)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

OVL = OVERLAP
STOP SIGN
TRAFFIC SIGNAL
ADDED LANE
EXISTING LANE CONFIGURATION

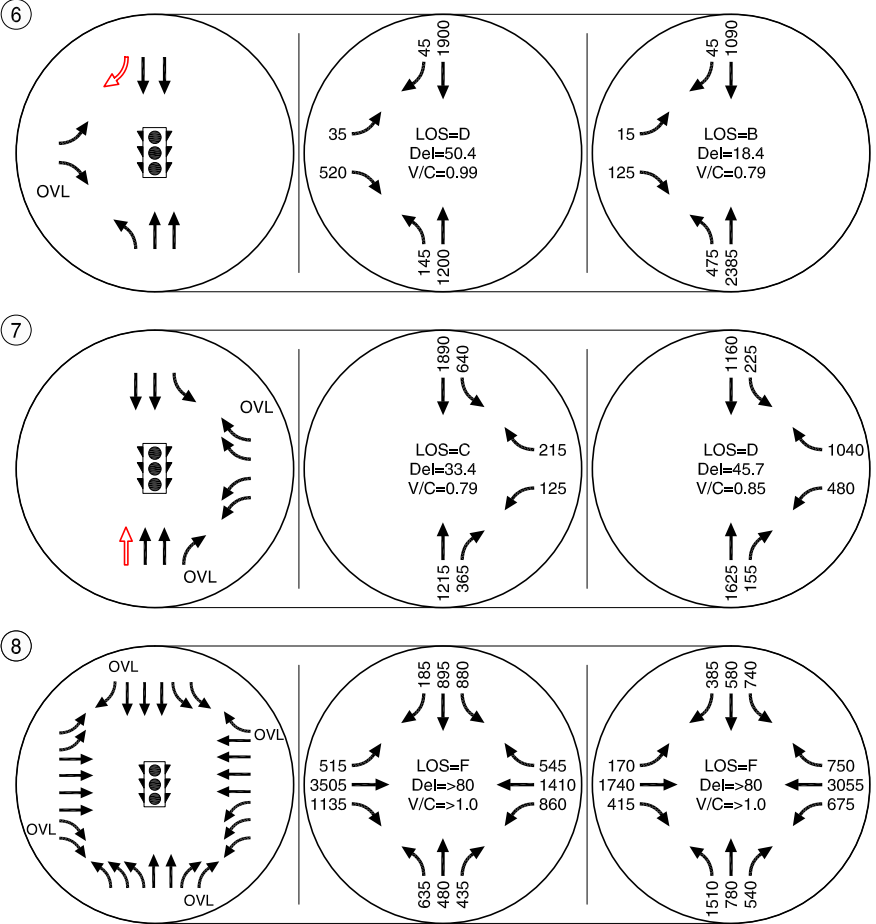
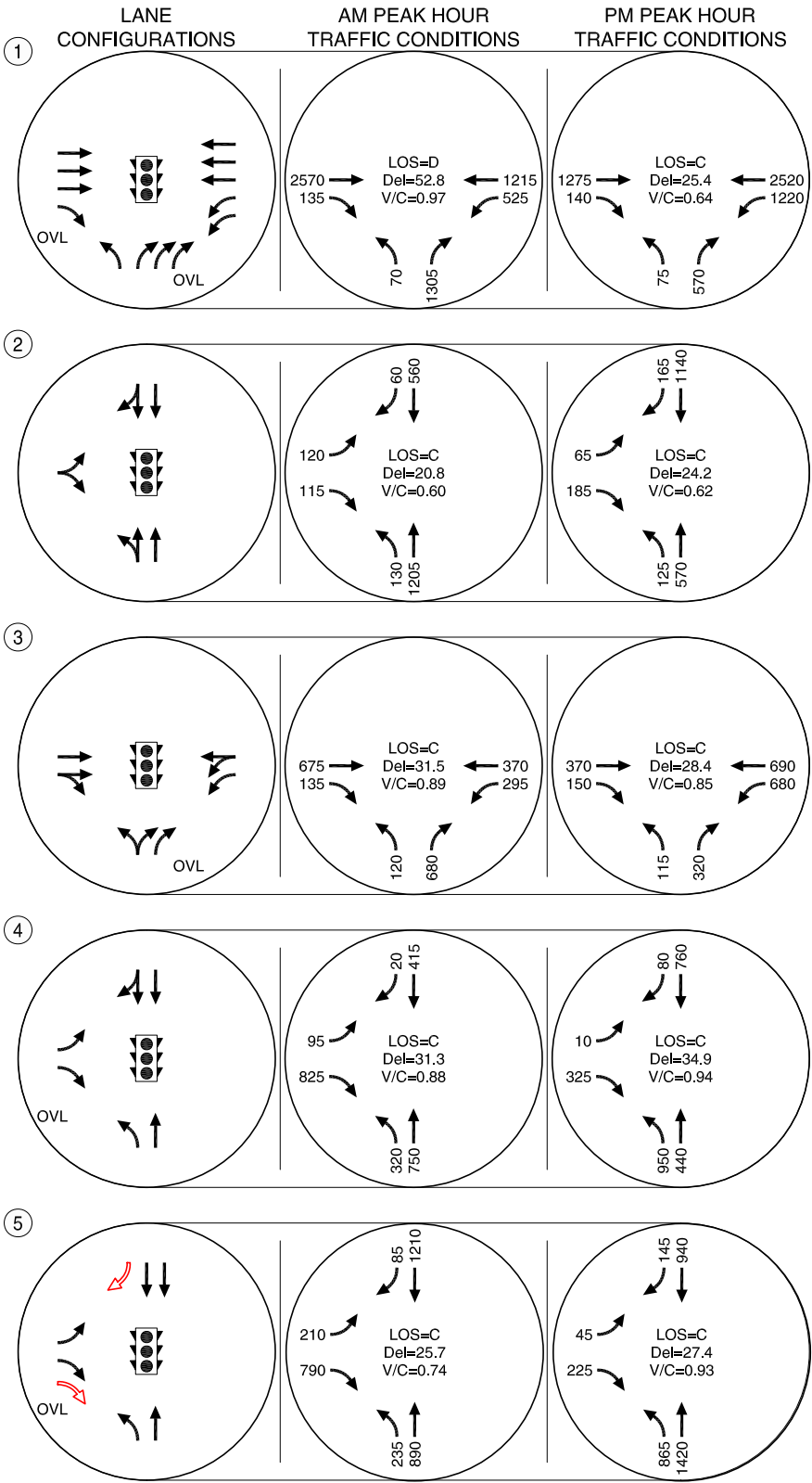
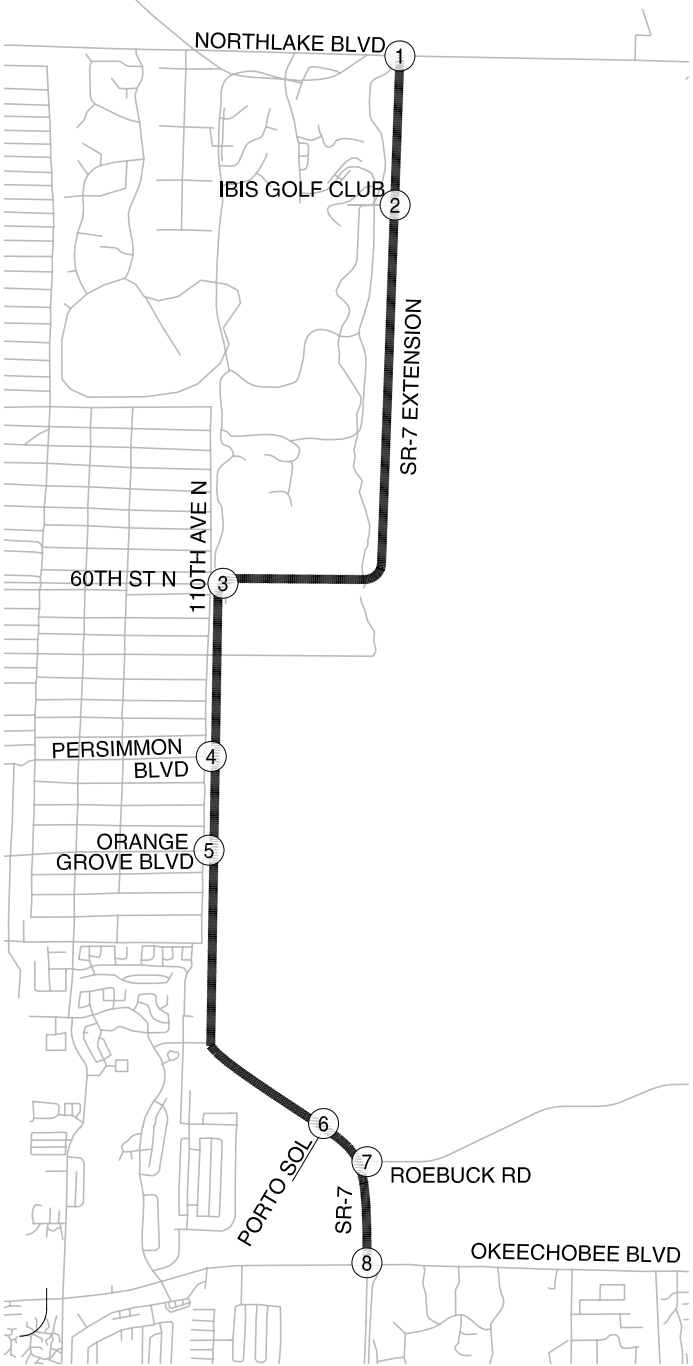
* COMPARED TO 2020 BUILD SCENARIO

2030 BUILD SCENARIO LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA



(NO SCALE)

BUILD SCENARIO



LEGEND

- CM = CRITICAL MOVEMENT (UNSIGNALIZED)

LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)

Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)

V/C = CRITICAL VOLUME-TO-CAPACITY RATIO
- OVL = OVERLAP

= STOP SIGN

= TRAFFIC SIGNAL

= ADDED LANE

= EXISTING LANE CONFIGURATION

* COMPARED TO 2030 BUILD SCENARIO

2040 BUILD SCENARIO LANE CONFIGURATION AND TRAFFIC CONDITIONS
ROYAL PALM BEACH, PALM BEACH COUNTY, FLORIDA

FIGURE
13

Section 6

Diversion Analysis

Diversion Analysis

The SR 7 corridor extension is expected to alleviate traffic along other parallel corridors, such as Royal Palm Beach Boulevard/Coconut Boulevard and Seminole Pratt-Whitney Road to the west as well as Jog Road and the Turnpike to the east.

A comparison of projected volumes for the No-Build and Build scenarios revealed that with the connection of SR 7 between Okeechobee Boulevard and Northlake Boulevard, the following reductions in daily traffic volumes are anticipated:

- About 4,000 on Seminole Pratt-Whitney Road south of Northlake Boulevard,
- About 5,000 on Royal Palm Beach Blvd in the vicinity of 60th Street,
- More than 3,000 on Jog Road, and
- Almost 2,000 on the Florida Turnpike.

Appendix F shows the corridors with a reduction or an addition of more than 2,000 daily vehicle trips.

Section 7
Roundabout
Operational Analysis

Roundabout Operational Analysis

As an intersection treatment, roundabouts were considered at the following two intersections along SR 7: Ibis Golf Club and 60th Street. Operational analyses were conducted to determine the number of lanes required at the two intersections for years 2020, 2030, and 2040 traffic volume forecasts. The geometric design parameters reflect recommendations from FHWA's *Roundabouts: An Informational Guide* (hereafter, Roundabout Guide). The weekday a.m. and p.m. peak hour time periods were analyzed with single-lane and two-lane roundabout alternatives for each forecast year using the NCHRP Report 572 methodology as interpreted by SIDRA Intersection software (version 4.0).

The analysis maintained a maximum volume-to-capacity (v/c) ratio of 0.85 for each approach per the recommendation in the FHWA Roundabout Guide. LOS, which accounts for average control delay per vehicle (assuming HCM 2010 roundabout LOS definitions), and queue lengths were also considered; however, capacity was consistently the constrained operational parameter that dictated approach configuration and number of circulatory lanes.

SR 7/IBIS GOLF CLUB ROUNDABOUT OPERATIONS

The forecast v/c ratios in 2020 for a single-lane roundabout at the SR 7/Ibis Golf Club intersection were found to be greater than 0.85 in the weekday a.m. and p.m. peak hours; therefore, a two-lane roundabout is necessary to accommodate future volumes. The operations summary for the SR 7/Ibis Golf Club intersection is provided in Table 4. A summary of the 95th percentile queue lengths is shown in Table 5. Appendix G-1 contains the software output sheets.

Table 4 SR 7/Ibis Golf Club Intersection Operations Summary

Year	Study Period	Single-Lane Geometry			Two-Lane Geometry		
		Critical Movement	V/C Ratio	Overall LOS	Critical Movement ¹	V/C Ratio	Overall LOS
2020	AM	Northbound	1.11	*	Northbound	0.56	A
	PM	Southbound	1.08	*	Southbound	0.54	A
2030	AM				Northbound	0.64	A
	PM				Southbound	0.62	A
2040	AM				Northbound	0.73	A
	PM				Eastbound	0.81	A

¹ Northbound Approach = SR 7 (South Approach)

Southbound Approach = SR 7 (North Approach)

Eastbound Approach = Ibis Golf Club (West Approach)

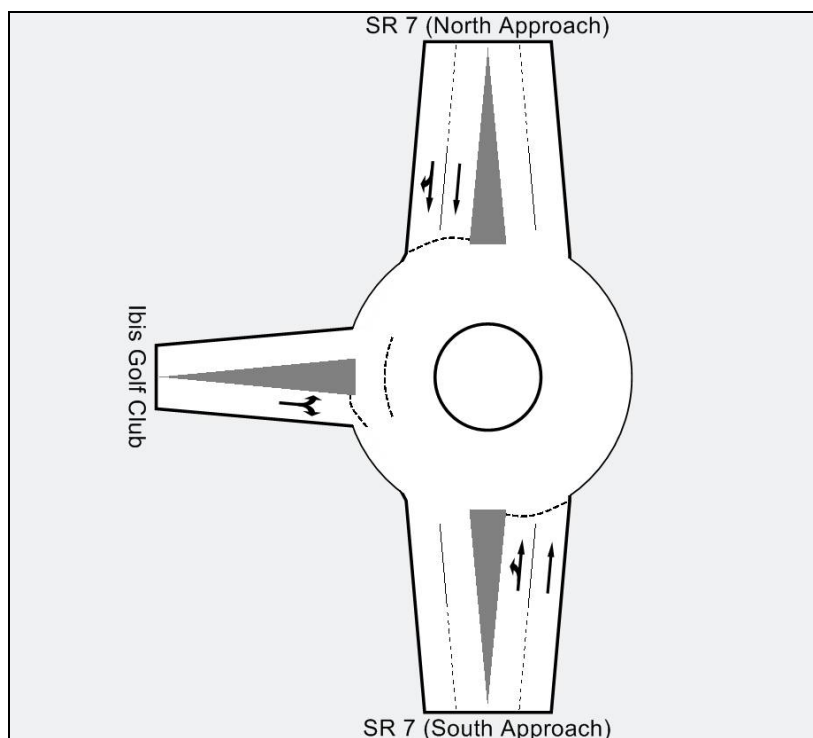
* LOS not reported due to v/c ratio on critical movement exceeding 1.0

Table 5 SR 7/Ibis Golf Club Intersection Queue Summary with Recommended Lane Configuration

Year	Study Period	95 th Percentile Queue Lengths (feet)		
		Northbound (SR 7)	Southbound (SR 7)	Eastbound (Ibis Golf Club)
2020	AM	125	50	50
	PM	50	125	75
2030	AM	150	50	50
	PM	50	150	100
2040	AM	200	75	75
	PM	75	200	200

The lane configurations shown in Exhibit 1 for a two-lane roundabout (as depicted schematically by SIDRA) are expected to accommodate forecast traffic volumes through year 2040 for both the a.m. and p.m. peak hours. The Ibis Golf Club approach interacts with two circulating lanes.

Exhibit 1 SR 7/Ibis Golf Club Intersection Lane Configuration



SR 7/60TH STREET ROUNDABOUT OPERATIONS

At the SR 7/60th Street intersection, the v/c ratios for a single-lane roundabout were found to be greater than 0.85 during the a.m. and p.m. peak hour periods by 2020; therefore, a two-lane roundabout is required to accommodate year 2020 volumes. A two-lane roundabout was also found to operate acceptably through 2040. The operations summary for the SR 7/60th Street intersection is provided in Table 6. A summary of the 95th percentile queue lengths is shown in Table 7. Appendix G-2 contains the software output sheets.

Table 6 SR 7/60th Street Intersection Operations Summary

Year	Study Period	Single-Lane Geometry			Double-Lane Geometry		
		Critical Movement	V/C Ratio	Overall LOS	Critical Movement	V/C Ratio	Overall LOS
2020	AM	Northbound	1.07	*	Northbound	0.54	A
	PM	Westbound	1.15	*	Westbound	0.57	A
2030	AM				Northbound	0.64	A
	PM				Westbound	0.66	A
2040	AM				Northbound	0.79	B
	PM				Westbound	0.76	B

¹ Northbound Approach = SR 7 (South Approach)

Westbound Approach = SR 7

Eastbound Approach = 60th Street (West Approach)

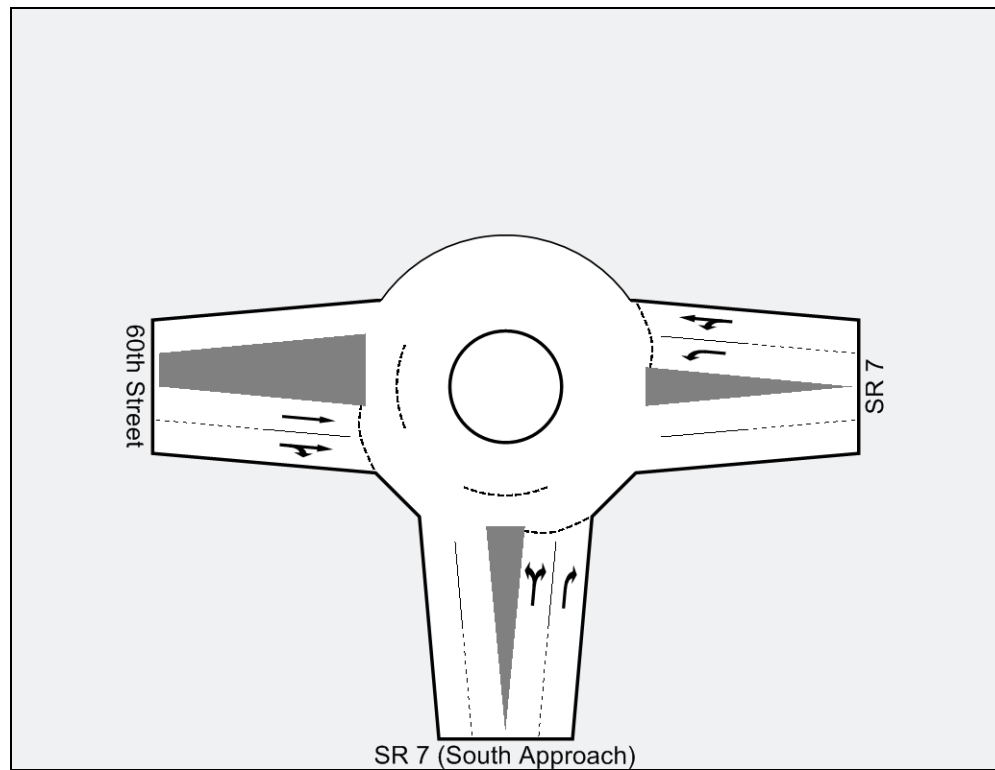
* LOS not reported due to v/c ratio on critical movement exceeding 1.0

Table 7 SR 7/60th Street Intersection Queue Summary with Recommended Lane Configuration

Year	Study Period	95 th Percentile Queue Lengths (feet)		
		Northbound (SR 7)	Westbound (SR 7)	Eastbound (60 th Street)
2020	AM	100	50	75
	PM	50	125	75
2030	AM	150	75	75
	PM	50	150	75
2040	AM	225	75	125
	PM	50	225	125

The lane configurations shown in Exhibit 2 for a two-lane roundabout are expected to accommodate forecast traffic volumes through year 2040 for both the a.m. and p.m. peak hours. The 60th Street and SR 7 south approaches interact with two circulating lanes.

Exhibit 2 SR 7/60th Street Intersection Lane Configuration



Section 8

Findings

Findings

Based on the traffic operations analysis of future conditions, under the No-Build Scenario, improvements beyond stop control would likely be required at Roebuck Road, Porto SOL Entrance, and Orange Grove Boulevard by 2020 and at Persimmon Boulevard by 2030 to meet LOS standard of D. Under the Build Scenario, improvements beyond stop control would be likely required at all intersections between Okeechobee Boulevard and Northlake Boulevard by 2020.

In addition to improving control at individual intersections, the widening of SR 7 to a four-lane facility south of Persimmon Boulevard by 2030 under the No-Build Scenario was identified as a need in order to accommodate the expected traffic demand. Under the Build Scenario, improvements such as additional turning lanes, right-turn overlap and cycle length increases were required to achieve LOS D.

All intersections, except for Okeechobee Boulevard, are expected to operate at LOS D or better during the weekday a.m. and p.m. peak hours under both the No-Build and Build Scenario. The intersection of Okeechobee Boulevard is expected to perform at LOS F during the peak hours by 2030, even with triple left-turn and double right-turn lanes.

It is significant to note that the SR 7 corridor extension is expected to alleviate traffic along other parallel corridors, such as Royal Palm Beach Boulevard/Coconut Boulevard and Seminole Pratt-Whitney Road to the west as well as Jog Road and the Turnpike to the east.

Analysis of the SR 7 intersections of Ibis Golf Club and 60th Street as roundabouts indicated that two-lane roundabouts would accommodate forecast traffic volumes through year 2040 for both a.m. and p.m. peak hours.

Section 9

References

References

1. Robinson, B. W., L. Rodegerdts, W. Scarbrough, W. Kittelson, R. Troutbeck, W. Brilon, L. Bondzio, K. Courage, M. Kyte, J. Mason, A. Flannery, E. Myers, J. Bunker, and G. Jacquemart. *Roundabouts: An Informational Guide*. Report FHWA-RD-00-067. FHWA, U.S. Department of Transportation, June 2000.
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