
SECTION 1 - OVERVIEW

INTRODUCTION

GMB Engineers & Planners, Inc. has been retained by the Florida Department of Transportation, District Five, as a sub consultant to Wilbur Smith Associates to provide the Design Traffic for SR 44 Project Development and Environment (PD&E) Study. The purpose of the PD&E study is to consider Transportation System Management (TSM) improvements to SR 44 and evaluate the two-lane extension of Beresford Avenue from Blue Lake Avenue to Summit Avenue. This Final Technical Memorandum for Evaluation of Future Traffic Conditions is a continuation of two earlier reports "Final Technical Memorandum, Phase 1 – Existing Traffic Conditions Analysis, December 2001, Financial Project ID: 404646-1" and "Draft Technical Memorandum, Phase 2 – Future Traffic Conditions Analysis, April 2002, Financial Project ID: 404646-1".

STUDY OBJECTIVE

The objective is to develop Design Traffic Volumes for use by the Department in the PD&E of SR 44 located in the City of DeLand, Volusia County. As a second phase of the effort, the objective of this report is to provide the Department with the future traffic forecasts including the Design Hour Traffic Volumes and an evaluation of future operating conditions for SR 44 for the No-Build and Build conditions.

METHODOLOGY

The methodology prepared for the development of this Technical Memorandum is consistent with the Design Traffic Procedure (Topic No. 525-030-120-f) published by the Florida Department of Transportation. The methodology covers the following topics:

- Develop future year traffic volume forecasts for the corridor based on trends analysis of historical traffic counts and/or officially adopted travel demand models (FSUTMS).
- Evaluate the future year traffic volume forecasts based on capacity to determine whether or not the corridor will operate under constrained or unconstrained capacity conditions.
- In addition to design year traffic conditions, develop opening year and mid-design year traffic volume forecasts.

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- Provide a Generalized Link Level of Service analysis for the corridor based on No-Build and Build traffic conditions.
 - Provide Level of Service Analysis for the intersections along the corridor for No-Build and Build traffic conditions.
 - Based on the Level of Service analysis, provide recommendations for improvements to accommodate the anticipated travel demand within the corridor.
 - Establish lane equivalency factor (damage factor), lane factor (percentage of trucks in design lane) and daily directional split for ESAL forecasting utilizing standard lane factors.
 - Estimate 18 kip Accumulated Equivalent Single Axle Loading (ESAL) based upon traffic factors developed above. Axle loading will be determined for asphalt pavement.
 - Provide Level of Service Ranges for the No-Build and Build conditions for the purpose of performing noise analysis.
 - Perform a microscopic CORSIM simulation for SR 44 between SR 15A and Kepler Road including the intersections around the intersection of SR 44 and US 17-92 for the opening and design years for the No-Build and Build conditions. The intersections around the intersection of SR 44 and US 17-92 include all the major intersections bounded by Voorhis Avenue in the south, Ohio Avenue on the north, Clara Avenue in the west and Amelia Avenue on the east.

SECTION 2 – PROJECT INFORMATION

PROJECT LOCATION AND LIMITS

SR 44 within the study limits of the project traverses through the Central Business District of the City of DeLand in Volusia County, Florida in an east-west direction. SR 44 provides a regional connection between Lake County and Atlantic Avenue in New Smyrna Beach, Volusia County. Financial Project Number 404646-1 is the administrative reference for the evaluation of potential improvements to SR 44 in Volusia County, Florida. This technical memorandum involves development of design traffic volumes and evaluation of future conditions along the SR 44 corridor for the No-Build and Build conditions. The project begins at CR 42 in Lake County and ends at West Ramps of the SR 44 interchange with Interstate 4 in Volusia County.

This final technical memorandum is a continuation of two earlier reports “Final Technical Memorandum, Phase 1 – Existing Traffic Conditions Analysis, December 2001, Financial Project ID: 404646-1”) and “Draft Technical Memorandum, Phase 2 – Future Traffic Conditions Analysis, April 2002, Financial Project ID: 404646-1”. This final technical memorandum for future traffic conditions analysis is finalized based on the comments received for the draft future traffic conditions analysis technical memorandum. The responses for the comments along with the actual comments are included in Appendix A.

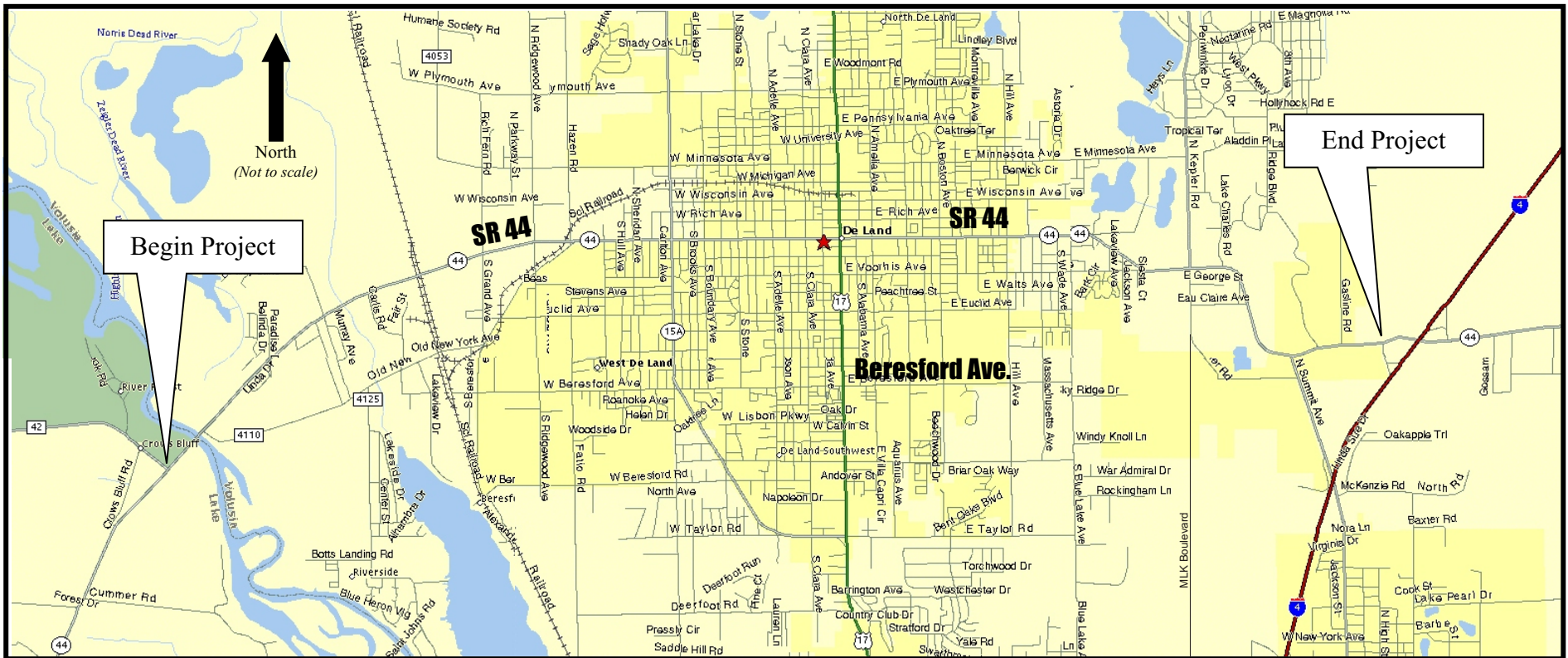
Figure 1 is a study area map illustrating the limits of this project and the surrounding roadway network.

EXISTING CONDITIONS

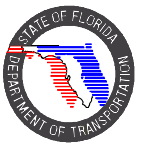
The FDOT classifies SR 44 as a rural principal arterial from Lake County Line (M.P. 0.000) to Ridgewood Avenue (M.P. 2.850), as an urban principal arterial from Ridgewood Avenue to just west of West Ramps of I-4 (M.P. 9.600), and as a rural principal arterial east of M.P. 9.600. SR 44 runs through a predominantly rural area between the Lake County Line and the CSX rail line, transitions into an urban environment through the City of DeLand, and then transitions back to rural environment towards the eastern terminus of the project. Major institutional land uses including Volusia County Administrative Complex, the City Hall of DeLand, and the new Volusia County Courthouse are located along SR 44 in the

Figure 1

Study Area Map



SR 44 PD&E Study
 From CR 42 to West Ramps of I-4
 FIN No.: 404646-1-22-01
 FAP No.: 3401 034 P
 Volusia County, Florida



Downtown DeLand. Stetson University is a major land use located along Amelia Avenue just north of SR 44 corridor. SR 44 is classified with access classification 4 (non restrictive) between Lake County Line and SR 15A, and between Hill Avenue and Kepler Road. Between SR 15A and Hill Avenue and between Kepler Road and West Ramps of I-4, SR 44 is classified with access classification 6 (non restrictive) and 3 (restrictive) respectively.

According to the FDOT Roadway Characteristics Inventory (RCI) database information, the posted speeds on SR 44 range from 45 to 55 miles per hour (mph) west of the CSX rail line, 35-40 mph between the rail line and Clara Avenue, 25 mph through the downtown DeLand, 35-40 mph between downtown and Hill Avenue, and 45-50 mph towards I-4.

SR 44 is currently a two lane undivided roadway within the study limits. In the rural sections of SR 44, the road's typical section consists of two 11 to 12-ft. wide lanes, 4-ft. wide paved shoulders and 4-ft. wide grass shoulders on either side. The pavement width ranges between two 15.5-ft. wide lanes, 6-ft. wide paved shoulders and features curb and gutter on either side between Clara Avenue and Amelia Avenue in the downtown area. Between Amelia Avenue and Hill Avenue, the road's typical section consists of two 18.5-ft. wide lanes, 4-ft. wide paved shoulders and curb and gutter shoulders on either side. East of Hill Avenue, SR 44 has two 12-ft. wide lanes with paved shoulders and grass shoulders on either side. There are no turning movements allowed at the intersection of SR 44 and US 17-92. SR 44 has on street parking between Clara Avenue and Amelia Avenue on both sides of the roadway. SR 44 is programmed to be widened to a four-lane roadway between Summit Avenue and west Ramps of I-4. The construction phase is scheduled to be completed in Year 2004.

Major east west roadways in the vicinity of the corridor include Beresford Avenue. Major north south roadways within the project limits include SR 15A, US 17-92, and Amelia Avenue, Hill Avenue, Kepler Road, and Summit Avenue.

Beresford Avenue is a two lane undivided roadway from west of SR 15A to Blue Lake Avenue. Based on Volusia County's functional classification, Beresford Avenue is classified as an urban collector. The speed limit varies between 30 and 35 mph between SR 15A and Blue Lake Avenue. The land use for the most part along Beresford Avenue is residential in nature. Other major land uses include Southridge Golf Club and DeLand

Memorial Gardens. Beresford Avenue is planned to be extended as a new two lane roadway from Blue lake Avenue to Summit Avenue.

SR 15A is classified by FDOT as an urban minor arterial from just south of Beresford Avenue to just north of SR 44. SR 15A is a four lane divided roadway from just north of SR 44 to Beresford Avenue and is a two lane undivided roadway from Beresford Avenue to US 17-92. The posted speed limit on SR 15A is 45 mph between Beresford Avenue and just north of SR 44. SR 15A is programmed to be widened to a four-lane roadway between Beresford Avenue and US 17-92 and between Plymouth Avenue and SR 15/US 17.

US 17-92 is classified by FDOT as an urban principal arterial between Beresford Avenue and Ohio Avenue. US 17-92 is a two lane undivided roadway with street-scaping between Voorhis Avenue and Ohio Avenue. The posted speed limits vary between 25 and 30 mph between Beresford Avenue and Ohio Avenue. There are no turning movements allowed at the intersection of SR 44 and US 17-92. US 17-92 has on street parking on the east side of the roadway from just north of Howry Avenue to just south of Indiana Avenue. On the west side of the roadway, US 17-92 has on street parking from Church Street to Howry Avenue.

CONCLUSIONS FROM EXISTING CONDITIONS ANALYSIS

The conclusions that were reported in the "Final Technical Memorandum, Phase 1 – Existing Traffic Conditions Analysis, December 2001, Financial Project ID: 404646-1" are as follows.

The traffic count data collected for the project revealed that the traffic flow on SR 44 is directional and destined to the downtown DeLand. The peak direction on SR 44 west of US 17-92 was eastbound during the morning and westbound during the evening. Similarly, the peak direction on SR 44 east of US 17-92 was westbound during the morning and eastbound during the evening. This clearly shows that the traffic along SR 44 is destined to the downtown area. This is consistent with the results from the origin and destination study conducted during the Planning Study (PLEMO) that indicated that only approximately 5.6 percent through traffic occurs on SR 44 between Lake County Line and I-4.

Based on the intersection analysis, all signalized intersections along SR 44 were found to operate at LOS D or better with the exception of three unsignalized intersections where the minor street was found to operate at LOS E or F. The roadway link LOS analysis indicates that all the roadway segments including SR 44, SR 15A, Beresford Avenue, portions of US 17-92 operate within their adopted LOS standard. The roadway segments along US 17-92 between Voorhis Avenue and Rich Avenue were found to operate at LOS E below their adopted LOS standard D. However this section of the roadway has been designated as a constrained facility by Volusia County and as a backlogged facility by both Volusia County and the City of DeLand thereby allowing acceptable LOS Standard as LOS E.

CORSIM reported several spillbacks on US 17/92 between SR 44 and Indiana Avenue both in the northbound and southbound approaches. However, no phase or cycle failures occurred in the model. The CORSIM model has been validated for the existing condition and can be used to develop the CORSIM models for the No-Build and other alternatives for the design year conditions.

SECTION 3 – EFFECT OF THE OPENING OF THE COURTHOUSE ON TRAFFIC VOLUMES

COMPARISON OF TRAFFIC VOLUMES

The traffic counts collected for the existing conditions analysis were conducted during the months of August and October 2001 prior to the opening of the new Volusia County Courthouse. In order to assess the change in traffic patterns after the opening of the new Volusia County courthouse, additional traffic counts were collected in January and February 2002. In comparing the traffic volumes collected prior to and after the opening of the new Volusia County courthouse a letter (dated February 12, 2002) was prepared and sent to the project team members and is included in Appendix A.

The following section briefly discusses the comparison of the traffic volumes (summarized in the letter dated February 12, 2002) collected prior to and after the opening of the new Volusia County courthouse.

Additional Traffic Counts

In order to assess the change in traffic patterns after the opening of the new Volusia County courthouse, Volusia County collected twenty-four (24) hour approach counts at all the approaches of the following intersections.

- SR 44 @ Amelia Avenue
- SR 44 @ Alabama Avenue
- SR 44 @ Florida Avenue

In addition turning movement counts were collected by Volusia County at the following intersections.

- SR 44 @ Amelia Avenue (8 hours including AM, mid day and PM Peak)
- Amelia Avenue @ Rich Avenue (8 hours including AM, mid day and PM Peak)
- SR 44 @ Alabama Avenue (2 hours PM Peak)
- SR 44 @ Florida Avenue (2 hours mid day)

The approach counts collected between January 23 and February 2, 2002 was compared to the bi directional counts collected prior to the opening of the new Volusia County courthouse. The approach counts were converted to Annual Average Daily Traffic (AADT) based on the most recent axle and seasonal adjustment factors.

The AADT on all the approaches collected after the opening of the new Volusia County courthouse were found to be higher than the AADT collected prior to the opening of the new courthouse. The traffic volumes on the southbound approaches of Alabama Avenue and Amelia Avenue being higher than the corresponding previous values (prior to the opening of courthouse) made sense since there are accesses from the courthouse onto Alabama Avenue and Amelia Avenue. However the increase in traffic on the westbound approach of Amelia Avenue at the intersection of Amelia Avenue and SR 44 did not make sense. Since these traffic volumes (both prior and post opening of the courthouse) were taken only for one day, it was recommended to average these values and obtain the AADT for these locations.

The turning movement counts collected between January 22 and January 31, 2002 was compared to the turning movement counts collected during the month of October 2001 prior to the opening of the new Volusia County courthouse. The turning movement count collected between 11:00 AM and 1:00 PM at the intersection of SR 44 and Florida Avenue were not used in the comparison since there was no turning movement count collected during this time period prior to the opening of the new Volusia County courthouse

The PM peak hour turning movement counts collected after the opening of the new Volusia County courthouse at the intersections of SR 44 and Amelia Avenue, SR 44 and Alabama Avenue, and Amelia Avenue and Rich Avenue were found to be 8.7%, 20.6% and 1.5% higher than the corresponding values collected prior to the opening of the new Volusia County courthouse. Among these three intersections, the intersection at SR 44 and Alabama Avenue experienced considerable increase (20%) compared to the other two intersections where the increase in turning movement volumes were less than 10%. This made sense since there is an access from the courthouse parking garage onto Alabama Avenue.

Based on the comparison of traffic volumes collected prior to and after the opening of the new Volusia County Courthouse, it was recommended to:

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- Average the AADT (before and after) and use it to obtain future daily traffic volumes.
 - Use the turning movement percentages based on the turning movement counts collected after the opening of the new Volusia County Courthouse in TURNS5 spreadsheet at the intersections of SR 44 and Alabama Avenue, SR 44 and Amelia Avenue, and Amelia Avenue and Rich Avenue to obtain future year design hour turning movement percentages.
 - For the remaining intersections continue to use the turning movement percentages based on the turning movement counts collected prior to the opening of the new Volusia County Courthouse in TURNS5 spreadsheet to obtain future year design hour turning movement percentages.

Based on the recommendation, the traffic volumes (both prior and post opening of the courthouse) were averaged to obtain the AADT at these locations with the exception on Alabama Avenue. The AADT based on the new traffic counts were used along Alabama Avenue since the roadway had an access to the public parking garage in the courthouse thereby carrying majority of traffic coming from the new courthouse.

The traffic count data collected after the opening of courthouse also revealed that the traffic flow on SR 44 is directional and destined to the downtown DeLand. The peak direction on SR 44 west of Alabama Avenue was eastbound during the morning and westbound during the evening. Similarly, the peak direction on SR 44 east of Alabama Avenue was westbound during the morning and eastbound during the evening.

SECTION 4 – ANALYSIS SCENARIOS

DESIGN PERIOD

Based on information provided by the Department, the following periods were used to provide design traffic forecasts for the SR 44 Study area.

- Existing Year - 2000
- Opening Year - 2005
- Mid-Design Year - 2015
- Design Year - 2025

ANALYSIS SCENARIOS

Design traffic volumes were developed for two traffic conditions, No Build and Build. The no build alternative includes SR 44 remaining as two lanes between CR 42 and Summit Avenue and being widened to four lanes between Summit Avenue and I-4. The build alternative based on the SR 44 PLEMO study dated November 16, 2000 is the same as no build alternative with respect to SR 44 and includes a new two-lane roadway referred as Beresford Avenue Extension between Blue Lake Avenue and Summit Avenue.

Consistent with the SR 44 PLEMO Study, there were several build scenarios analyzed as part of this study and are summarized in the next section. Based on comments from project team members and based on the analysis results (summarized in the following sections), the final build alternative includes several Transportation System Management (TSM) improvements to SR 44 including a bi-directional turn lane along SR 44 between SR 15A and Clara Avenue, between Amelia Avenue and Blue Lake Avenue, a four lane typical section between Voorhis Avenue and Kepler Road, and between Summit Avenue and I-4. The remaining portion of SR 44 between CR 42 and West Ramps of I-4 will remain as two lane section. The various TSM improvements along SR 44 include providing additional turn lanes at the intersection, realigning intersections, and signaling intersections. In addition to the improvements along SR 44, the Build alternative includes a new two-lane roadway referred as Beresford Avenue Extension between Blue Lake Avenue and SR 44.

TRANSPORTATION PLAN

Information for roadway improvements in the study area was obtained from Volusia County Metropolitan Planning Organization (MPO) and the FDOT. [Table 1](#) is a list of programmed roadway improvements in the vicinity of the project compiled from the year 2001/2002 – 2005/2006 Transportation Improvement Program (TIP). [Table 2](#) is a list of planned roadway improvements in the project vicinity compiled from the Volusia County MPO's Long Range Transportation Plan (LRTP) Refined 2020 Cost Feasible Plan adopted in November 2000.

The four laning of SR 44 from 0.25 miles west of Summit Avenue to I-4 is consistent with the Volusia County MPO's TIP and Refined 2020 Cost Feasible Plan. The new two-lane roadway referred as Beresford Avenue Extension between Blue Lake Avenue and Summit Avenue is consistent with the Volusia County MPO's Refined 2020 Cost Feasible Plan. Also, the new two lane Beresford Avenue Extension between Blue Lake Avenue and Kepler Road is consistent with the Volusia County Adopted Five Year Road Program.

Based on the programmed improvements, four laning of SR 15A between US 17/92 and Beresford Avenue and new two lane Fatjo Road Extension from SR 44 and Beresford Avenue are assumed to be in place by Opening Year 2005. Similarly, based on the planned improvements, four laning of Kepler Road (W. Volusia Beltway/Veteran's Memorial Parkway) is assumed to be in place by Mid Design Year 2015.

TABLE 1
SR 44 (from CR 42 to West Ramps of I-4) PD&E Study
FY 2001/2002 - FY 2005/2006 Programmed Improvements in the Vicinity of the Study Area*

FDOT Fin. Mgmt. No./ Local Agency Project No.	Facility	From	To	Description	Responsible Agency	Phase	Completion Date
4084631	I-4	SR 472	SR 44	Widen to six lanes	FDOT	Right of Way	2004-2005
4084641	I-4	SR 44	I-95	Widen to six lanes	FDOT	Right of Way	2004-2005
2408052	SR 44	West ramps I-4	Pioneer Tr. (CR 4118)	Widen to four lanes	FDOT	Construction	2003-2004
2408221	SR 15A	US 17/92	Beresford Ave.	Widen to four lanes	FDOT	Construction	2003-2004
2408551	SR 15A	Plymouth Avenue	Green Dairy Road	Widen to four lanes	FDOT	Construction	2001-2002
2408561	SR 15A	Green Dairy Road	SR 15/US 17	Widen to four lanes	FDOT	Construction	2004-2005
2408871	US 17/92	SR 472	SR 15A	Widen to six lanes	FDOT	Right of Way	2004-2005
2409982	SR 44	.25 mi w/o CR 4139	West ramps of I-4	Widen to four lanes	FDOT	Construction	2003-2004
1358-1	Beresford Avenue	Blue Lake Avenue	Kepler Road	New Two Lanes	Volusia County	Construction	2003-2004
4400	Fatio Road Extension	SR 44	Beresford Ave.	New Two Lanes	Volusia County	Construction	2004-2005
4893	CR 92	SR 15A	Existing 4-Lane Section	Widen to four lanes	Volusia County	Construction	2002-2003
4738-1	I-4 Frontage Road	SR 472	Orange Camp Road	New two lanes	Volusia County	Right of Way	2004-2005
4738-2	I-4 Frontage Road	Orange Camp Road	CR 4139/Summit Ave.	New two lanes	Volusia County	Preliminary Eng.	2004-2005

* Source: Volusia County MPO, Transportation Improvement Program 2001/2002 - 2005-2006, Adopted June 26, 2001
Volusia County Adopted Five Year Road Program, FY 00/01 - FY 05/06, adopted 9/20/01 (updated 11/29/01)

18-Jul-02

TABLE 2**Planned Improvements in the Vicinity of the Study Area by Year 2020***

Facility	From	To	Description	Phase
SR 15A	Beresford Ave.	US 17/92	Widen to four Lanes	2001-2005
SR 44	Summit Ave.	I-4	Widen to four Lanes	2001-2005
Beresford Av	Blue Lake Ave.	Summit Ave.	Extend as two lanes	2006-2010
Blue Lake Av	Orange Camp Rd.	SR 472	Extend as two lanes	2011-2020
Westside connector (Fatio Road)	SR 44	Beresford Ave.	New two lanes	2001-2005
Westside connector (Fatio Road)	Beresford Ave.	20th/Hamilton Ave.	New two lanes	2011-2020
SR 15A	US 17	Plymouth Ave.	Widen to four Lanes	2001-2005
SR 44	I-4	Pioneer Trail	Widen to four Lanes	2001-2005
CR 92	SR 15A	US 17/92	Widen to four Lanes	2001-2005
I-4	SR 472	I-95	Widen to six Lanes	2006-2010
W. Volusia Beltway/Veterans Memorial Pkwy.	SR 44	SR 472	Widen to four Lanes	2011-2020
US 17/92	SR 15A	SR 472	Widen to six Lanes	2006-2010
Frontage Road (along I-4)	Summit Ave.	SR 472	Extend as two lanes	2006-2010

* Source: Volusia County MPO, L RTP Refinement Cost Feasible Plan 2020, Adopted November 28, 2000.

SECTION 5 – FUTURE TRAFFIC VOLUMES

FUTURE CORRIDOR TRAVEL DEMAND

The development of traffic projections for SR 44, Beresford Avenue, and other roadways within the study area requires the examination of historical traffic growth, proposed development and a basic understanding of the traffic circulation patterns and characteristics of the study area. In arriving at the volume forecasts for SR 44, Beresford Avenue and other roadways, various growth rates were examined. The following sections discuss how the future corridor travel demand was determined.

Trends Analysis

The trends analysis was performed for the study area roadways using historical count data information from FDOT and Volusia County. Based on historical data, future growth rates were calculated using the least square linear regression method. The FDOT defines an acceptable Historic Trends Growth Rate as that which has an R square value of 75.00% or greater. The growth rates resulting from the trends analysis for SR 44, Beresford Avenue, and the other study area roadways are summarized in Table 3. The trends analysis spreadsheets for all the locations are included in the Appendix B.

Among the eleven FDOT stations along SR 44 within the project limits only three stations (west of SR 15A) exhibited R square values greater than 75%. All the count stations along SR 15A, Blue Lake Avenue south of Beresford Avenue, Kepler Road south of SR 44, two stations along Beresford Avenue, and Voorhis Avenue west of Alabama Avenue within the project limits exhibited R square values greater than 75%. All the remaining count stations along all other study area roadways including US 17-92 did not exhibit R square values greater than 75%.

FSUTMS Model

Year 2020 Model Refinements

To begin modeling for this project, the most current model data used in SR 44 PLEMO Study was used. The model used in the SR 44 PLEMO study was refined based on comments from the project team during the scoping meeting. The results of the year

TABLE 3
SR 44 (from C.R. 42 to West Ramp of I-4) PD&E Study
Growth Rate Analysis Summary Based on Trends Analysis

Location	AADT Volume		Growth Rate	R-Squared
	Existing	YR 2025		
CR 42				
North of SR 44	4,400	6,900	2.37%	65.30%
SR 44				
West of CR 42	6,700	10,500	2.36%	84.40%
East of Lake County Line	9,900	14,100	1.70%	90.50%
East of CR 4053	11,400	17,400	2.18%	83.70%
East of Hazen Road	13,800	18,500	1.42%	71.40%
0.015 mi East of SR 15A	11,900	14,000	0.74%	8.60%
0.599 mi East of SR 15A	12,800	13,600	0.26%	0.70%
West of SR 15-600	10,000	10,400	0.15%	0.10%
1.31 mi East of SR 15/600	12,900	19,200	2.04%	49.60%
1.50 mi East of SR 15/600	11,400	17,600	2.27%	72.20%
West of C-4101	14,900	23,300	2.35%	70.50%
West of C-4139	13,800	22,600	2.67%	64.90%
US 17-92 (SR 15/600)				
North of SR 15A	28,100	25,900	-0.33%	18.00%
North of Beresford Ave.	20,000	27,600	1.58%	53.60%
South of SR 44	18,600	24,400	1.30%	39.60%
0.03 mi North of SR 44	16,000	23,300	1.83%	67.30%
0.41 mi North of SR 44	19,100	22,100	0.65%	16.80%
SR 15A				
North of SR 44	24,700	42,700	3.04%	82.60%
South of SR 44	23,400	39,300	2.82%	75.00%
West of SR 15	20,500	28,900	1.71%	80.70%
Grand Avenue				
North of SR 44	2,000	1,600	-0.75%	5.70%
Beresford Avenue				
West of SR 15A	4,500	8,700	2.65%	87.50%
East of SR 15A	4,700	7,900	2.84%	31.00%
West of US 17-92	4,700	9,300	4.08%	49.50%
West of Alabama Avenue	9,900	9,500	-0.17%	4.20%
West of Amelia Avenue	9,000	11,100	0.97%	17.00%
West of Boston Avenue	5,200	13,900	4.52%	82.90%

TABLE 3
SR 44 (from C.R. 42 to West Ramp of I-4) PD&E Study
Growth Rate Analysis Summary Based on Trends Analysis

Location	AADT Volume		Growth Rate	R-Squared
	Existing	YR 2025		
West of Hill Avenue	3,800	4,800	1.10%	35.40%
Amelia Avenue				
North of SR 44	10,900	5,200	-2.18%	7.40%
North of Wisconsin Ave.	11,400	10,500	-0.32%	1.30%
North of Ohio Avenue	10,800	14,300	1.35%	4.80%
Blue Lake Avenue				
South of SR 44	2,200	4,100	3.71%	70.00%
South of Beresford Avenue	3,700	10,800	8.16%	75.00%
Old New York Avenue				
South of SR 44	3,500	4,900	1.72%	0.60%
Garfield Avenue				
North of SR 44	2,100	3,300	2.29%	7.20%
Hill Avenue				
North of SR 44	4,000	3,800	-0.22%	5.20%
North of Beresford Ave.	2,400	-400	-4.85%	60.20%
Kepler Road				
North of SR 44	14,200	25,800	3.41%	71.30%
South of SR 44	10,700	25,900	5.95%	75.80%
Summit Avenue				
South of SR 44	4,100	7,200	3.11%	56.70%
Voorhis Avenue				
West of Alabama Avenue	4,700	7,100	2.11%	75.00%
East of Alabama Avenue	5,300	7,400	1.68%	24.60%
East of Amelia Avenue	4,100	6,200	2.09%	60.00%
West of SR 44	3,000	4,200	1.77%	25.00%

2020 model refinements exercise were summarized in the form of a letter on September 14, 2001. A copy of the letter is included in Appendix A. In order to simulate SR 44 under the no build and build alternatives the following network changes were made to the year 2020 VCUATS highway network. The no build alternative under the PD&E study includes SR 44 remaining as two lanes between CR 42 and Summit Avenue and being widened to four lanes between Summit Avenue and I-4. The build alternative under the PD&E study is the same as no build alternative with respect to SR 44. However, this alternative also includes a new two-lane roadway referred as Beresford Avenue Extension between Blue Lake Avenue and Summit Avenue.

The network changes that were made were based on the improvements listed in the most current Transportation Improvement Program (TIP) and the Year 2020 LRTP Refinement prepared by the Volusia County MPO. The changes include:

- SR 44 was coded as four-lane roadway (programmed to be constructed by Year 2004) from Summit Avenue to I-4 for both the build and no build alternatives based on the TIP. This segment of the roadway was coded as a two-lane roadway under the no build alternative in the PLEMO study.
- Western Volusia Beltway / Veterans Memorial Parkway was coded as a four lane roadway from SR 44 to Taylor Road based on the Year 2020 LRTP Refinement. This segment of the roadway was coded as a two-lane roadway under the no build and build alternatives in the PLEMO study.
- Introduced turn prohibitors at the intersection of US 17/92 and SR 44 under both the alternatives. Turning movements were allowed at this intersection under both the alternatives in the PLEMO study.
- In addition to existing zone 601, new TAZ 483 was introduced to reflect Royal Oaks DRI. Also socio economic data for zone 601 was revised to take into account of the Royal Oaks DRI.
- Socio economic data for zone 597 was revised to take into account of the Twelve Oaks DRI.
- Socio economic data for zones 657-663 were revised to take into account of the Victoria Park DRI.
- Based on discussions with City of DeLand staff, socio economic data for zones 696 and 697 were revised to take into account of the new Volusia County Justice Center.

The socio economic data that was used for the PLEMO study and the revised socio economic data used for the PD&E study are appended along with the letter in Appendix A. The socio economic data for the Victoria Park, Twelve Oaks, and Royal Oaks were obtained from Appendix C of the "SR 44 PLEMO from Lake County to I-4, Volusia Technical Report – Final Draft, dated November 16, 2000".

The number of lanes plot and the year 2020 PSWADT (Peak Season Weekday Average Daily Traffic) for the No Build and Build alternatives for the PLEMO study and the PD&E study are included in Appendix A along with the letter dated September 19, 2001.

Based on the model refinement exercise, it was conclude that the year 2020 model volumes for the no build and build alternatives under the PD&E study are almost the same as those under the PLEMO study conducted previously. Under the build alternative for the PD&E study, the traffic diversion onto the new Beresford Avenue Extension from SR 44 is also almost the same as those under the PLEMO study conducted previously.

Year 2020 Model Runs

Next in the modeling process various model runs were performed especially for the Build alternative to determine the most viable build alternative. In evaluating the various build alternatives, a select link analysis was performed on SR 44 east of Summit Avenue to find out how much traffic gets diverted from SR 44 onto Beresford Avenue Extension. Additional select link analysis was performed on Beresford Avenue Extension east of Kepler Road to find out how much traffic from Beresford Avenue Extension goes to Beresford Avenue west of US 17-92. The letter dated December 3, 2001 summarizing the results of the year 2020 model runs for SR 44 and select link analysis for SR 44 PD&E Study was sent to the project team.

In performing the various model runs, the most current model data developed for the SR 44 PD&E study (summarized in September 14, 2001 memo) was used.

The various scenarios that were evaluated are:

- No Build: The no build alternative includes SR 44 remaining as two lanes between CR 42 and Summit Avenue and being widened to four lanes between Summit Avenue and I-4.
- Build: The build alternative is the same as no build alternative with respect to SR 44. However, this alternative also includes a new two-lane roadway

referred as Beresford Avenue Extension between Blue Lake Avenue and Summit Avenue.

- Build 1: The build 1 alternative is the same as the build alternative with one exception. The exception being Beresford Avenue Extension in this scenario connects between Blue Lake Avenue and SR 44 (forms a T intersection with SR 44). Summit Avenue in this scenario forms a T intersection with Beresford Avenue.
- Build 2: The build 2 alternative is the same as the build 1 alternative with one exception. The exception being SR 44 is modeled as a four lane divided roadway between Lake County Line and SR 15A.
- Build 3: The build 3 alternative is the same as the build 1 alternative with one exception. The exception being SR 44 is modeled as a two-lane roadway with bi-directional center turn lane between SR 15A and Blue Lake Avenue.

The No Build, Build, Build 1, Build2, and Build 3 alternatives are shown in Figures 2 through 6 respectively. The results of the model runs are briefly discussed below.

No Build: SR 44 approximately carried, 13,000, 16,100, 13,100, 20,500, 19,000, and 19,100 Peak Season Weekday Average Daily Traffic Volumes (PSWADT) west of Hazen Avenue, west of SR 15A, in the downtown, west of Kepler Road, west of Summit Avenue, and west of I-4 ramps respectively. Year 2001 Annual Average Daily Traffic (AADT) at the same locations is 11,200, 13,500, 11,000, 14,500, 13,300, and 13,500 respectively. Beresford Avenue carried approximately 9,100 and 4,800 PSWADT east of US 17-92 and between SR 15A and US 17-92 respectively. Year 2001 AADT at the same locations on Beresford Avenue are 9,800 and 4,700 respectively.

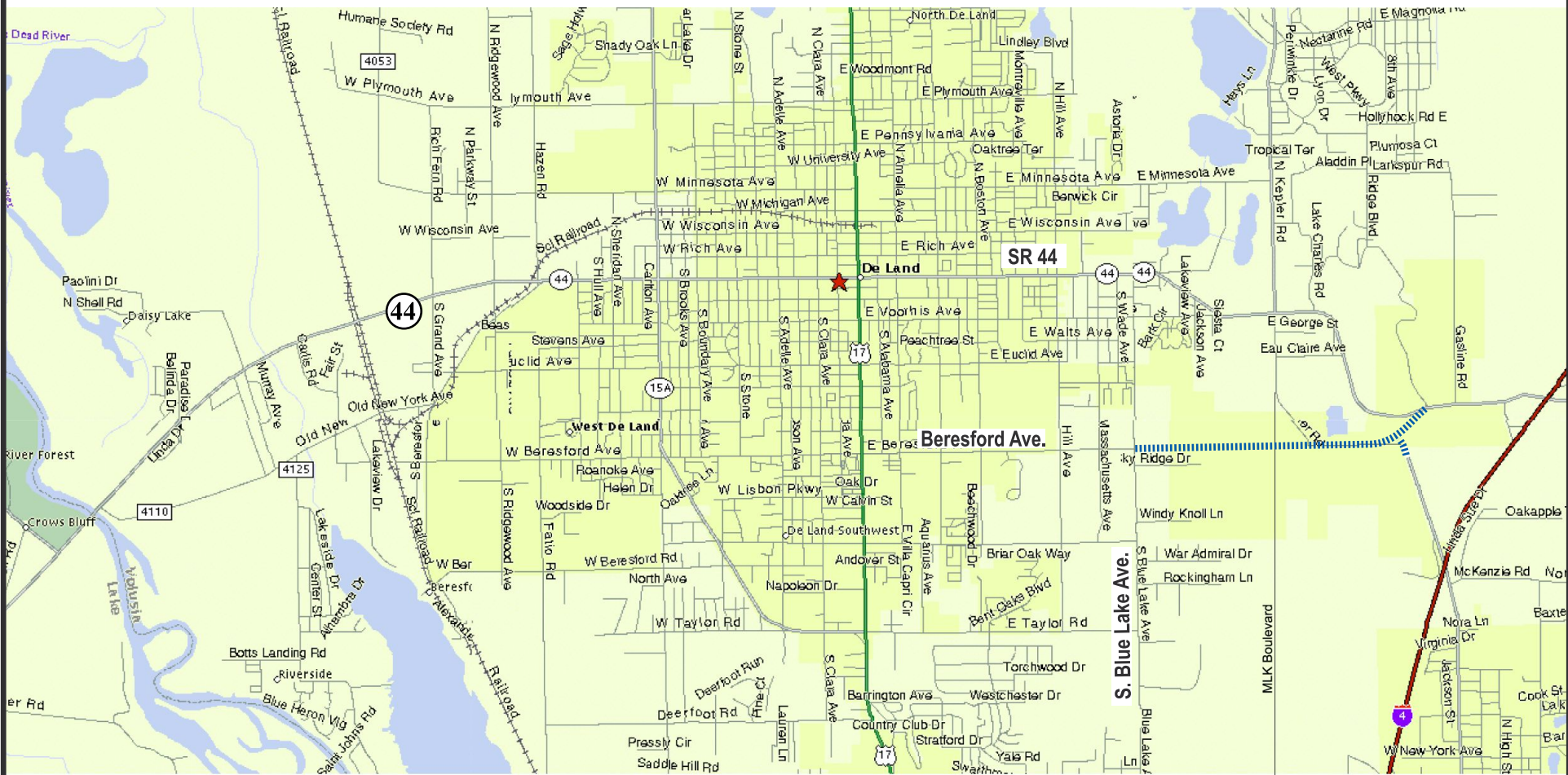
Build: SR 44 approximately carried almost the same traffic as in the No Build scenario 13,100, 16,100, and 12,700 PSWADT west of Hazen Avenue, west of SR 15A, and in the downtown respectively. West of Kepler Road and west of Summit Avenue the volume along SR 44 was slightly reduced compared to the No Build scenario amounting to 18,500 and 15,600 respectively. This could be attributed to the addition of Beresford Avenue Extension in this scenario. Also, SR 44 carried approximately 24,500 PSWADT west of I-4 ramps. Beresford Avenue Extension approximately carried 7,000 PSWADT west of Summit Avenue. Beresford Avenue also carried approximately 10,200 and 5,600 PSWADT east of US 17-92 and between SR 15A and US 17-92 respectively.



Prepared for: Florida Department of Transportation
 Prepared by: GMB Engineers & Planners, Inc.
 Prepared with: Wilbur Smith Associates

No Build Alternative SR 44 (from CR42 to West Ramps of I-4) PD&E Study

Figure 2



Legend:

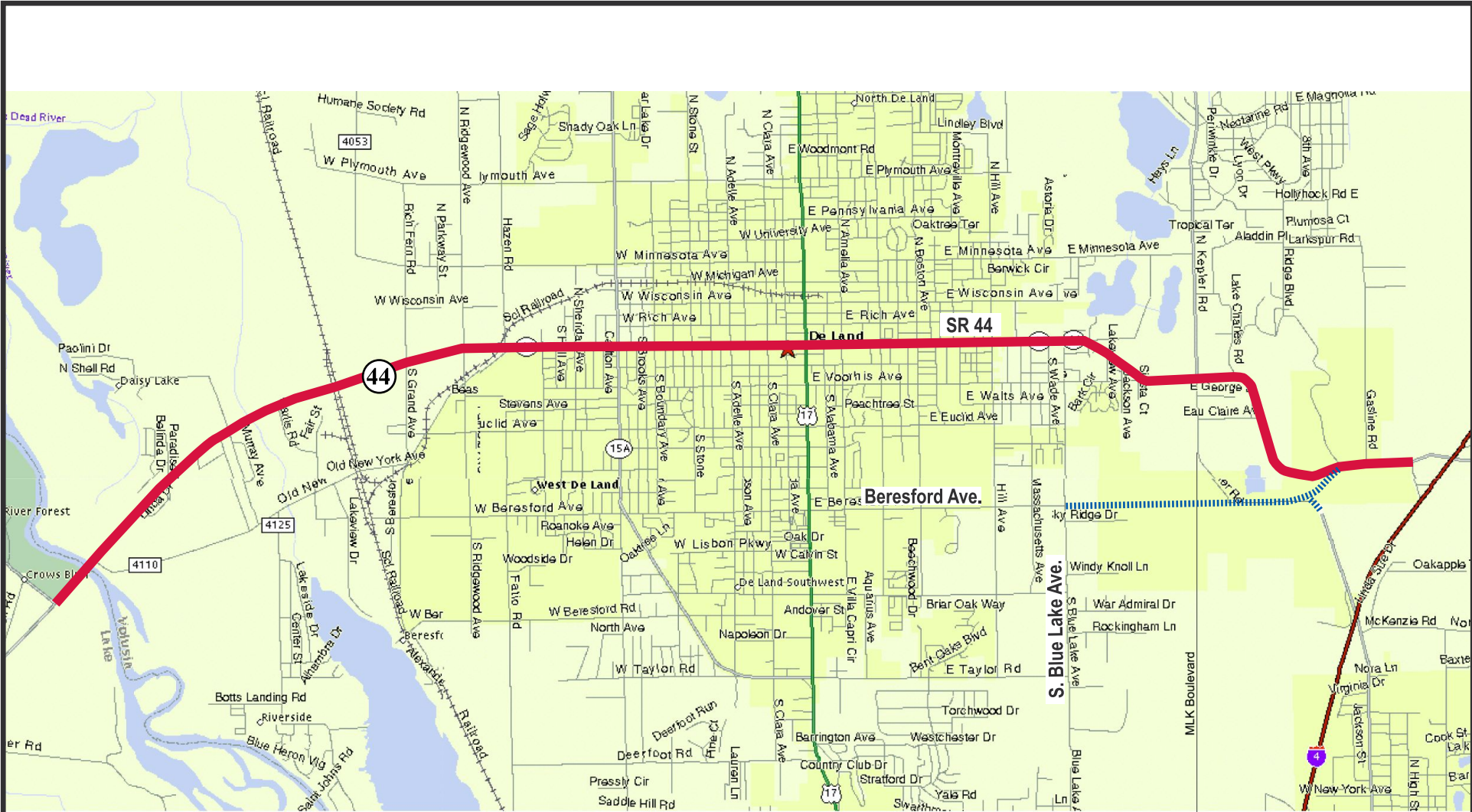
▬▬▬▬▬▬ New 2 Lane Extension



Prepared for: Florida Department of Transportation
 Prepared by: GMB Engineers & Planners, Inc.
 Prepared with: Wilbur Smith Associates

Build 1 Alternative
SR 44 (from CR42 to West Ramps of I-4)
PD&E Study

Figure 4



- Legend:**
- ▬ 4 Lane Improvement
 - - - - - New 2 Lane Extension



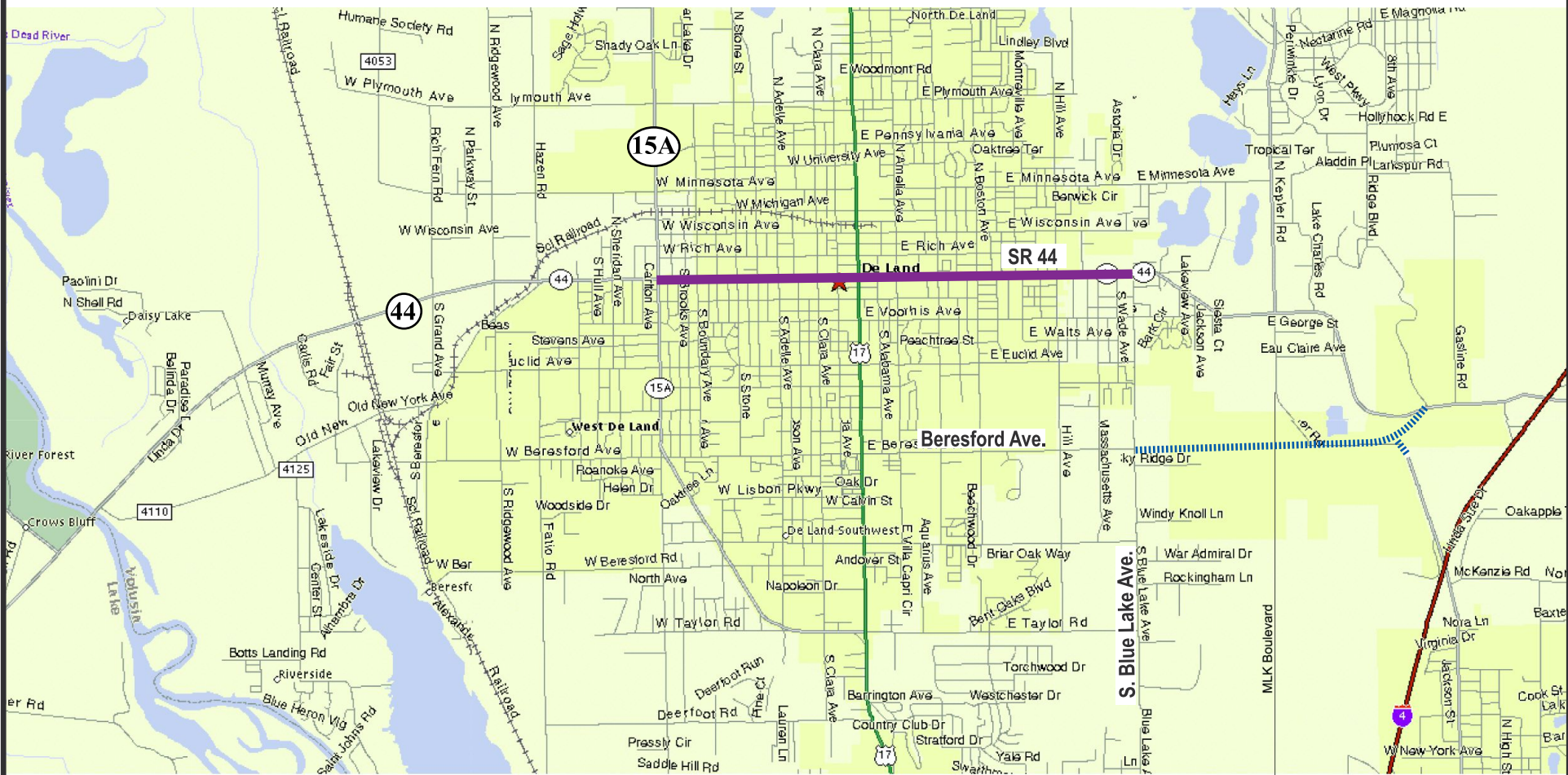
Prepared for: Florida Department of Transportation
 Prepared by: GMB Engineers & Planners, Inc.
 Prepared with: Wilbur Smith Associates

Build 2 Alternative

SR 44 (from CR42 to West Ramps of I-4)

PD&E Study

Figure 5



Legend:

- Bi-directional Turn Lane
- New Two Lane Extension



Prepared for: Florida Department of Transportation
 Prepared by: GMB Engineers & Planners, Inc.
 Prepared with: Wilbur Smith Associates

Build 3 Alternative SR 44 (from CR42 to West Ramps of I-4) PD&E Study

Figure 6

The select link analysis on SR 44 east of Summit Avenue indicated that Beresford Avenue Extension approximately diverts 16% of the traffic from SR 44. Also, the additional select link analysis on Beresford Avenue east of Kepler Road indicated that only approximately 10% of the traffic from Beresford Avenue Extension goes to Beresford Avenue west of US 17-92.

Build 1: Beresford Avenue Extension in this scenario connects between Blue Lake Avenue and SR 44 (forms a T intersection with SR 44). Summit Avenue in this scenario forms a T intersection with Beresford Avenue. SR 44 approximately carried almost the same traffic as in the No Build and Build scenarios 13,100, 16,300, and 12,900 PSWADT west of Hazen Avenue, west of SR 15A, and in the downtown respectively. West of Kepler Road and west of Summit Avenue the volume along SR 44 is exactly the same as in the Build scenario amounting to 18,500 and 15,600 respectively. SR 44 carried approximately 25,400 PSWADT west of I-4 ramps, which is slightly higher than build scenario. Beresford Avenue Extension approximately carried 10,100 PSWADT west of Summit Avenue. Beresford Avenue also carried approximately 10,200 and 5,700 PSWADT east of US 17-92 and between SR 15A and US 17-92 respectively almost exactly the same as in the Build scenario.

The select link analysis results on SR 44 east of Summit Avenue under this scenario indicated that Beresford Avenue Extension approximately diverts 18% of the traffic from SR 44. Also, the additional select link analysis on Beresford Avenue east of Kepler Road indicated that only approximately 10% of the traffic from Beresford Avenue Extension goes to Beresford Avenue west of US 17-92.

Build 2: As mentioned earlier, this scenario is the same as Build 1 scenario with one exception being that SR 44 is coded as a four-lane roadway between Lake County Line and SR 15A. SR 44 carries higher amount of traffic than in the case of No Build, Build, and Build 1 scenarios due to the increased capacity on SR 44 between Lake County Line and SR 15A. The traffic volumes are 15,900 and 21,200 PSWADT west of Hazen Avenue and west of SR 15A. The traffic volumes on SR 44 west of Hazen Road do not trigger a four-lane roadway. The traffic volumes along SR 44 between Hazen Road and SR 15A is redistributed between SR 44 and parallel facilities including Minnesota Avenue and Euclid Avenue diverting more traffic onto SR 44. However, since there is adequate capacity on the parallel facilities, a four-lane roadway is not required along SR 44

between Hazen Road and SR 15A. Due to no additional capacity increase on SR 44 beyond SR 15A, the traffic volumes along SR 44 are almost the same in the downtown, west of Kepler Road, and west of Summit Avenue as in the No Build, Build, and Build 1 scenarios amounting to 13,100, 18,700 and 15,700 respectively. SR 44 carried approximately 25,500 PSWADT west of I-4 ramps, as in the case of Build 1 scenario.

Beresford Avenue Extension approximately carried 10,100 PSWADT west of Summit Avenue as in the case of Build 1 scenario. Beresford Avenue also carried approximately 10,300 and 5,600 PSWADT east of US 17-92 and between SR 15A and US 17-92 respectively almost exactly the same as in the Build and Build 1 scenarios.

Build 3: As mentioned earlier, this scenario is the same as Build 1 scenario with one exception being that SR 44 is modeled as a two-lane roadway with bi-directional center turn lane between SR 15A and Blue Lake Avenue. The capacity on SR 44 between SR 15A and Blue Lake Avenue was increased by 20% to account for the increase in capacity associated with the additional bi-directional center turn lane.

SR 44 approximately carried almost the same traffic as in the Build and Build 1 scenarios west of Hazen Avenue and west of SR 15A amounting to 13,300, 16,700, PSWADT. Due to slight increase in capacity in the downtown area, SR 44 carried 14,100 PSWADT slightly higher than in the Build, Build 1, and Build 2 scenarios. However due to no additional capacity increase on SR 44 beyond Blue Lake Avenue, the traffic volumes along SR 44 are almost the same west of Kepler Road, west of Summit Avenue, and west of I-4 ramps as in the Build, and Build 1 scenarios amounting to 18,900, 15,700, and 25,500 respectively.

The following conclusions were reached and reported in the letter dated December 3, 2001.

- Based on the results from Build and Build 1 scenarios, the percentage of traffic (16 to 18%) that is diverted from SR 44 onto Beresford Avenue Extension and the amount of traffic (10%) from Beresford Avenue Extension going on to Beresford Avenue west of US 17-92 is almost the same irrespective of the way Beresford Avenue Extension is connected either onto SR 44 (Build 1 scenario) or onto Summit Avenue (Build scenario).
- Based on the results from Build 2 scenario, the traffic volumes on SR 44 west of Hazen Road do not trigger a four-lane roadway. The traffic volumes along SR 44 between Hazen Road and SR 15A is redistributed between SR 44 and

parallel facilities including Minnesota Avenue and Euclid Avenue diverting more traffic onto SR 44. However, since there is adequate capacity on the parallel facilities, a four-lane roadway is not required along SR 44 between Hazen Road and SR 15A.

- Based on the results from Build 3 scenario, due to the additional capacity on SR 44 between SR 15A and Blue Lake Avenue, SR 44 carries slightly higher traffic than in the case of other build scenarios only in the downtown area.
- All the scenarios were modeled for year 2020 since the long-range transportation plan and the FSUTMS model is for year 2020. However, since the design year for the SR 44 is Year 2025, traffic projections for the No Build and Build scenarios will be developed for the opening year 2005, mid design year 2015, and design year 2025 based on the comparison of growth rates resulting from trends analysis and FSUTMS model.

The year 2020 PSWADT (Peak Season Weekday Average Daily Traffic) for the No Build and various Build alternatives are included in Appendix A along with the letter dated December 3, 2001. The plots showing select link analysis results for the Build and Build 1 alternatives are included in Appendix A.

Based on the discussions with the project team, the Build 3 alternative which includes SR 44 as a two lane roadway with bi-directional center turn lane between SR 15A and Blue Lake Avenue was chosen as the final build alternative for modeling purposes. Beresford Avenue Extension in this scenario connects between Blue Lake Avenue and SR 44 (forms a T intersection with SR 44) and Summit Avenue in this scenario forms a T intersection with Beresford Avenue.

The select link analysis results on SR 44 east of Summit Avenue under this scenario indicated that Beresford Avenue Extension approximately diverts 18% of the traffic from SR 44. Additional select link analysis on Beresford Avenue east of Kepler Road indicated that only approximately 10% of the traffic from Beresford Avenue Extension goes to Beresford Avenue west of US 17-92. In addition to the two select link analysis, a new select link analysis was conducted on Summit Avenue south of TAZ 601 to determine whether the traffic from Summit Avenue destined to Kepler Road, west of Kepler Road, and towards the Downtown used either SR 44 or the new Beresford Avenue Extension. This select link analysis revealed that approximately 10% of the traffic to and from Summit Avenue destined to and from Kepler Road, west of Kepler Road, and towards the Downtown used SR 44 instead of the new Beresford Avenue Extension. This does not make sense and a decision was reached to perform hand adjustments to account for

this traffic. The plots showing the various select link analysis results performed for Build 3 (preferred Build alternative) is also included in the Appendix A.

Traffic Forecasts Utilized for Analysis

The traffic forecasts utilized for the No Build and Build scenarios are briefly discussed below.

In the case of both the build and no-build scenarios, SR 44 remains as a two lane undivided roadway between CR 42 and SR 15A. The year 2020 model volumes for both the build and no-build scenarios are almost identical. The trends analysis and FSUTMS model (both build and no build) growth rate were found to be 2% and was used to forecast future year volumes along SR 44 between CR 42 and SR 15A for both the build and no-build scenarios. The side streets including CR 42 and Grand Avenue were grown by 1.25% (based on FSUTMS No Build scenario) per year for both the build and no build scenarios. The future year traffic forecasts on other side streets including Hazen Road and Fatio Road were based on FSUTMS model volumes. The future year traffic forecasts on SR 15A were based on a composite growth rate of 2.1% (between trends growth rate of 2.5% and FSUTMS model growth rate of 1.8%) for both the build and no build scenarios.

Since the FDOT count stations along SR 44 east of SR 15A did not yield acceptable R square values, the traffic forecasts along SR 44 for both build and no build scenarios between SR 15A and west Ramps of I-4 is based on FSUTMS model volumes. Also since all but two of the count stations along Beresford Avenue yielded acceptable R square values based on Trends analysis, the traffic forecasts along Beresford Avenue for both build and no build scenarios is based on FSUTMS model volumes. To correct the discrepancy in forecasted model volume and to obtain a higher degree of confidence in the forecasting process, the model traffic forecasts were hand adjusted along SR 44 for both the build and no build scenarios. These hand adjustments were consistent with the earlier SR 44 PLEMO study.

Additional hand adjustments were made to the FSUTMS model volumes along SR 44 and Beresford Avenue in the case of build scenario based on reasonableness. This additional hand adjustment was made to correct the model's tendency of assigning traffic to and from Summit Avenue destined to and from Kepler Road, west of Kepler Road, and towards the Downtown along SR 44 instead of the new Beresford Avenue Extension. The

year 2020 FSUTMS model volumes for both no build and build scenarios along SR 44 and Beresford Avenue were grown to year 2025 volumes using reasonable growth rates based on the available capacity of the roadway.

The future year traffic volumes for the side streets north and south of SR 44 and north of Beresford Avenue were obtained using NCHRP procedures. These side streets include all major side streets including US 17-92 and Amelia Avenue between SR 15A and Voorhis Avenue. To correct the discrepancy in forecasted model volume and to obtain a higher degree of confidence in the forecasting process, the model traffic forecasts were further refined using procedures outlined in the NCHRP Report 255 "Highway Traffic Data for Urbanized Area Project Planning and Design".

The model refinement process is a recommended practice particularly when the study corridor includes numerous side streets parallel to each other. The basic premise employed in the adjustment process is that future year traffic volumes are influenced by existing travel patterns, by the addition or modification of roadway capacity, and by the level of overall congestion that will occur in the future. The future year traffic projections were refined at the cutline level using relationships between existing traffic counts and future year capacities. Tables 4 and 5 document the adjustment process for the five different cutlines using the NCHRP methodology for the no build and build conditions. The five different cutlines include all side streets north of SR 44 and east of US 17-92, all side streets south of SR 44 and east of US 17-92, all side streets north of SR 44 and west of US 17-92, all side streets south of SR 44 and west of US 17-92, and all side streets north of Beresford Avenue and east of US 17-92.

The adjusted AADT is a result of two-fold adjustment. The first adjustment is based on MAV and is obtained by multiplying FCAP factor * total cutline volume * % of total future MAV. The second adjustment is based on count and is obtained by multiplying FCOUNT factor * total cutline volume* % of year 2000 count AADT. The FCAP and FCOUNT factors are obtained by comparing the future year AADT/MAV ratio to the Capacity and Base Count adjustments graph shown in Figure A-14 of the NCHRP Report 255 "Highway Traffic Data for Urbanized Area Project Planning and Design".

TABLE 4
SR 44 (from CR 42 to West Ramps of I-4) PD&E Study
Recommended Year 2025 No Build AADT for the Sidestreets Based on NCHRP Procedures

SCREENLINE # 1 **North of SR 44 and East of US 17-92**

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Blue Lake Avenue	E	2	2,160	0.06	6,239	7,300	16,000	2	16,000	0.16	0.46	4,264	2,033	6,300	0.39
Hill Avenue	E	2	4,010	0.11	5,000	5,300	12,800	2	12,800	0.13	0.41	3,411	3,774	7,200	0.56
Boston Avenue	C	2	1,980	0.05	3,558	4,000	9,520	2	9,520	0.10	0.42	2,537	1,863	4,400	0.46
Garfield Avenue	E	2	2,130	0.06	4,341	4,900	12,800	2	12,800	0.13	0.38	3,411	2,005	5,400	0.42
Amelia Avenue	E	4	10,910	0.30	17,889	19,400	32,205	4	32,205	0.32	0.60	8,582	10,268	18,900	0.59
US 17-92	E	2	15,770	0.43	20,011	20,300	15,800	2	15,800	0.16	1.28	4,210	14,842	19,100	1.21
			36,960	1.00	57,038	61,200	99,125		99,125	1.00	0.62	FCAP= 0.43	FCOUNT= 0.57	61,300	

SCREENLINE # 2 **South of SR 44 and East of US 17-92**

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Voorhis Avenue	E	2	2,950	0.07	7,202	8,300	12,800	2	12,800	0.11	0.65	3,111	3,062	6,200	0.48
Blue Lake Avenue	E	2	2,170	0.06	4,926	5,700	16,000	2	16,000	0.14	0.36	3,889	2,252	6,100	0.38
Hill Avenue	E	2	2,440	0.06	2,791	2,900	12,800	2	12,800	0.11	0.23	3,111	2,533	5,600	0.44
Boston Avenue	C	2	1,280	0.03	2,778	3,200	9,520	2	9,520	0.08	0.34	2,314	1,329	3,600	0.38
Garfield Avenue	E	2	1,940	0.05	4,740	5,500	9,520	2	9,520	0.08	0.58	2,314	2,014	4,300	0.45
Alabama Avenue	E	2	2,600	0.07	4,387	4,494	9,520	2	9,520	0.08	0.47	2,314	2,699	5,000	0.53
Amelia Avenue	E	4	9,590	0.24	16,549	18,400	32,205	4	32,205	0.27	0.57	7,827	9,954	17,800	0.55
US 17-92	E	2	16,410	0.42	20,111	21,100	15,800	2	15,800	0.13	1.34	3,840	17,033	20,900	1.32
			39,380	1.00	63,484	69,594	118,165		118,165	1.00	0.59	0.41	0.59	69,500	

SCREENLINE #1 **North of Beresford Ave. and East of US 17-92**

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Blue Lake Avenue	E	2	2,170	0.06	4,926	5,700	16,000	2	16,000	0.18	0.36	4,985	1,877	6,100	0.38
Hill Avenue	E	2	2,440	0.07	2,791	2,900	12,800	2	12,800	0.14	0.23	3,988	2,110	4,100	0.32
Boston Avenue	C	2	1,280	0.03	2,778	3,200	9,520	2	9,520	0.11	0.34	2,966	1,107	3,600	0.38
Garfield Avenue	E	2	1,940	0.05	4,740	5,500	9,520	2	9,520	0.11	0.58	2,966	1,678	4,300	0.45
Alabama Avenue	E	2	2,090	0.06	3,526	3,612	11,900	2	11,900	0.13	0.30	3,707	1,807	4,500	0.38
Amelia Avenue	E	2	6,880	0.19	14,376	16,300	12,800	2	12,800	0.14	1.27	3,988	5,950	14,500	1.13
US 17-92	E	2	20,020	0.54	22,445	22,400	16,600	2	16,600	0.19	1.35	5,172	17,313	22,500	1.36
			36,820	1.00	55,582	59,612	89,140		89,140	1.00	0.67	FCAP= 0.47	FCOUNT= 0.53	59,600	

TABLE 4 (Continued)
SR 44 (from CR 42 to West Ramps of I-4) PD&E Study
Recommended Year 2025 No Build AADT for the Sidestreets Based on NCHRP Procedures

SCREENLINE # 4 North of SR 44 and West of US 17-92

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Boundary Avenue	C	2	1,510	0.12	3,061	3,456	9,520	2	9,520	0.16	0.36	815	1,908	2,700	0.28
Stone Street	E	2	3,930	0.32	3,445	3,890	12,800	2	12,800	0.21	0.30	1,095	4,966	6,100	0.48
Adelle Avenue	C	2	1,050	0.08	4,185	4,725	9,520	2	9,520	0.16	0.50	815	1,327	2,100	0.22
Clara Avenue	E	2	2,950	0.24	3,881	4,381	12,800	2	12,800	0.21	0.34	1,095	3,728	4,800	0.38
Florida Avenue	E	2	2,940	0.24	3,881	4,381	16,000	2	16,000	0.26	0.27	1,369	3,715	5,100	0.32
			12,380	1.00	18,452	20,834	60,640		60,640	1.00	0.34	FCAP= 0.25	FCOUNT= 0.75	20,800	

SCREENLINE # 5 South of SR 44 and West of US 17-92

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Boundary Avenue	C	2	1,100	0.10	1,791	1,897	9,520	2	9,520	0.15	0.20	415	1,143	1,600	0.17
Stone Street	E	2	2,650	0.25	2,687	2,847	12,800	2	12,800	0.20	0.22	559	2,753	3,300	0.26
Adelle Avenue	E	2	1,180	0.11	3,399	3,601	12,800	2	12,800	0.20	0.28	559	1,226	1,800	0.14
Clara Avenue	E	2	2,490	0.23	2,644	2,801	12,800	2	12,800	0.20	0.22	559	2,587	3,100	0.24
Florida Avenue	E	2	3,320	0.31	2,644	2,801	16,000	2	16,000	0.25	0.18	698	3,449	4,100	0.26
			10,740	1.00	13,164	13,946	63,920		63,920	1.00	0.22	FCAP= 0.20	FCOUNT= 0.80	13,900	

Reference: NCHRP 255 "Highway Traffic Data for Urbanized Area Project Planning and Design".

TABLE 5
SR 44 (from CR 42 to West Ramps of I-4) PD&E Study
Recommended Year 2025 Build AADT for the Sidestreets Based on NCHRP Procedures

SCREENLINE #1 North of SR 44 and East of US 17-92

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Blue Lake Avenue	E	2	2,160	0.06	6,352	7,500	16,000	2	16,000	0.16	0.47	4,611	2,053	6,700	0.42
Hill Avenue	E	2	4,010	0.11	4,504	4,600	12,800	2	12,800	0.13	0.36	3,689	3,812	7,500	0.59
Boston Avenue	C	2	1,980	0.05	4,292	4,900	9,520	2	9,520	0.10	0.51	2,743	1,882	4,600	0.48
Garfield Avenue	E	2	2,130	0.06	3,954	4,400	12,800	2	12,800	0.13	0.34	3,689	2,025	5,700	0.45
Amelia Avenue	E	4	10,910	0.30	17,347	19,000	32,205	4	32,205	0.32	0.59	9,281	10,371	19,700	0.61
US 17-92	E	2	15,770	0.43	19,922	20,300	15,800	2	15,800	0.16	1.28	4,553	14,991	19,500	1.23
			36,960	1.00	56,371	63,700	99,125		99,125	1.00	0.64	FCAP= 0.45	FCOUNT= 0.55	63,700	

SCREENLINE #2 South of SR 44 and East of US 17-92

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Voorhis Avenue	E	2	2,950	0.07	6,517	7,500	12,800	2	12,800	0.11	0.59	3,396	3,104	6,500	0.51
Blue Lake Avenue	E	2	2,170	0.06	5,179	6,000	16,000	2	16,000	0.14	0.38	4,245	2,284	6,500	0.41
Hill Avenue	E	2	2,440	0.06	3,059	3,200	12,800	2	12,800	0.11	0.25	3,396	2,568	6,000	0.47
Boston Avenue	C	2	1,280	0.03	2,195	3,700	9,520	2	9,520	0.08	0.39	2,526	1,347	3,900	0.41
Garfield Avenue	E	2	1,940	0.05	4,192	4,800	9,520	2	9,520	0.08	0.50	2,526	2,042	4,600	0.48
Alabama Avenue	E	2	2,600	0.07	4,387	4,494	9,520	2	9,520	0.08	0.47	2,526	2,736	5,300	0.56
Amelia Avenue	E	4	9,590	0.24	16,267	18,000	32,205	4	32,205	0.27	0.56	8,545	10,092	18,600	0.58
US 17-92	E	2	16,410	0.42	19,922	21,100	15,800	2	15,800	0.13	1.34	4,192	17,269	21,500	1.36
			39,380	1.00	61,718	72,794	118,165		118,165	1.00	0.62	0.43	0.57	72,900	

SCREENLINE #3 North of Beresford Ave. and East of US 17-92

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Blue Lake Avenue	E	2	2,170	0.06	5,179	6,000	16,000	2	16,000	0.18	0.38	5,557	1,889	6,500	0.41
Hill Avenue	E	2	2,440	0.07	3,059	3,200	12,800	2	12,800	0.14	0.25	4,445	2,124	5,000	0.39
Boston Avenue	C	2	1,280	0.03	2,195	3,700	9,520	2	9,520	0.11	0.39	3,306	1,114	3,900	0.41
Garfield Avenue	E	2	1,940	0.05	4,192	4,800	9,520	2	9,520	0.11	0.50	3,306	1,689	4,600	0.48
Alabama Avenue	E	2	2,090	0.06	3,526	3,612	11,900	2	11,900	0.13	0.30	4,133	1,820	4,700	0.39
Amelia Avenue	E	2	6,880	0.19	13,912	15,800	12,800	2	12,800	0.14	1.23	4,445	5,990	15,500	1.21
US 17-92	E	2	20,020	0.54	22,221	22,400	16,600	2	16,600	0.19	1.35	5,765	17,429	22,800	1.37
			36,820	1.00	54,284	63,012	89,140		89,140	1.00	0.71	FCAP= 0.49	FCOUNT= 0.51	63,000	

TABLE 5 (Continued)
SR 44 (from CR 42 to West Ramps of I-4) PD&E Study
Recommended Year 2025 Build AADT for the Sidestreets Based on NCHRP Procedures

SCREENLINE # 4 North of SR 44 and West of US 17-92

2-LANE SCENARIO Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Boundary Avenue	C	2	1,510	0.12	3,474	3,937	9,520	2	9,520	0.16	0.41	837	1,927	2,800	0.29
Stone Street	E	2	3,930	0.32	3,402	3,855	12,800	2	12,800	0.21	0.30	1,125	5,015	6,100	0.48
Adelle Avenue	C	2	1,050	0.08	4,112	4,660	9,520	2	9,520	0.16	0.49	837	1,340	2,200	0.23
Clara Avenue	E	2	2,950	0.24	3,828	4,338	12,800	2	12,800	0.21	0.34	1,125	3,764	4,900	0.38
Florida Avenue	E	2	2,940	0.24	3,828	4,338	16,000	2	16,000	0.26	0.27	1,406	3,751	5,200	0.33
			12,380	1.00	18,644	21,126	60,640		60,640	1.00	0.35	FCAP= 0.25	FCOUNT= 0.75	21,200	

SCREENLINE # 5 South of SR 44 and West of US 17-92

Facility	Minimum Acceptable LOS	Existing No. of Lanes	Existing AADT	% of Tot COUNT	Yr 2020 Future Year Model Vol	YR 2025 Future Year Forecast	Existing Capacity at Acceptable LOS	Future No. of Lanes	Future Capacity at Acceptable LOS	% of Total Future Capacity	Future Yr V/C Ratio	Adjustment		Adjusted YR 2025 Future Forecast	V/C Ratio at Acceptable LOS
												Capacity	Base Count		
Boundary Avenue	C	2	1,100	0.10	2,207	2,327	9,520	2	9,520	0.15	0.24	407	1,119	1,500	0.16
Stone Street	E	2	2,650	0.25	2,534	2,671	12,800	2	12,800	0.20	0.21	547	2,695	3,200	0.25
Adelle Avenue	E	2	1,180	0.11	3,387	3,570	12,800	2	12,800	0.20	0.28	547	1,200	1,700	0.13
Clara Avenue	E	2	2,490	0.23	2,412	2,542	12,800	2	12,800	0.20	0.20	547	2,532	3,100	0.24
Florida Avenue	E	2	3,320	0.31	2,412	2,542	16,000	2	16,000	0.25	0.16	683	3,376	4,100	0.26
			10,740	1.00	12,951	13,653	63,920		63,920	1.00	0.21	FCAP= 0.20	FCOUNT= 0.80	13,600	

Reference: NCHRP 255 "Highway Traffic Data for Urbanized Area Project Planning and Design".

Also the traffic forecasts especially on Amelia Avenue, Alabama Avenue, SR 44, US 17-92, Beresford Avenue and Rich Avenue were compared to the traffic volumes reported in the West Volusia Justice Center Parking/Traffic Report prepared by Ghyabi Lassiter & Associates. The traffic forecasts were found to be consistent and in most cases higher than those reported in the West Volusia Justice Center Parking/Traffic Report.

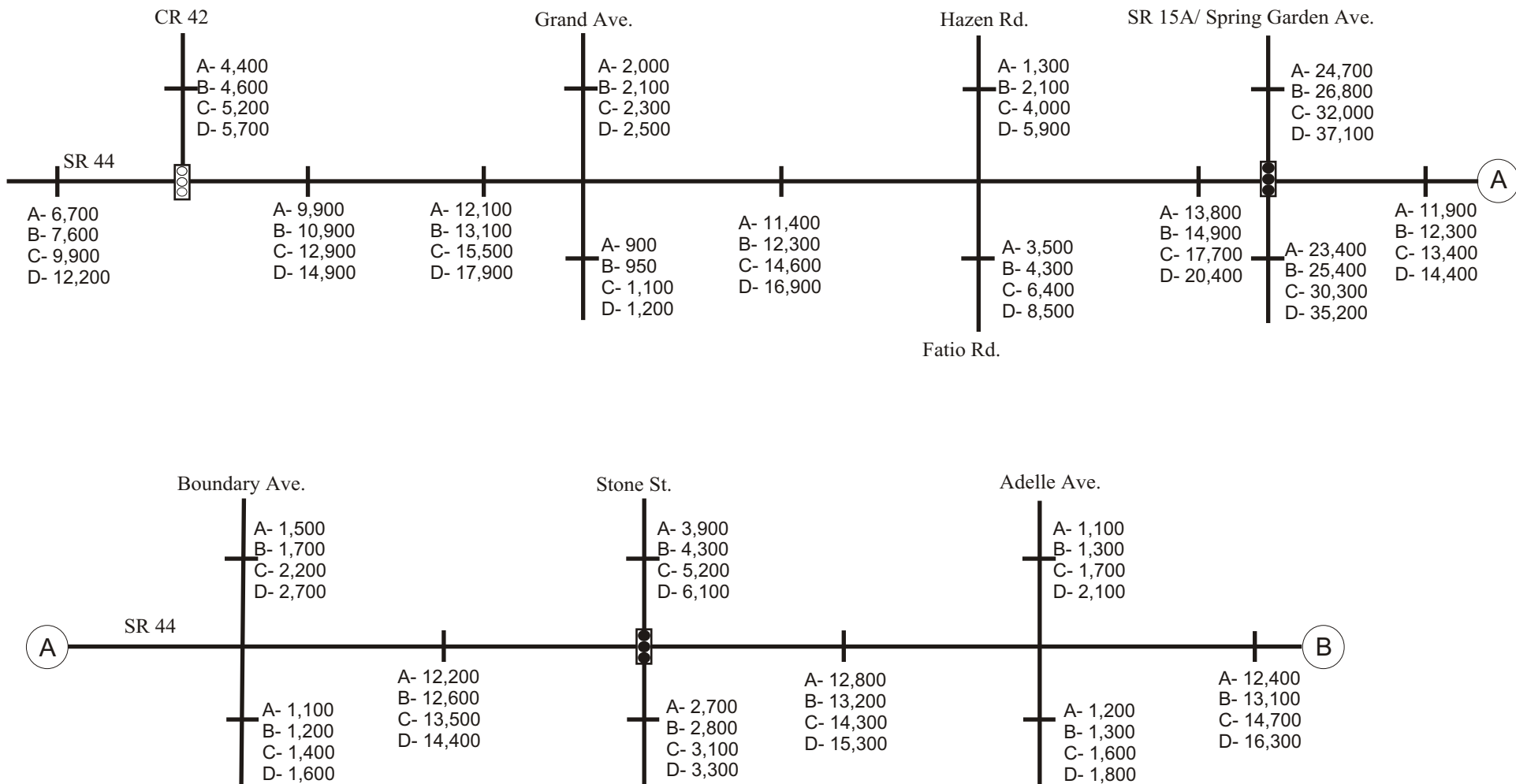
DESIGN TRAFFIC FORECASTS



Appropriate growth rates were applied to existing volumes to project AADT for the entire study area including SR 44 and Beresford Avenue. The following sections present the design volume forecasts for No-Build and Build conditions. It should be noted that specific traffic volume increases might vary slightly from recommended growth factors due to rounding.

No Build and Build Traffic Forecasts

The no build alternative includes SR 44 remaining as two lanes between CR 42 and Summit Avenue and being widened to four lanes between Summit Avenue and I-4. The build alternative includes SR 44 as a two-lane roadway with bi-directional center turn lane between SR 15A and Blue Lake Avenue. Also the build alternative includes SR 44 being widened to four lanes between Summit Avenue and I-4 and a new two lane Beresford Avenue Extension between Blue Lake Avenue and SR 44.

Figures 7a through 7e illustrate estimated existing and projected Average Annual Daily Traffic (AADT) volumes for opening year 2005, mid-design year 2015 and design year 2025, for the No Build alternative. Figures 8a through 8e illustrate estimated existing and projected AADT volumes for opening year 2005, mid-design year 2015 and design year 2025, for the Build alternative. Directional Design Hourly Volumes (DDHV) depicted in Figures 9a through 9e illustrate projected DDHV for opening year 2005, mid-design year 2015 and design year 2025, for the No-Build alternative. The DDHV depicted in Figures 10a through 10e illustrate projected DDHV for opening year 2005, mid-design year 2015 and design year 2025, for the Build alternative. The DDHV represent an application of K30 and D30 factors summarized in Table 6 to the AADT volumes.



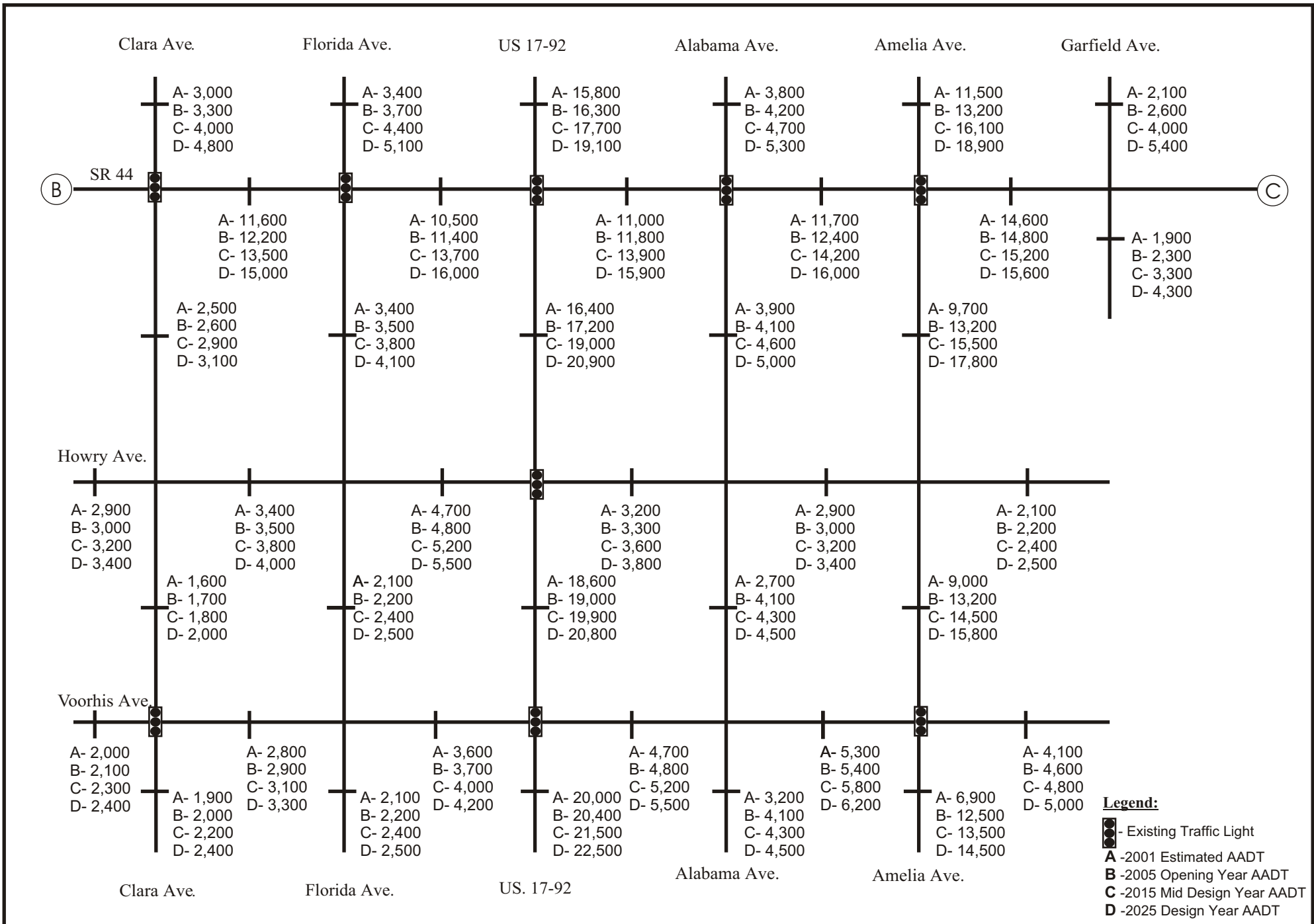
Legend:
 - Flashing Traffic Light
 - Existing Traffic Light
A -2001 Estimated AADT
B -2005 Opening Year AADT
C -2015 Mid Design Year AADT
D -2025 Design Year AADT



Prepared for: Florida Department of Transportation
 Prepared by: GMB Engineers & Planners, Inc.
 Prepared with: Wilbur Smith Associates

Annual Average Daily Traffic Volumes (No Build)
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

Figure 7a



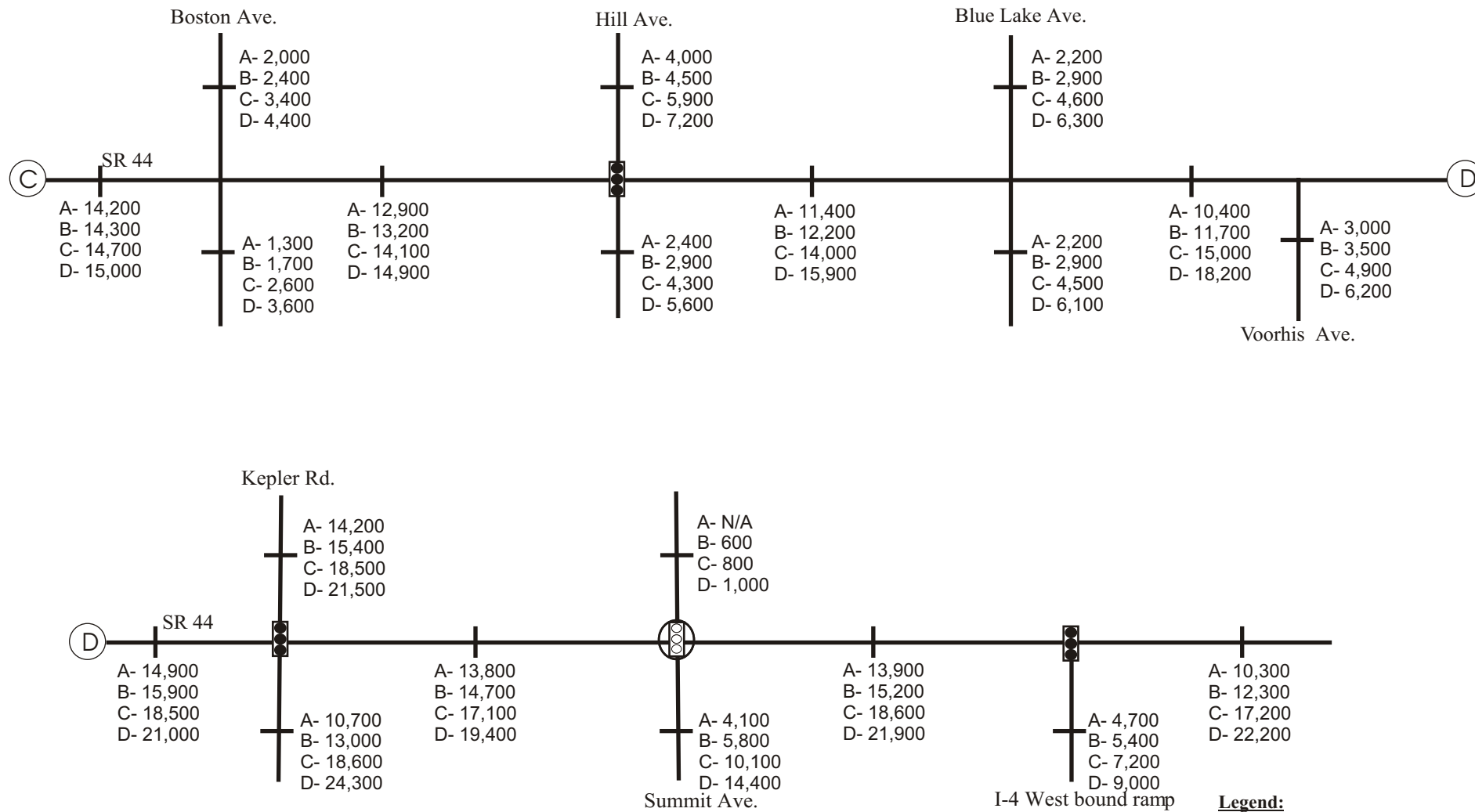
Legend:
 - Existing Traffic Light
A -2001 Estimated AADT
B -2005 Opening Year AADT
C -2015 Mid Design Year AADT
D -2025 Design Year AADT



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Annual Average Daily Traffic Volumes (No Build)
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

Figure 7b

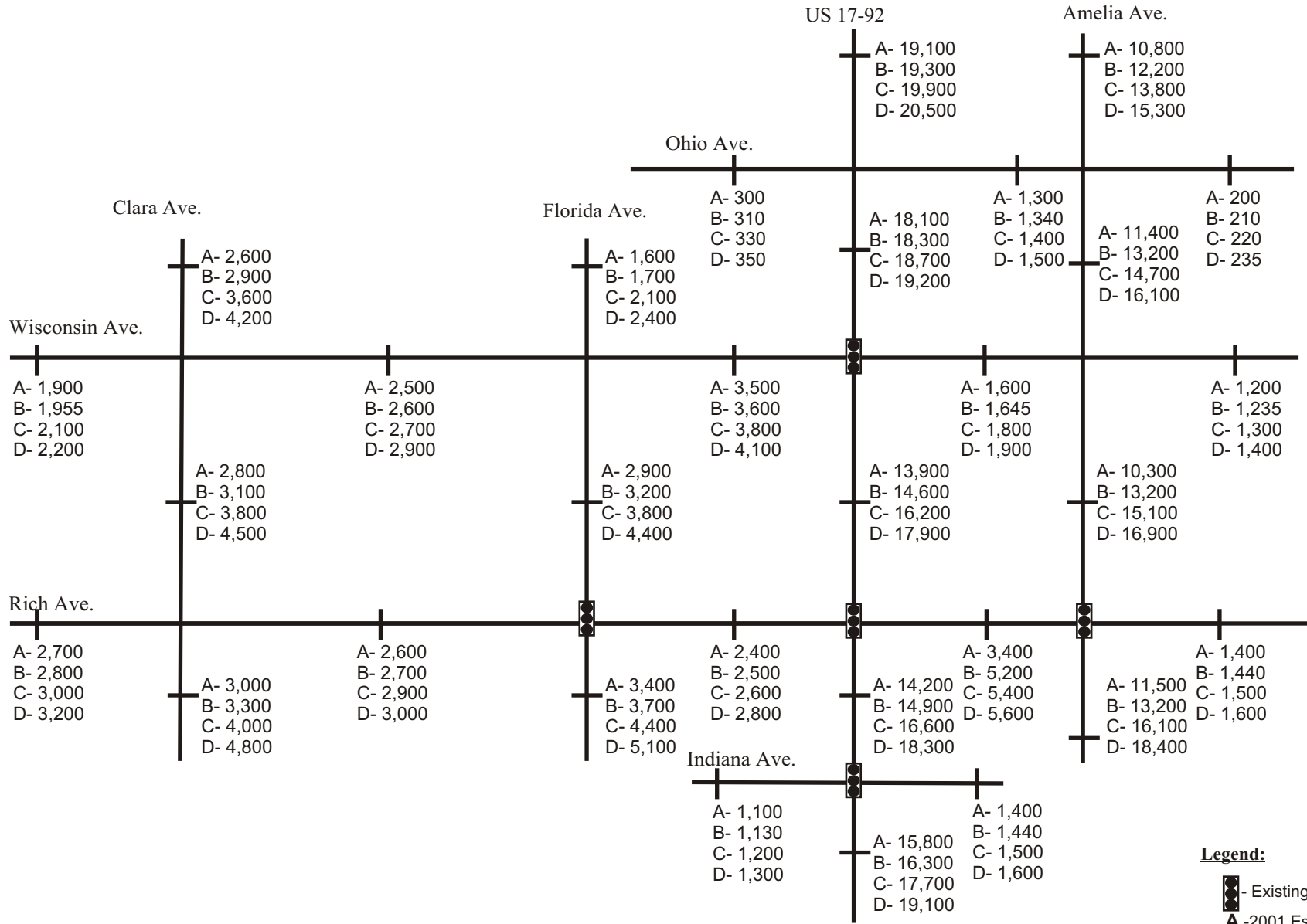



Legend:
 - Proposed Traffic Light
 - Existing Traffic Light
A -2001 Estimated AADT
B -2005 Opening Year AADT
C -2015 Mid Design Year AADT
D -2025 Design Year AADT



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Annual Average Daily Traffic Volumes (No Build)
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study



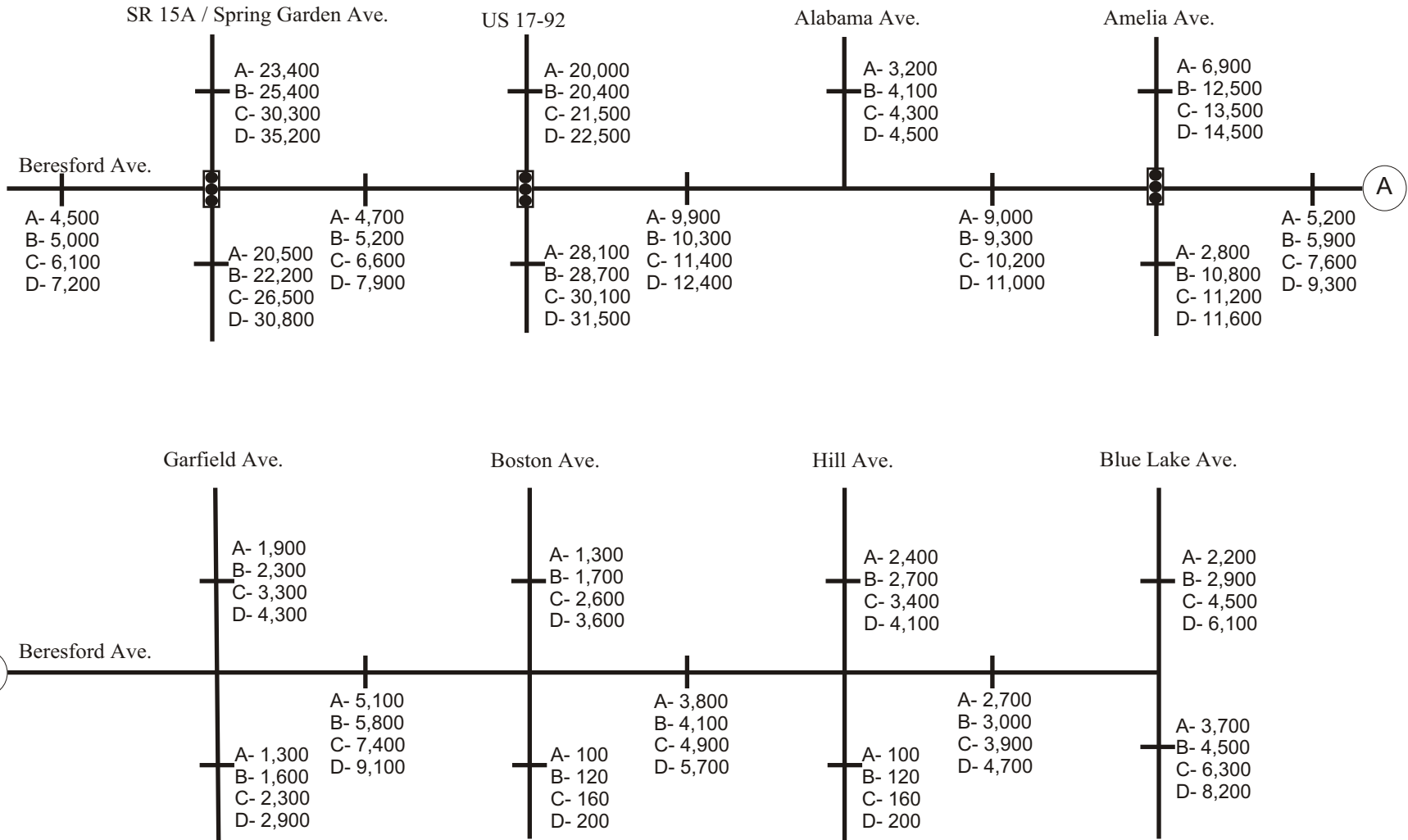
Legend:
 - Existing Traffic Light
A -2001 Estimated AADT
B -2005 Opening Year AADT
C -2015 Mid Design Year AADT
D -2025 Design Year AADT




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Annual Average Daily Traffic Volumes (No Build)
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

Figure 7d



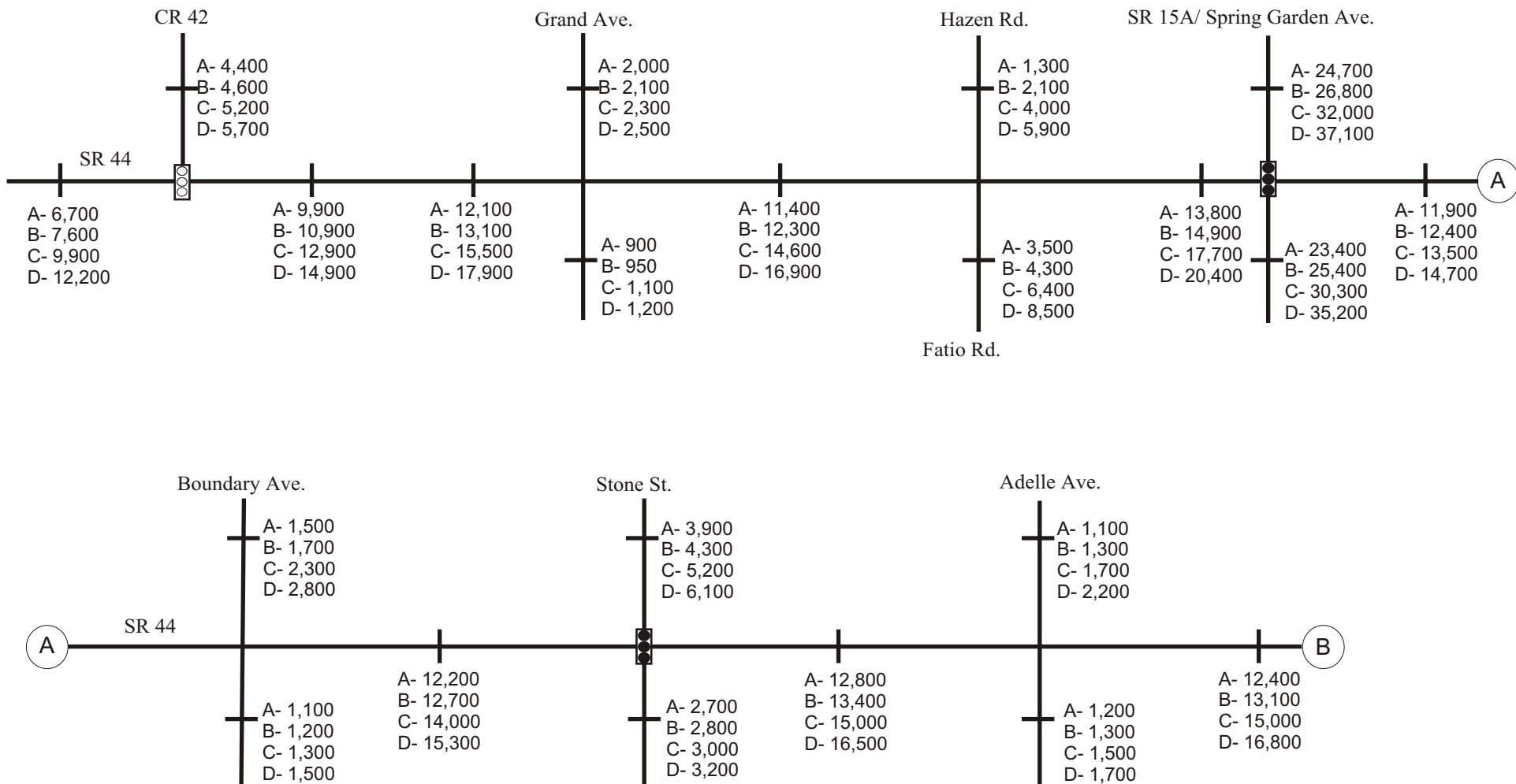
Legend:

-  - Existing Traffic Light
- A** -2001 Estimated AADT
- B** -2005 Opening Year AADT
- C** -2015 Mid Design Year AADT
- D** -2025 Design Year AADT



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 Prepared with: Wilbur Smith Associates

Annual Average Daily Traffic Volumes (No Build)
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study



- Legend:**
- Flashing Traffic Light
 - Existing Traffic Light
 - A** -2001 Estimated AADT
 - B** -2005 Opening Year AADT
 - C** -2015 Mid Design Year AADT
 - D** -2025 Design Year AADT



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Annual Average Daily Traffic Volumes (Build)
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

Figure 8a

Figure 8b

Figure 8c

Figure 8d

Figure 8e

Figure 9a

Figure 9b

Figure 9c

Figure 9d

Figure 9e

Figure 10a

Figure 10b

Figure 10c

Figure 10d

Figure 10e

Table 6

Table 6 continued

Design Hour Volumes at the Intersections

The existing and future year AADT's for the No-Build and Build alternatives along with the recommended design characteristics shown in Table 6 were used to develop design hour volumes (DHV's) at the intersections for the No-Build and Build alternatives. The DHV's for the intersections were developed using the TURNS5 spreadsheet, which balances AADT's and calculates DHV's based on K30 and D factors used as input into the program.

The estimated design hour volumes from TURNS5 spreadsheet were assessed for reasonableness. Minor adjustments were made and are reported in the TURNS5 output included in Appendix C and D for the No-Build and Build conditions, respectively. These adjustments are necessary because accepting an estimated value that is unrealistically large may lead to over design and accepting an estimated volume that is too small may result in an inadequate design.

SECTION 6 - LEVEL OF SERVICE ANALYSIS

A Level of Service (LOS) analysis was performed for the No-Build and Build scenarios. This section presents the results of the operational analyses for the future No-Build and Build alternatives 1, 2, and 3, and signal warrant analysis for unsignalized intersections. All conditions were analyzed using the most current adopted procedures as outlined in the Transportation Research Board's - Highway Capacity Manual (HCM) 2000 report. Specific analysis techniques utilized in this study include signalized intersections, unsignalized intersections and arterial analyses.

FUTURE SIGNAL REQUIREMENTS

The need for future traffic signal was determined only for Build conditions for all the unsignalized intersections along SR 44 and Beresford Avenue. The intersections that were evaluated for future signal requirements include;

- SR 44 @ CR 42
- SR 44 @ Grand Avenue
- SR 44 @ Hazen Road / Fatio Road
- SR 44 @ Boundary Avenue
- SR 44 @ Adelle Avenue
- SR 44 @ Garfield Avenue
- SR 44 @ Boston Avenue
- SR 44 @ Blue Lake Avenue
- SR 44 @ Voorhis Avenue
- Beresford Avenue @ Alabama Avenue
- Beresford Avenue @ Garfield Avenue
- Beresford Avenue @ Boston Avenue
- Beresford Avenue @ Hill Avenue
- Beresford Avenue @ Blue Lake Avenue
- Beresford Avenue @ Kepler Road

-
- Beresford Avenue @ Summit Avenue

The need for future signal requirements at this location was determined by using Signal Warrants 1 and 2, as specified in the Manual on Uniform Traffic Control Devices (MUTCD). Signal warrant 1 is the Minimum Vehicle Volumes warrant and Signal Warrant 2 is for Interruption of Continuous Traffic. Criteria to warrant signals should be based on actual counts. In order to assess future signal requirements, existing hourly variations of traffic flow were utilized with future traffic volumes to establish approximate conditions when signals might be warranted. If volumes for an intersection meet the criteria for one signal warrant, then that intersection is analyzed under signal control.

Based on this analysis, under the Build conditions, the intersections along SR 44 at Grand Avenue, Hazen Road / Fatio Road, Garfield Avenue, Boston Avenue, and Blue Lake Avenue will require the installation of a signal by the opening year 2005. Also the intersection at Beresford Avenue and Kepler Road will require the installation of a signal by the opening year 2005. The intersections along SR 44 at CR 42, Boundary Avenue, and Adelle Avenue will require the installation of a signal by the mid design year 2015. The intersections along Beresford Avenue at Alabama Avenue, Garfield Avenue, Blue Lake Avenue, and Summit Avenue will require the installation of a signal by the design year 2025. The intersection of SR 44 and Voorhis Avenue and the intersections along Beresford Avenue at Hill Avenue and Boston Avenue would not require signalization through the design year 2025. The signal warrant spreadsheets are included in Appendix E.

INTERSECTION OPERATION ANALYSIS

Intersection operational analyses were performed for Opening, Mid-Design, and Design years for the No Build and Build alternatives. All the unsignalized and signalized intersections were analyzed using the most current adopted procedures as outlined in the Transportation Research Board's - Highway Capacity Manual (HCM) 2000 report.

No Build

The no build alternative includes SR 44 remaining as two lanes between CR 42 and Summit Avenue and being widened to four lanes between Summit Avenue and I-4. The No-Build geometry shown in Figures 11a through 11e is the same as the existing intersection geometry with few exceptions.

Figure 11a

Figure 11b

Figure 11c

Figure 11d

Figure 11e

The first exception will be at the intersection of SR 44 and Hazen Road / Fatio Road where by the opening year 2005, the programmed new two lane Fatio Road between SR 44 and Beresford Avenue will be in place and form the northbound approach of the intersection. The second exception will be at the intersection of SR 44 and Kepler Road where by the mid design year 2015, the planned four laning of Kepler Road between SR 44 and SR 472 introduces modified intersection geometry. Also intersection geometries at the intersections of SR 44 and Summit Avenue, SR 44 and I-4 Westbound Ramps, and SR 15A and Beresford Avenue will be modified based on the programmed four laning of SR 44 between Summit Avenue and I-4 and four laning of SR 15A between Beresford Avenue and US 17-92. Turn lanes were assumed at these Intersections as part of the above mentioned roadway Improvements.

Based on this geometry, intersection operational characteristics i.e., levels of service, were tested using the design hour volumes developed using TURNS5. These design hour volumes for all the intersections along SR 44, Beresford Avenue and the intersections around the intersection of SR 44 and US 17-92 for the opening, mid design, and design years are shown in [Figures 12a through 12e](#), [Figures 13a through 13e](#), and [Figures 14a through 14e](#) respectively. The intersections around the intersection of SR 44 and US 17-92 include all the major intersections bounded by Voorhis Avenue in the south, Ohio Avenue on the north, Clara Avenue in the west and Amelia Avenue on the east.

As shown in [Figures 12a through 12c](#), the following intersections along SR 44 operate below their adopted LOS standard.

- SR 44 @ Grand Avenue – Minor street movement operating at LOS F
- SR 44 @ Hazen Road / Fatio Road - Minor street movement operating at LOS F
- SR 44 @ SR 15A – LOS E
- SR 44 @ US 17-92 – LOS F
- SR 44 @ Amelia Avenue – LOS F
- SR 44 @ Garfield Avenue - Minor street movement operating at LOS F
- SR 44 @ Boston Avenue - Minor street movement operating at LOS F; and
- SR 44 @ Blue Lake Avenue - Minor street movement operating at LOS F

Figure 12a

Figure 12b

Figure 12c

Figure 12d

Figure 12e

Figure 13a

Figure 13b

Figure 13c

Figure 13d

Figure 13e

Figure 14a

Figure 14b

Figure 14c

Figure 14d

Figure 14e

Based on Figures 12b, 12d, and 12e all the intersections along Beresford Avenue and all the intersections around the intersection of SR 44 are found to operate within their acceptable LOS standard.

During the mid-design year, as shown in [Figures 13a through 13c](#), the minor streets of the unsignalized intersections along SR 44 operating at LOS F in the opening year 2005 continues to operate at LOS F. In addition the following intersections along SR 44 operate below their adopted LOS standard.

- SR 44 @ CR 42 - Minor street movement operating at LOS F
- SR 44 @ SR 15A – worsens to LOS F
- SR 44 @ Boundary Avenue - Minor street movement operating at LOS F
- SR 44 @ Adelle Avenue - Minor street movement operating at LOS F
- SR 44 @ US 17-92 – continues to operate at LOS F
- SR 44 @ Amelia Avenue – continues to operate at LOS F

Based on Figures 13b and 13d, the following intersections in the downtown around the intersection of SR 44 and US 17-92 are found to not operate within their acceptable LOS standard.

- Howry Avenue @ Amelia Avenue – Minor street movement operating at LOS F
- Wisconsin Avenue @ Amelia Avenue - Minor street movement operating at LOS F

Based on Figure 13e, the intersection at Beresford Avenue and US 17-92 operate at LOS F below their adopted LOS standard E showing the need for improvement at this intersection even without the Beresford Avenue Extension.

During the design year, as shown in [Figures 14a through 14c](#), the minor streets of the unsignalized intersections along SR 44 operating at LOS F in the opening year 2005 and mid design year 2015 continues to operate at LOS F. In addition the following intersections along SR 44 operate below their adopted LOS standard.

- SR 44 @ SR 15A – continues to operate at LOS F
- SR 44 @ Florida Avenue – LOS F

-
- SR 44 @ US 17-92 – continues to operate at LOS F
 - SR 44 @ Amelia Avenue – continues to operate at LOS F
 - SR 44 @ Voorhis Avenue - Minor street movement operating at LOS F

Based on Figures 14b and 14d, the following intersections in the downtown around the intersection of SR 44 and US 17-92 are found not to operate within their acceptable LOS standard.

- Howry Avenue @ Amelia Avenue – Minor street movement continues to operate at LOS F
- Wisconsin Avenue @ Amelia Avenue - Minor street movement continues to operate at LOS F
- Voorhis Avenue @ Alabama Avenue – Minor street movement operates at LOS F

Based on Figure 14e, the intersection at Beresford Avenue and US 17-92 continues to operate at LOS F. In addition the minor streets at the unsignalized intersections along Beresford Avenue at Alabama Avenue and Garfield Avenue operate at LOS F. Based on Figure 9e, it can be seen that the intersections at US 17-92, Alabama Avenue, and Garfield Avenue along Beresford Avenue show the need for improvement even without the Beresford Avenue Extension.

This intersection analysis for the No Build condition clearly shows the need for intersection improvements along SR 44 at almost all the unsignalized intersections and at the signalized intersections including SR 15A, US 17-92, Florida Avenue, and Amelia Avenue. The intersection analysis also shows that along Beresford Avenue apart from the unsignalized intersections at Alabama Avenue and Garfield Avenue, the signalized intersection at US 17-92 needs improvement even without the Beresford Avenue Extension. In addition among the intersections analyzed around the intersection of SR 44 and US 17-92, the unsignalized intersections at Howry Avenue and Amelia Avenue, Wisconsin Avenue, and Voorhis Avenue and Alabama Avenue needs improvement.

Build

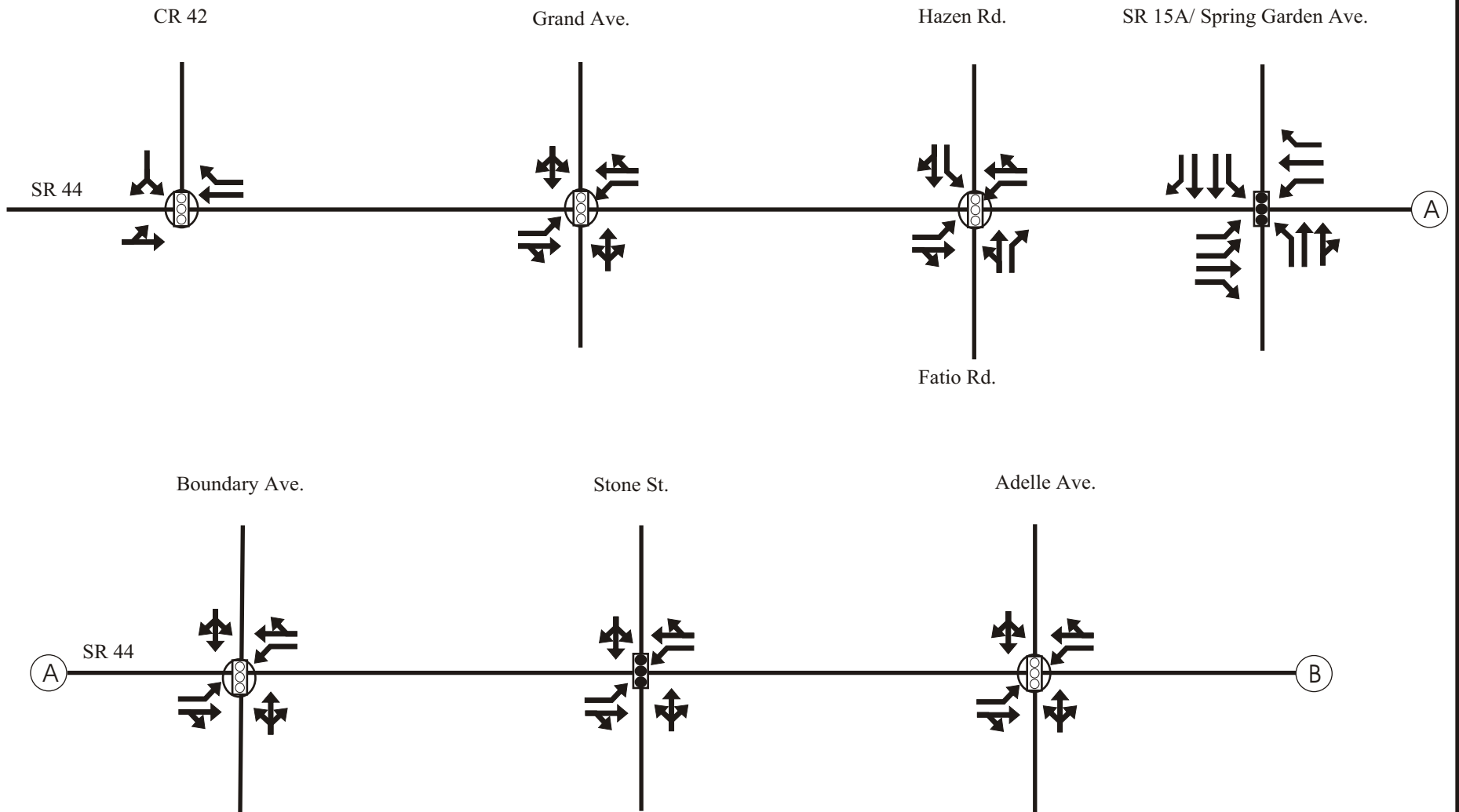
The build alternative includes SR 44 as a two-lane roadway with bi-directional center turn lane between SR 15A and Blue Lake Avenue. Also the build alternative includes SR 44

being widened to four lanes between Summit Avenue and I-4 and a new two lane Beresford Avenue Extension between Blue Lake Avenue and SR 44.

The proposed build geometry along SR 44, and Beresford Avenue are shown in Figures 10a through 10e. The proposed build geometry includes traffic signals at those intersections that warrants a traffic signal based on signal warrant analysis described in Section 6 under future signal requirements. In addition as mention in the No Build scenario there would be modified intersection geometries for the opening year 2005 at the intersection of SR 44 and Hazen Road/Fatio Road, SR 44 and Summit Avenue, SR 44 and I-4 Westbound Ramps, and SR 15A and Beresford Avenue associated with the programmed new two lane Fatio Road between SR 44 and Beresford Avenue, programmed four laning of SR 44 between Summit Avenue and I-4 and programmed four laning of SR 15A between Beresford Avenue and US 17-92. Also the intersection geometry at SR 44 and Kepler Road will be modified by the year 2015 based on the planned four laning of Kepler Road between SR 44 and SR 472.

In addition to the mainline improvements, the following intersection improvements are recommended based on the No Build Analysis and signal warrant analysis and are shown in Figures 15a through 15e. The improvements include:

- Signalize the intersection of SR 44 and CR 42 by the mid design year 2015
- Signalize the intersection of SR 44 and Grand Avenue by the opening year 2005
- Signalize the intersection of SR 44 and Hazed Road / Fatio Road by the opening year 2005
- Introduce an additional eastbound Left turn lane, an eastbound right turn lane, a westbound right turn lane and a southbound right turn lane at the intersection of SR 44 and SR 15A
- Signalize the intersection of SR 44 and Boundary Avenue by the mid design year 2015
- Signalize the intersection of SR 44 and Adelle Avenue by the mid design year 2015
- Introduce a southbound Left turn lane at the intersection of SR 44 and Clara Avenue
- Eliminate the Offset at the intersection of SR 44 and Florida Avenue and thereby eliminate Split Phase Operation



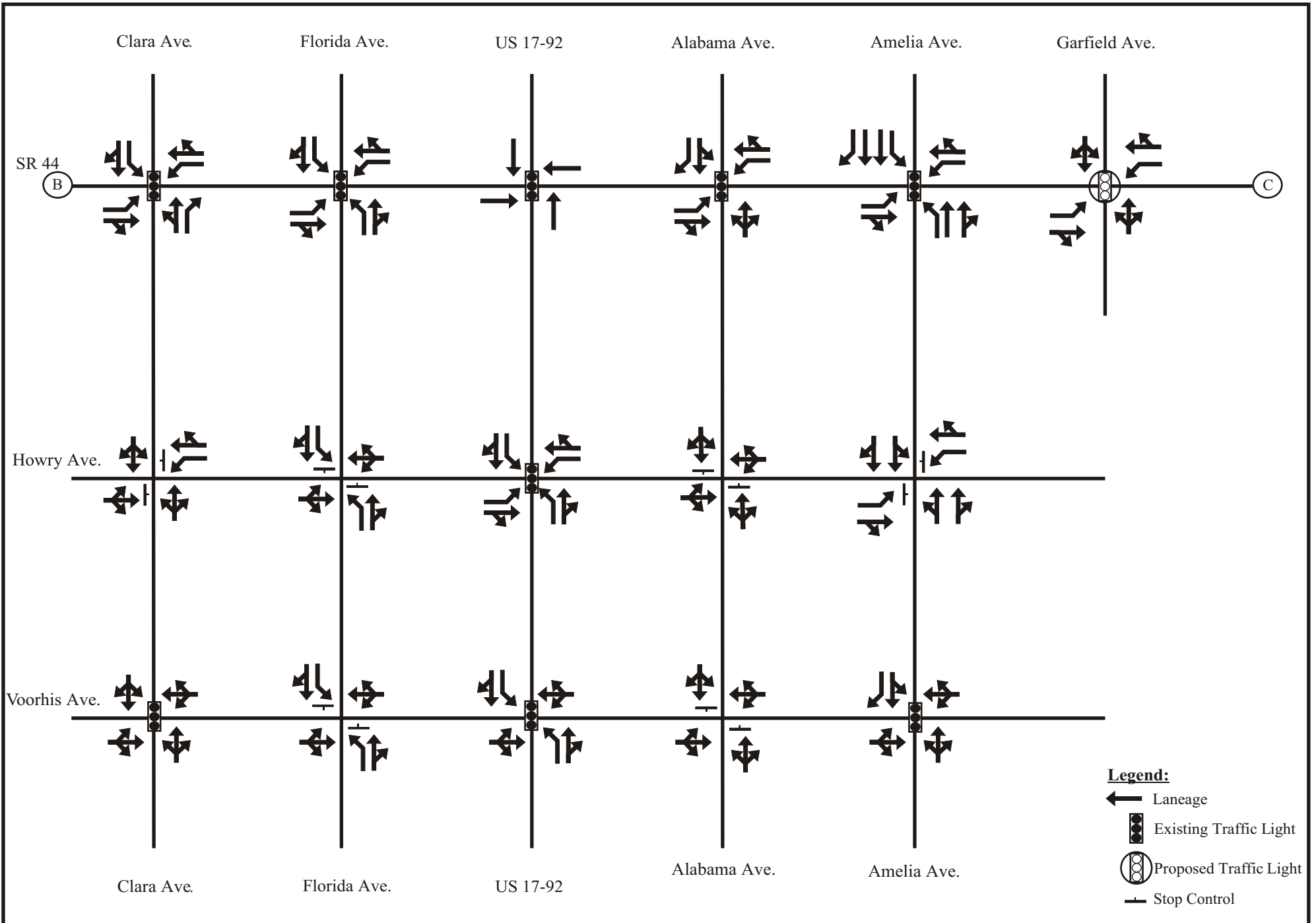
Note: The intersection geometry at Hazen Rd./ Fatio Rd. is assumed based on programmed improvement of a new two lane Fatio Rd.



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 Prepared with: Wilbur Smith Associates

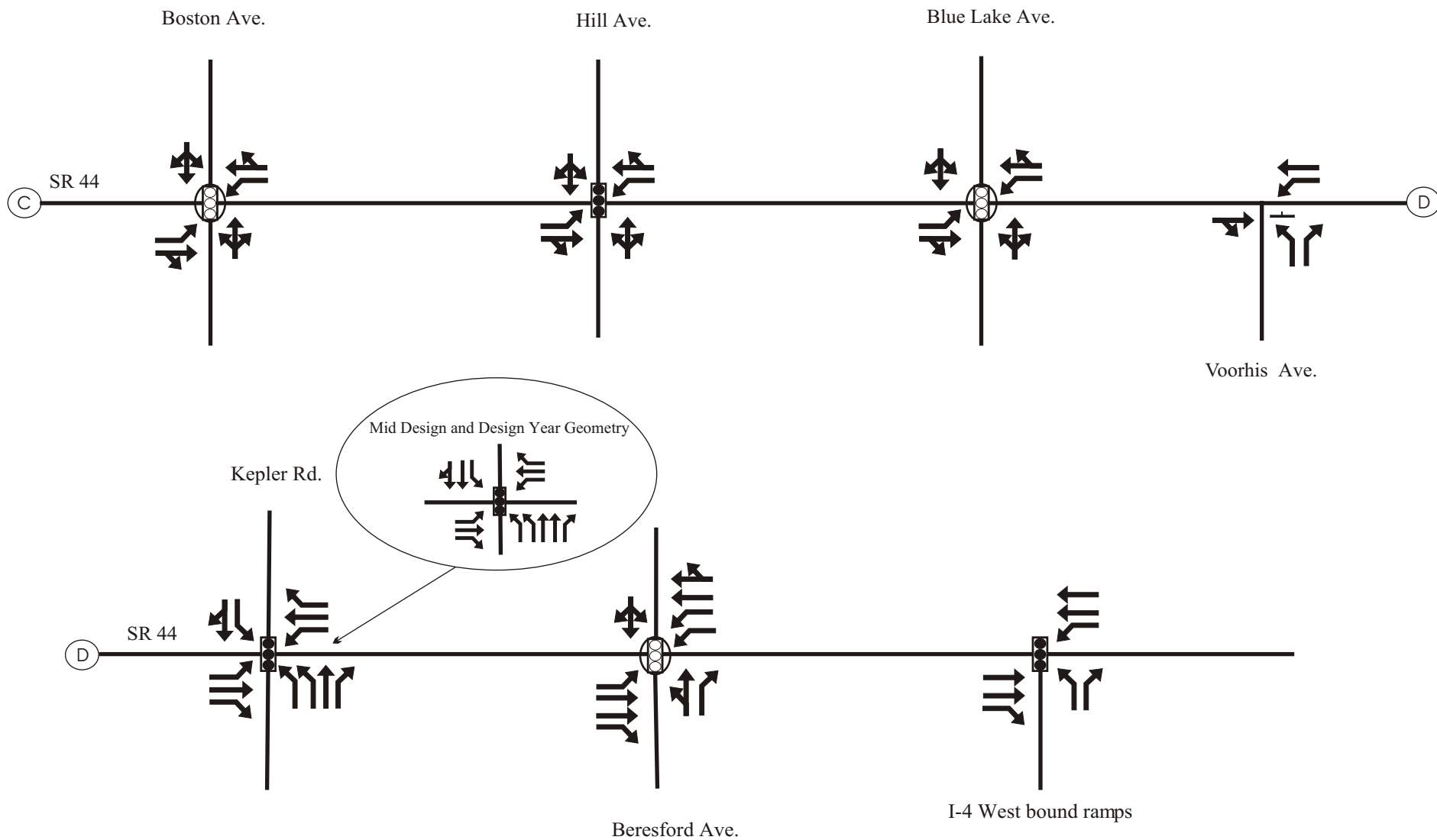
Proposed Build Geometry
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

Figure 15a



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 Prepared with: Wilbur Smith Associates

Proposed Build Geometry
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study



Notes:

1. The intersection geometry at Summit Ave. and I-4 Westbound Ramps are based on programmed four laning along SR 44
2. The intersection geometry at Kepler Rd is based on planned four laning of Kepler Rd. From SR 44 to SR 472 by Mid Design Year 2015.

Legend:

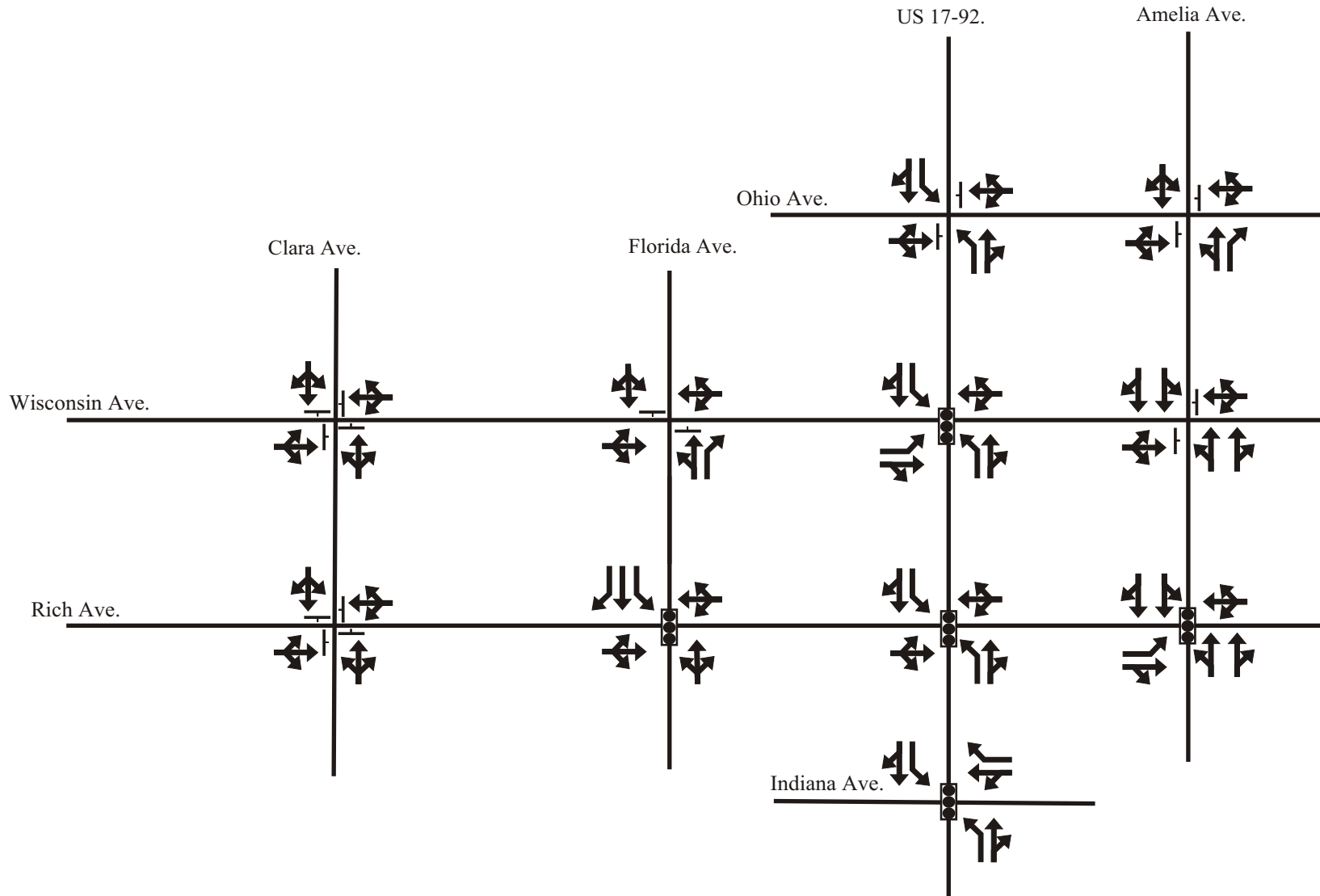
- ← Laneage
- ⊗ Proposed Traffic Light
- ⊞ Existing Traffic Light



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Proposed Build Geometry
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

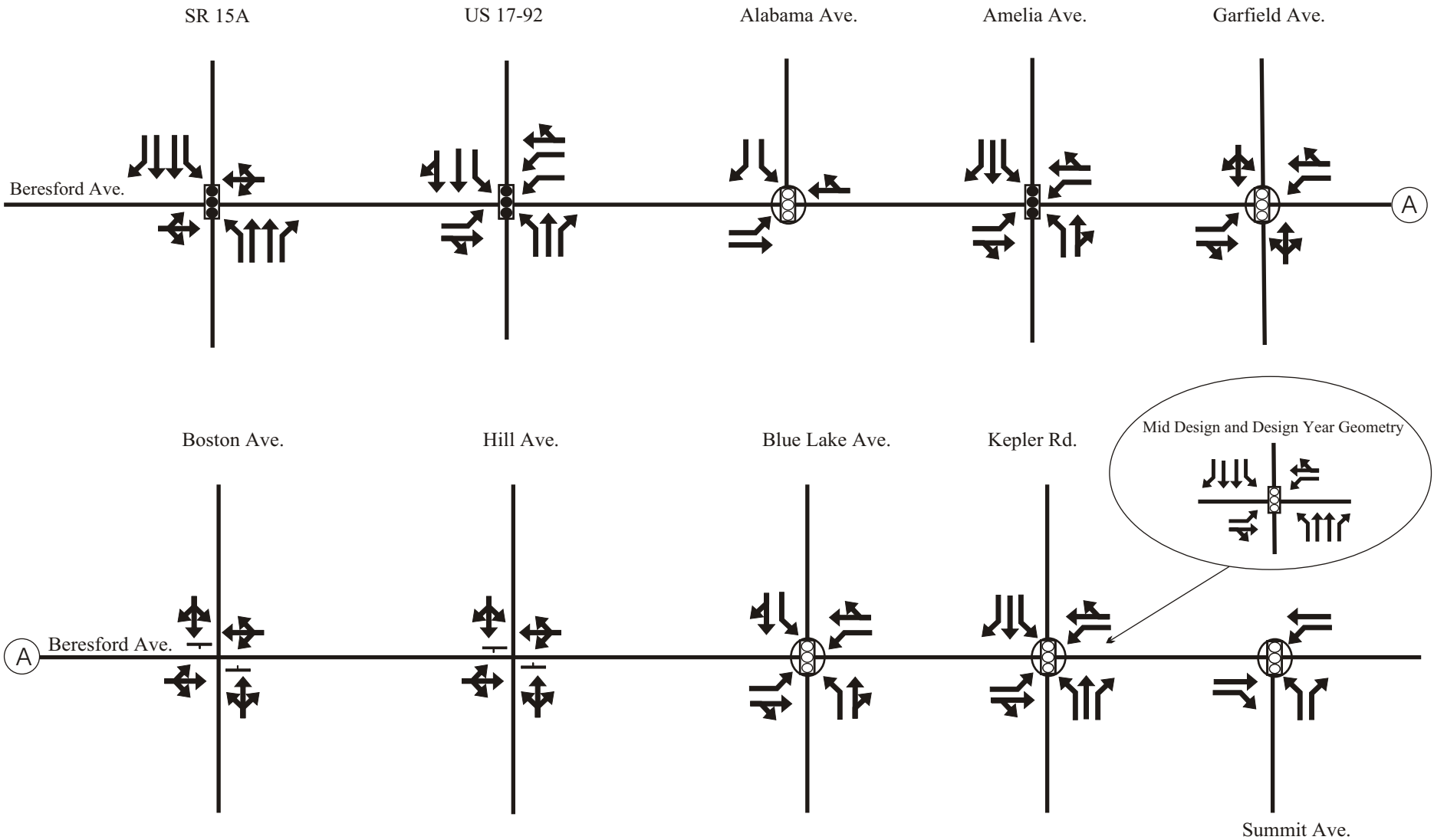
Figure 15c



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Proposed Build Geometry
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

Figure 15d



Notes:

1. The intersection geometry at SR 15A and Beresford Ave. is assumed based on programmed four laning along SR 15A.
2. Beresford Avenue between Blue Lake Avenue and SR 44 is assumed to be open by Year 2005.

Legend:

- ← Laneage
- ⊥ Stop Control
- ⬆ Existing Traffic Light
- ⊕ Proposed Traffic Light



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Proposed Geometry
 SR 44 (from CR 42 to West Ramps of I-4)
 PD&E Study

-
- Introduce a southbound and northbound Left turn lane and a southbound right turn lane at the intersection of SR 44 and Amelia Avenue and thereby eliminate Split Phase Operation
 - Signalize the intersection of SR 44 and Garfield Avenue by the opening year 2005 and introduce a eastbound and westbound left turn lane as part of the bi-directional lane improvement
 - Signalize the intersection of SR 44 and Boston Avenue by the opening year 2005
 - Signalize the intersection of SR 44 and Blue Lake Avenue by the opening year 2005 and introduce a eastbound and westbound left turn lane as part of the bi-directional lane improvement
 - Introduce an additional northbound Left turn lane at the intersection of SR 44 and Kepler Road
 - Provide a four lane typical section along SR 44 between Voorhis Avenue and Kepler Road to receive the dual northbound left turn lanes from Kepler Road onto SR 44
 - Introduce an additional westbound Left turn lane at the intersection of SR 44 and Beresford Avenue
 - Introduce an additional westbound Left turn lane by modifying the shared left/through/right turn lane at the intersection of US 17-92 and Beresford Avenue
 - Signalize the intersection of Beresford Avenue and Alabama Avenue by the design year 2025
 - Introduce a southbound left turn lane and right turn lane at the intersection of Amelia Avenue and Beresford Avenue
 - Signalize the intersection of Beresford Avenue and Garfield Avenue by the design year 2025
 - Introduce an exclusive left turn lane and a shared through/right turn lane on all the approaches at the intersection of Beresford Avenue and Blue Lake Avenue
 - Introduce an exclusive left turn lane and a shared through/right turn lane on the eastbound and westbound approaches at the intersection of Beresford Avenue and Kepler Road
 - Introduce two lanes in each direction along Beresford Avenue between SR 44 and Summit Avenue to receive the dual westbound left turn lanes from SR 44 onto Beresford Avenue
 - Signalize the intersection of Beresford Avenue and Summit Avenue by the design year 2025

Based on the proposed intersection geometry shown in Figures 15a through 15e, intersection operational characteristics i.e., levels of service, were tested for the build scenario using the design hour volumes developed using TURNS5 spreadsheets. These design hour volumes for all the intersections along SR 44, Beresford Avenue and the intersections around the intersection of SR 44 and US 17-92 for the opening, mid design, and design years are shown in Figures 16a through 16e, Figures 17a through 17e, and Figures 18a through 18e respectively. The intersections around the intersection of SR 44 and US 17-92 include all the major intersections bounded by Voorhis Avenue in the south, Ohio Avenue on the north, Clara Avenue in the west and Amelia Avenue on the east.

As shown in Figures 16a through 16e in the case of the opening year 2005, all the intersections along SR 44, Beresford Avenue and all the intersections around the intersection of SR 44 and US 17-92 operate within their acceptable LOS standard with the exception of the intersection at US 17-92, which is found to operate at LOS F.

In the case of the mid design year 2015, as shown in Figures 17a through 17e, all the intersections along SR 44, Beresford Avenue and all the intersections around the intersection of SR 44 and US 17-92 operate within their acceptable LOS standard with the exception of four intersections. The four include the signalized intersection at SR 44 and US 17-92, and the three unsignalized intersections at Wisconsin Avenue and Amelia Avenue, Howry Avenue and Amelia Avenue, and Beresford Avenue and Garfield Avenue that were found to operate at LOS F.

In the case of the design year 2025, as shown in Figures 18a through 18e, all the intersections along SR 44, Beresford Avenue and all the intersections around the intersection of SR 44 and US 17-92 operate within their acceptable LOS standard with the exception of five intersections. The four include the signalized intersection at SR 44 and US 17-92, and the four unsignalized intersections at Wisconsin Avenue, Ohio Avenue and Amelia Avenue, Howry Avenue and Amelia Avenue, and Voorhis Avenue and Alabama Avenue that were found to operate at LOS F.

Based on the build intersection analysis, the following mainline improvements along SR 44 are recommended.

- Introduce a bi-directional turn lane between SR 15A and Clara Avenue and between Amelia Avenue and Blue Lake Avenue



- Figure 16a



- Figure 16b



- Figure 16c



- Figure 16d



- Figure 16e



- Figure 17a



- Figure 17b



- Figure 17c



- Figure 17d



- Figure 17e



- Figure 18a



- Figure 18b



- Figure 18c



- Figure 18d



- Figure 18e

-
- Provide a four lane typical section along SR 44 between Voorhis Avenue and Kepler Road to receive the dual northbound left turn lanes from Kepler Road onto SR 44
 - Provide a new two lane Beresford Avenue extension from Blue Lake Avenue to Summit Avenue
 - Introduce two lanes in each direction along Beresford Avenue between SR 44 and Summit Avenue to receive the dual westbound left turn lanes from SR 44 onto Beresford Avenue

Based on the recommended mainline improvements and intersection improvements all the intersections along SR 44 and Beresford Avenue are found to operate within their acceptable LOS standard through the design year with the exception of the intersection at US 17-92 and SR 44, which is found to operate at LOS F.

The HCS printouts for the opening year 2005 No-Build and Build intersection analysis are included in Appendix F and G respectively. The HCS printouts for the mid design year 2015 No-Build and Build intersection analysis are included in Appendix H and I respectively. The HCS printouts for the design year 2025 No-Build and Build intersection analysis are included in Appendix J and K respectively.

ROADWAY OPERATIONAL ANALYSIS

The roadway operational level of service analyses was performed by comparing the directional design hour volumes against the directional design hour capacities. The directional design hour capacities for SR 44 and Beresford Avenue were obtained using ART_TAB spreadsheets. The directional design hour capacities for all other roadway segments including US 17-92 were obtained from Tables 5-1 through 5-3 of 1998 FDOT Level of Service Handbook based on the functional classification identified by FDOT, Volusia County, and the City of DeLand.

No Build

The directional design hour volumes shown in Figures 9a through 9e were compared against the directional design hour capacities and the resulting roadway level of service is shown in Tables 7, 8, and 9 for the No-Build condition for the opening year 2005, mid design year 2015, and the design year 2025.

Table 7

Table 7 continued

Table 7 continued

Table 7 continued

Table 8

Table 8 continued

Table 8 continued

Table 8 continued

Table 9

Table 9 continued

Table 9 continued

Table 9 continued

Tables 7, 8, and 9 include area type, functional classification, adopted LOS standard and number of lanes for all the roadway segments within the study area.

Based on the [Table 7](#), it can be seen that during the opening year 2005, the roadway segments along SR 44 between Clara Avenue and Garfield Avenue operate at LOS E. Table 7 also shows that all the remaining roadway segments along SR 44 and all the roadway segments along Beresford Avenue are found to operate within their acceptable LOS standard. Amelia Avenue between Euclid Avenue and south of Beresford is found to operate at LOS F. US 17-92 between Indiana Avenue and Voorhis Avenue is found to operate at LOS E.

SR 44 between SR 15A and Hill Avenue is designated as a constrained facility by Volusia County and the City of DeLand. US 17-92 between Beresford Avenue and Plymouth Avenue is designated as a constrained facility by Volusia County. Also, US 17-92 between SR 15A and Plymouth Avenue is designated as a backlogged facility by both Volusia County and the City of DeLand. By designating the roadways as constrained or backlogged, the City of DeLand and Volusia County allows maximum acceptable LOS as LOS E.

Based on Tables 8 and 9, it can be seen that during the mid design year 2015 and design year 2025, under the no build conditions, the roadway segments along SR 44 between Clara Avenue and Garfield Avenue worsens to LOS F. Additionally SR 44 between Voorhis Avenue and Summit Avenue is found to operate at LOS F during the design year 2025. Tables 8 and 9 also show that all the remaining roadway segments along SR 44 and all the roadway segments along Beresford Avenue are found to operate within their acceptable LOS standard. Amelia Avenue between Howry Avenue and south of Beresford is found to operate at LOS F during the mid design year 2015 and design year 2025. Also Amelia Avenue north of Ohio Avenue is found to operate at LOS F during the design year 2025. US 17-92 between Wisconsin Avenue and Howry Avenue and between Howry Avenue and Beresford Avenue is found to operate at LOS E and F respectively during the mid design year 2015 and design year 2025. Additionally US 17-92 between SR 44 and Howry Avenue is found to operate at LOS F during the design year 2025.

The roadway LOS for all other roadways for the opening year 2005, mid design year 2015, and the design year 2025 are also shown in Tables 7, 8, and 9 respectively for the No-Build scenario. The roadway LOS analysis for the No-Build scenario indicates that sections of SR 44, US 17-92, and Amelia Avenue are operating below their acceptable LOS due to increased traffic volumes, absence of intersection improvements (turn lane improvements) thereby creating the need for higher green time, and need of additional capacity especially west of Summit Avenue.

Build

The directional design hour volumes shown in Figures 4a through 4e were compared against the directional design hour capacities and the resulting roadway level of service is shown in Tables 10, 11, and 12 for the Build condition for the opening year 2005, mid design year 2015, and the design year 2025. Tables 10, 11, and 12 include area type, functional classification, adopted LOS standard and number of lanes for all the roadway segments within the study area.

Based on the [Table 10](#), it can be seen that during the opening year 2005, only the roadway segments along SR 44 between Clara Avenue and Florida Avenue and between Alabama Avenue and Garfield Avenue operate at LOS E. Table 10 also shows that all the remaining roadway segments along SR 44 and all the roadway segments along Beresford Avenue are found to operate within their acceptable LOS standard. Amelia Avenue between Euclid Avenue and south of Beresford is found to operate at LOS F. US 17-92 between Indiana Avenue and Voorhis Avenue is found to operate at LOS E.

As mentioned in the No Build section, SR 44 between SR 15A and Hill Avenue is designated as a constrained facility by Volusia County and the City of DeLand. US 17-92 between Beresford Avenue and Plymouth Avenue is designated as a constrained facility by Volusia County. Also, US 17-92 between SR 15A and Plymouth Avenue is designated as a backlogged facility by both Volusia County and the City of DeLand. By designating the roadways as constrained or backlogged, the City of DeLand and Volusia County allows maximum acceptable LOS as LOS E.

Table 10

Table 10 continued

Table 10 continued

Table 10 continued

Table 11

Table 11 continued

Table 11 continued

Table 11 continued

Table 12

Table 12 continued

Table 12 continued

Table 12 continued

Based on Tables 11 and 12, it can be seen that during the mid design year 2015 and design year 2025, under the build conditions, the roadway segments along SR 44 between Clara Avenue and Garfield Avenue operate at LOS E which is acceptable based on the roadway being designated as constrained facility by both the Volusia County and the City of DeLand.

Tables 11 and 12 also show that all the remaining roadway segments along SR 44 and all the roadway segments along Beresford Avenue are found to operate within their acceptable LOS standard. Amelia Avenue between Howry Avenue and south of Beresford is found to operate at LOS F during the mid design year 2015 and design year 2025. Also Amelia Avenue north of Ohio Avenue is found to operate at LOS F during the design year 2025. US 17-92 between Wisconsin Avenue and Howry Avenue and between Howry Avenue and Beresford Avenue is found to operate at LOS E and F respectively during the mid design year 2015 and design year 2025. Additionally US 17-92 between SR 44 and Howry Avenue is found to operate at LOS F during the design year 2025.

The roadway LOS for all other roadways for the opening year 2005, mid design year 2015, and the design year 2025 are also shown in Tables 10, 11, and 12 respectively for the Build scenario. The roadway LOS analysis for the Build scenario clearly indicates that the extension of Beresford Avenue between Blue Lake and SR 44 and the mainline improvements and intersection improvements along SR 44 helps to maintain acceptable LOS along SR 44 through the design year 2025. Sections of US 17-92, and Amelia Avenue are operating at LOS F due to increased traffic volumes.

The ART-TAB printouts for the opening year 2005 No-Build and Build are included in Appendix L and M respectively. The ART-TAB printouts for the mid design year 2015 No-Build and Build are included in Appendix N and O respectively. The ART-TAB printouts for the design year 2025 No-Build and Build are included in Appendix P and Q respectively.

SECTION 7 - CORSIM SIMULATION ANALYSIS

The SR 44 PD&E study uses CORSIM software as a tool to compare the traffic operations among various improvement strategies for future year conditions. CORSIM is a microscopic computer software that simulates individual vehicular behavior in response to real world roadway and traffic conditions through a street network. This microscopic feature enables CORSIM to provide a more realistic assessment of the traffic operations that is not available in other software programs such as TRANSYT-7F and HCS.

This section describes the process and required data used to develop the CORSIM models and also documents detail comparisons of measurement of effectiveness, such as average speed and delay time, among the following four scenarios for future years:

- Opening Year 2005: No- Build & Build
- Design Year 2025: No- Build & Build

The CORSIM models for these future scenarios were developed based on the validated CORSIM model, which was developed for the existing year 2001 condition. This validated model was documented in an earlier report titled "Final Technical Memorandum, Phase 1 – Existing Traffic Conditions Analysis, December 2001, Financial Project ID: 404646-1".

The study limits in the future CORSIM models remain the same as in the existing model. They include SR 44 from SR 15A to Kepler Road and the downtown grid from Clara Avenue to Amelia Avenue west to east and from Voorhis Avenue to Ohio Avenue south to north. The downtown grid was included to analyze the traffic circulation with no turning movements allowed at the intersection of US 17-92 and SR 44. Figure 19 is a link-node diagram of the CORSIM model showing all streets and intersections to be studied as part of this PD&E study.

Data Collection

The CORSIM models for the future conditions were developed based on the validated CORSIM model for the existing year 2001 condition. The following paragraphs describe the data used for the future CORSIM models.

Figure 19

Roadway Characteristics

As described previously in this report, there is no programmed or planned improvements within the study limits for CORSIM analysis other than four laning Kepler Road between SR 44 and SR 472 by the year 2015. Therefore, the roadway and intersection information in the No-Build models remain the same as in the existing model, except for 4 lanes on Kepler Road in the Year 2025 No-Build model. Figures 11a through 11e as described previously in this report show the intersection lane configurations and types of traffic control for each intersection for the No-Build conditions.

The HCS analysis, as documented previously in the report, has identified a list of improvements to accommodate the projected traffic by year 2005 and by year 2025. Figures 15a through 15e as described previously in this report show the intersection lane configurations and types of traffic control for each intersection for the Build conditions.

Traffic Volumes

As a second phase of the Design Traffic Technical Memorandum, design hour volumes were developed for the future years including No-Build and Build scenarios. Figures 12a through 12e and Figures 16a through 16e as described previously in this report show the projected turning movement volumes in the No-Build and Build conditions for year 2005. Figures 14a through 14e and Figures 18a through 18e show the projected turning movement volumes in the No-Build and Build conditions for year 2025.

Signal Phasing and Timing

Currently, the signals along SR 44 from Clara Avenue to Amelia Avenue and along US 17/92 from Voorhis Avenue to Wisconsin Avenue are coordinated in a semi-actuated system, with the SR 44/US 17/92 intersection as the master. The system runs at a cycle length of 105 seconds during the p.m. peak hour. All other signalized intersections in the CORSIM model are operating as isolated signals. As described previously in this report, the study used HCS 2000 software to develop the signal phasing and timing for the future year conditions. The printouts of these HCS analysis are included in Appendix. From the HCS analysis, the cycle length for Year 2005 conditions remains as 105 seconds, and increases to 150 seconds for year 2025 conditions. This increase is mainly due to the projected traffic growth in the study area. The Build scenarios for year 2005 and 2025

also included the intersection of SR 44 and Garfield Avenue in the coordinated signal system due to its close proximity to Amelia Avenue.

In addition to the proposed timing, TSPP-Draft software was used to maximize the progression band along SR 44 and US 17/92 in each scenario.

Parking Activities

Parking activities were assumed to remain as in the existing conditions except for the on street parking along SR 44 between Alabama Avenue and Amelia Avenue on the north side. They were recently removed in November, 2001 in connection with the new Volusia County Courthouse. Also few parking spaces were removed in November 2001 along SR 44 on either side of Alabama Avenue to accommodate the left turn lanes on westbound and eastbound approaches at the new signalized intersection of SR 44 and Alabama Avenue. The parking inventory is shown in Figure 20.

Evaluation

The CORSIM analysis was conducted for the future year conditions based on the information as described in the previous section. Prior to the final comparisons and analysis of MOE's, the approach volumes were checked between the input volumes and model volumes. Whenever significant differences occurred on a particular link, source/sink nodes were introduced to ensure that CORSIM model reasonably replicate the projected volumes.

Year 2005

Table 13 provides the summary of MOE's at each intersection for the No-Build and Build scenarios. This table shows that longer delay would be experienced at the intersection of SR 44 at SR 15A, US 17/92, Amelia Avenue, and at Kepler Road in the No-Build condition with no other significant operation deficiencies in the system. The operations at the above mentioned intersections would improve significantly with the recommended improvements in the Build condition, except for the US 17/92 intersection. This is mainly due to right-of-way constraints for geometric improvements.

Figure

20

Table 13

Table 13 continued

Table 13 continued

Table 13 continued

Table 13 continued

Table 13 continued

Table 14 summarizes the system MOE's for SR 44, US 17/92, and for the entire system for the No-Build and Build scenarios. The summary shows that the average speed in the Build scenario is identical to the No-Build with an average speed of 24 mph to 25 mph along SR 44 and about 18 mph along US 17/92. The average speed for the entire system in the Build scenario (20.1 mph) is slightly better than the No-Build scenario (19.1 mph). The increase in the average speed does not appear to be significant. This is mainly because that the projected volumes (both No Build and Build) within the study area are close to the existing capacity in the system.

Year 2025

Table 15 provides the summary of MOE's at each intersection for the No-Build and Build scenarios. This table shows that extremely long delay would be experienced at the intersection of SR 44 at SR 15A, US 17/92, Alabama Avenue, Amelia Avenue, Garfield Avenue, and at Kepler Road in the No-Build condition. The operations at the above mentioned intersections would improve significantly with the recommended improvements in the Build condition, except for the US 17/92 intersection. Again, this is mainly due to right-of-way constraints for geometric improvements at this intersection.

Table 16 summarizes the system MOE's for SR 44, US 17/92, and for the entire system for the No-Build and Build scenarios. The summary shows that the average speed along SR 44 improves from 13.5 mph to 21.4 mph in the Build scenario in the eastbound direction, the average speed along SR 44 improves from 18.8 mph to 21.3 mph in the Build scenario in the westbound direction, and the entire system speed improves from 12.6 mph to 16.8 mph in the Build scenario. The average speed along US 17/92 is identical to the No-Build with an average speed of 14 mph to 15 mph. The increases in the average speed along SR 44 in the build scenario is significant due to the various mainline and intersection improvements performed along SR 44 and due to the traffic diversion resulting from the new two lane Beresford Avenue Extension from Blue Lake Avenue and SR 44.

Table 14

Table 15

Table 15 continued

Table 15 continued

Table 15 continued

Table 15 continued

Table 15 continued

Table 16

SECTION 8 - RECOMMENDED IMPROVEMENTS

Based on evaluation of operating conditions for the No-Build and Build conditions, it is recommended that the proposed through lanes and intersection geometries, as shown in [Figures 15a through 15e](#) be provided for SR 44 and Beresford Avenue. Based on the build intersection analysis, the following mainline improvements along SR 44 are recommended.

- Introduce a bi-directional turn lane between SR 15A and Clara Avenue and between Amelia Avenue and Blue Lake Avenue
- Provide a four lane typical section along SR 44 between Voorhis Avenue and Kepler Road to receive the dual northbound left turn lanes from Kepler Road onto SR 44
- Provide a new two lane Beresford Avenue extension from Blue Lake Avenue to Summit Avenue
- Introduce two lanes in each direction along Beresford Avenue between SR 44 and Summit Avenue to receive the dual westbound left turn lanes from SR 44 onto Beresford Avenue

In addition to the mainline improvements, the following intersection improvements are recommended and are shown in [Figures 15a through 15e](#). The improvements include:

- Signalize the intersection of SR 44 and CR 42 by the mid design year 2015
- Signalize the intersection of SR 44 and Grand Avenue by the opening year 2005
- Signalize the intersection of SR 44 and Hazed Road / Fatio Road by the opening year 2005
- Introduce an additional eastbound Left turn lane, an eastbound right turn lane, a westbound right turn lane and a southbound right turn lane at the intersection of SR 44 and SR 15A
- Signalize the intersection of SR 44 and Boundary Avenue by the mid design year 2015
- Signalize the intersection of SR 44 and Adelle Avenue by the mid design year 2015
- Introduce a southbound Left turn lane at the intersection of SR 44 and Clara Avenue

-
- Eliminate the Offset at the intersection of SR 44 and Florida Avenue and thereby eliminate Split Phase Operation
 - Introduce a southbound and northbound Left turn lane and a southbound right turn lane at the intersection of SR 44 and Amelia Avenue and thereby eliminate Split Phase Operation
 - Signalize the intersection of SR 44 and Garfield Avenue by the opening year 2005 and introduce a eastbound and westbound left turn lane as part of the bi-directional lane improvement
 - Signalize the intersection of SR 44 and Boston Avenue by the opening year 2005
 - Signalize the intersection of SR 44 and Blue Lake Avenue by the opening year 2005 and introduce a eastbound and westbound left turn lane as part of the bi-directional lane improvement
 - Introduce an additional northbound Left turn lane at the intersection of SR 44 and Kepler Road
 - Provide a four lane typical section along SR 44 between Voorhis Avenue and Kepler Road to receive the dual northbound left turn lanes from Kepler Road onto SR 44
 - Introduce an additional westbound Left turn lane at the intersection of SR 44 and Beresford Avenue
 - Introduce an additional westbound Left turn lane by modifying the shared left/through/right turn lane at the intersection of US 17-92 and Beresford Avenue
 - Signalize the intersection of Beresford Avenue and Alabama Avenue by the design year 2025
 - Introduce a southbound left turn lane and right turn lane at the intersection of Amelia Avenue and Beresford Avenue
 - Signalize the intersection of Beresford Avenue and Garfield Avenue by the design year 2025
 - Introduce an exclusive left turn lane and a shared through/right turn lane on all the approaches at the intersection of Beresford Avenue and Blue Lake Avenue
 - Introduce an exclusive left turn lane and a shared through/right turn lane on the eastbound and westbound approaches at the intersection of Beresford Avenue and Kepler Road
 - Introduce two lanes in each direction along Beresford Avenue between SR 44 and Summit Avenue to receive the dual westbound left turn lanes from SR 44 onto Beresford Avenue

-
- Signalize the intersection of Beresford Avenue and Summit Avenue by the design year 2025

The proposed improvements provide acceptable LOS along SR 44 and Beresford Avenue, with the exception of the intersection at SR 44 and US 17-92, which is found to operate at LOS F.

Tables 17 and 18 provide a summary of ideal storage length requirements for the signalized intersections along SR 44 and Beresford Avenue respectively. 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.

In addition to the roadway geometry listed herein, the use of pedestrian and bicycle features should be evaluated during the final design process. The use and implementation of these features should be coordinated with the local government agencies.

Forecasted volumes were used to perform the 18 kip Equivalent Single Axle Load (ESAL) analysis. This analysis was performed for four locations along SR 44: between CR 42 and SR 15A, between SR 15A and Garfield Avenue, between Garfield Avenue and Kepler Road, and between Beresford Avenue and I-4. THE ESAL analysis was also performed for three locations along Beresford Avenue: between SR 15A and Blue Lake Avenue, between Blue Lake Avenue and Summit Avenue, and between Summit Avenue and SR 44. The ESAL spreadsheets are included in Appendix R.

Table 17

Table 17 continued

Table 17 continued

Table 18

Table 18 continued

APPENDIX

**FINAL TECHNICAL MEMORANDUM
PHASE 2 – FUTURE TRAFFIC CONDITIONS
ANALYSIS**

**For SR 44 (from CR 42 to West Ramps of I-4)
PD&E Study
Volusia County, Florida**

Financial Project ID: 404646-1
FAP No.: 3401 034 P

Final Prepared by:
GMB Engineers & Planners, Inc.
As a Subconsultant to
Wilbur Smith Associates
June 2002

For
FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT Five - DeLAND

CERTIFICATION

By

GMB ENGINEERS & PLANNERS, INC.

Financial Project ID: 404646-1

I, Babuji Ambikapathy, Florida P.E. Number 50689, have prepared and reviewed the Design Traffic and 18 KIP Equivalent Single Axle Load estimates for the above referenced FLORIDA DEPARTMENT OF TRANSPORTATION project. I have specifically followed the "Design Traffic (Traffic Forecasting and 18 KIP Equivalent Single Axle Loading) Procedure" as adopted by the Florida Department of Transportation. Based on traffic count information, general data sources, and other pertinent information, the Design Traffic and 18 KIP Equivalent Single Axle Load estimates have been prepared using current traffic engineering, transportation planning, and Florida Department of Transportation practices and procedures.

Babuji Ambikapathy, P.E. # 50689

GMB Engineers & Planners, Inc.

Date

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