Preliminary Engineering Analysis
CR 44 Corridor Study
From US 441 to CR 44B

CR 44 Corridor Transportation Study

FOR

BY

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1.0 Background

Lake County, in conjunction with the City of Eustis, City of Leesburg, and the City of Mount Dora has initiated a Corridor Transportation Study for CR 44 from the junction of CR 44 and SR 500/US 441 continuing east to the junction of CR 44 and SR 44, then continuing east on SR 44 to the intersection of SR 44 and CR 44B. The project, initiated in January 2002, was complete in July of 2003.

It is anticipated that CR 44 will be a critical element in the transportation network for Central Lake County. CR 44 provides an alternative route to SR 500/US 441, as well as, serve as the impetus for redevelopment and economic enhancement for areas adjacent to the Corridor. Several agencies were brought together to form a Study Advisory Group to assist in the completion of the CR 44 Corridor Study. The Study Advisory Group is composed of the following agencies:

- Lake County;
- City of Eustis;
- City of Leesburg; and,
- City of Mount Dora.

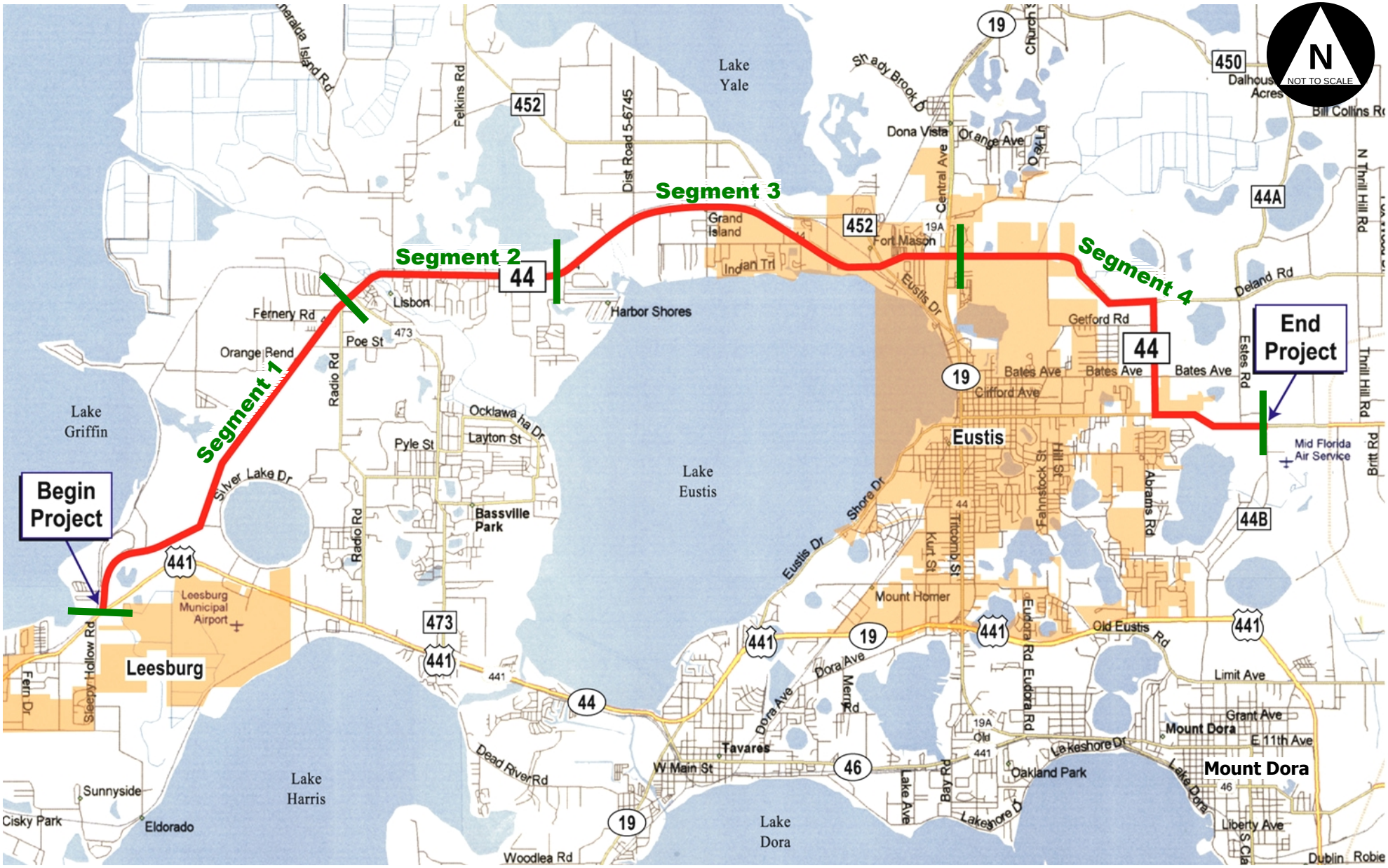
The CR 44 Corridor is approximately 15 miles in length and has varying characteristics. Based on discussions with Lake County and the Study Advisory Group, the Corridor was divided into four analysis segments based on adjacent land use, traffic characteristics, and roadway geometry to facilitate completion of the study. The resulting four study segments, divided to facilitate clear presentation, are as follows:

- Segment 1 - US 441 to Radio Road (approx. 4.0 miles)
- Segment 2 - Radio Road to Harbor Shores Road (approx. 2.5 miles)
- Segment 3 - Harbor Shores Road to SR 19 (approx. 4.5 miles)
- Segment 4 – SR 19 to CR 44B (approx. 4.0 miles)

The project location and study segments are displayed in Figure 1.0.

1.1 Purpose

The purpose of this Report is to provide an overview of the process and results of the Alternatives Analysis for the CR 44 Corridor Transportation Study. This Report reviews and presents: traffic forecasts, transportation strategies, alternatives development, evaluation of alternatives, and recommendations. This report also provides an overview of the Public Involvement Process that was utilized in order to build consensus on the recommendations.



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Project Location Map

CR 44: US 441 to CR 44B

1.2 Alternative Strategies Development Process

After the existing conditions of the CR 44 Corridor were identified, collected, and analyzed, the alternative strategies development process began. The culmination of the data collection efforts was the publication of the *Data Collection Report* in December 2002. The first step in the alternative strategies development process was to identify potential strategies that would address the Corridor deficiencies identified in the *Corridor Analysis Report*, dated March 2003. Once these strategies were identified and documented in the *Development of Strategies for Strategy Screening and Development of Alternatives for Alternative Screening* dated June 2003, specific alternatives incorporating applicable strategies were developed.

The major applicable strategies included the following: bicycle/pedestrian improvements; intersection improvements; and, additional mainline arterial lanes (i.e., four-laning CR 44). The next step was to develop a set of performance measures that would evaluate each alternative. Eighteen Performance measures were identified for evaluating each alternative. Each alternative was evaluated using the performance measures and then ranked. The end result of this process is the recommendations discussed in Section 10 of this Report.

2.0 Public Involvement Program

A comprehensive public involvement program was developed to assist in the identification of transportation concerns along the CR 44 Corridor. One of the major goals of the study was to develop, evaluate, and implement solutions that best serve the public interest. This can only be achieved with a proactive public involvement campaign.

The public involvement program was designed to further community understanding of the study area needs and potential solutions as well as involve the public in the development of improvement alternatives at each step in the decision making process. Through this process, the Project Advisory Group developed an alternative that both meets the transportation and economic needs of the community and is supported by stakeholders within the community.

The following public involvement activities, listed in Table 2.0, were conducted as part of this study.

Table 2.0
Public Involvement Summary

Activity	Date
Newsletter #1	April 2, 2002
Public Workshop #1	April 10-11, 2002
Newsletter #2	August 1, 2002
Public Workshop #2	August 15, 2002
Newsletter #3	January 9, 2003
Public Workshop #3	January 23, 2003
Newsletter #4	April 11, 2003
Public Workshop #4	April 24, 2003
Web Site	Updated Throughout the Project

In addition to the public meetings, there were:

- 5 presentations to the Board of County Commissioners (BCC)
- 4 meetings with the Citizens Advisory Community (CAC)
- 4 meetings with the Technical Advisory Community (TAC)
- 5 meetings with the Study Advisory Group

A detailed summary of the public involvement can be found in the *Public Involvement Program Report*, dated June 2003.

3.0 Existing Conditions

This section documents the current conditions along the CR 44 Study Corridor. The following information was collected to facilitate the existing conditions analyses:

- Turning Movement Counts;
- Approach Counts;
- Historical Average Daily Traffic (ADT) Counts;
- Crash History;
- Typical Sections;
- Multi-Modal Transportation;
- Land Use; and,
- Drainage.

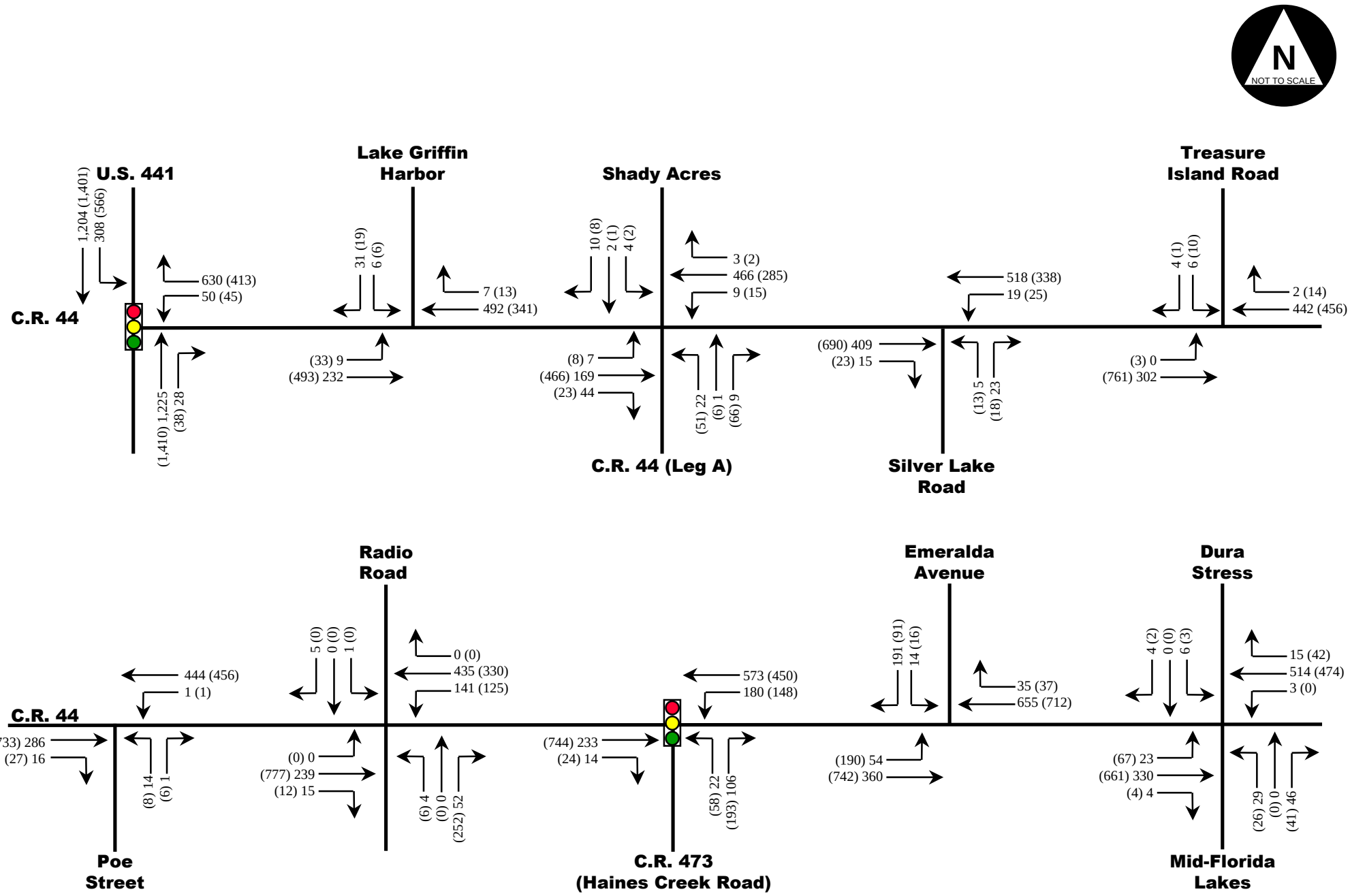
Detailed documentation of the existing conditions data collection is available in the *CR 44 Corridor Study Data Collection Report*, dated December 2002, also prepared by TEI.

3.1 Turning Movement Counts

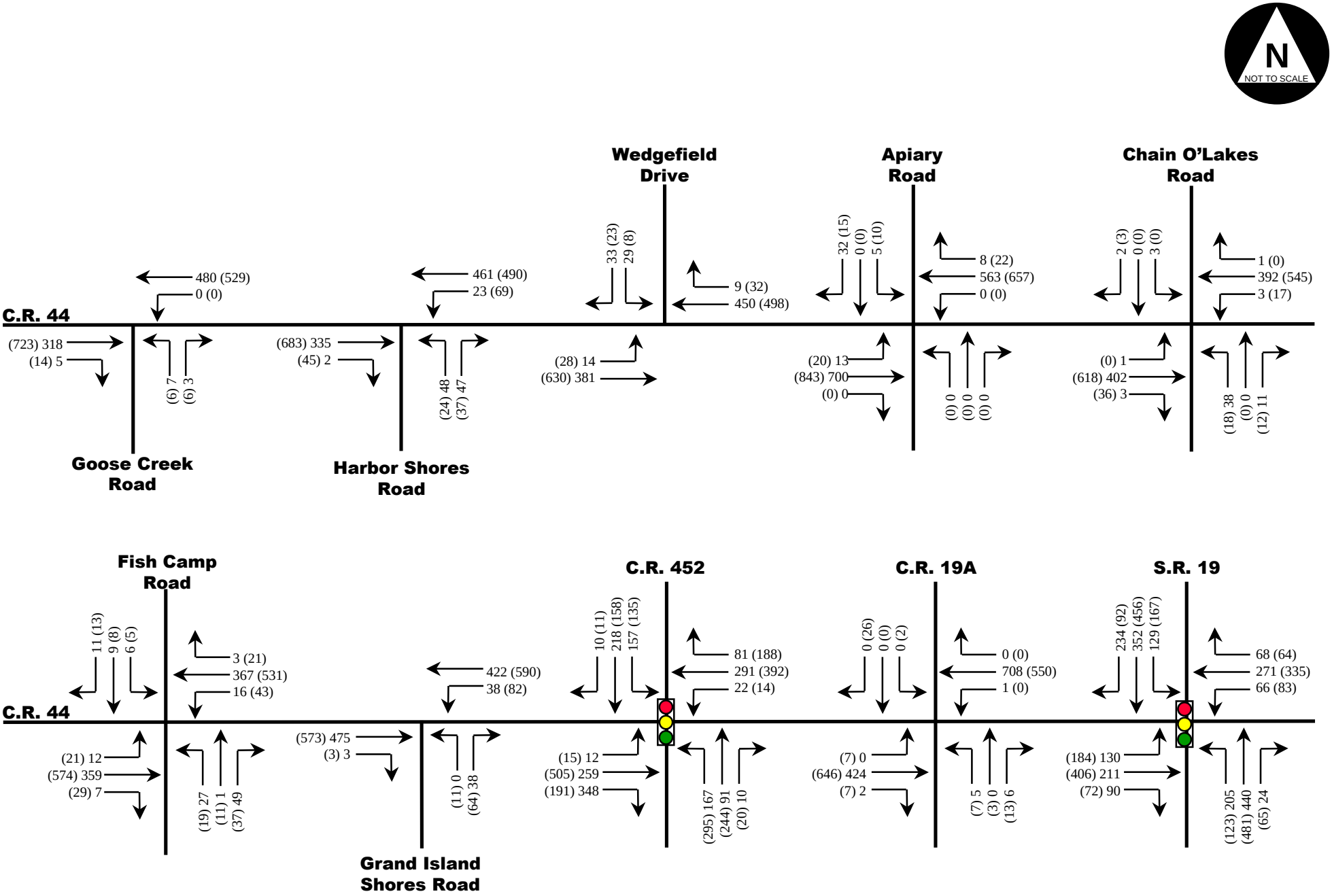
Roadways identified for traffic data collection activities were selected based on field volumes, information provided by Lake County, and coordination with the Study Advisory Group. Traffic count information was obtained for the CR 44 Corridor during the peak travel periods (February 2002, 7:00 AM – 9:00 AM, 4:00 PM - 6:00 PM) to serve as an input into the traffic operations analysis and planning process. Turning movement counts were collected at the following intersections along CR 44:

- US 441;
- Lake Griffin Harbor;
- CR 44 (Leg A)/Shady Acres Road;
- Silver Lake Road;
- Poe Street;
- Radio Road;
- CR 473 (Haines Creek Road);
- Emeralda Avenue;
- Goose Creek Road;
- Harbor Shores Road;
- Wedgefield Drive;
- Apiary Road;
- Chain O' Lakes Road;
- Fish Camp Road;
- Grand Island Shores Road;
- CR 452;
- CR 19A;
- SR19;
- Hicks Ditch Road (May 2002);
- CR 44A;
- Bates Avenue (August 2002);
- SR 44; and,
- CR 44B/SR 44.

Turning movement counts are displayed in Figure 3.1 and complete traffic count information is presented in Appendix A.



TEI Engineers & Planners	Figure No: 3.1	Page No: 6	(10) 20 (500) 250 (90) 50 - (PM) AM Turning Movement Volume	*2002 Existing Peak Hour Turning Movement Volumes* **CR 44: US 441 to CR 44B**



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(10) 20
(500) 250
(90) 50
- (PM) AM Turning Movement Volume

2002 Existing Peak Hour Turning Movement Volumes

CR 44: US 441 to CR 44B

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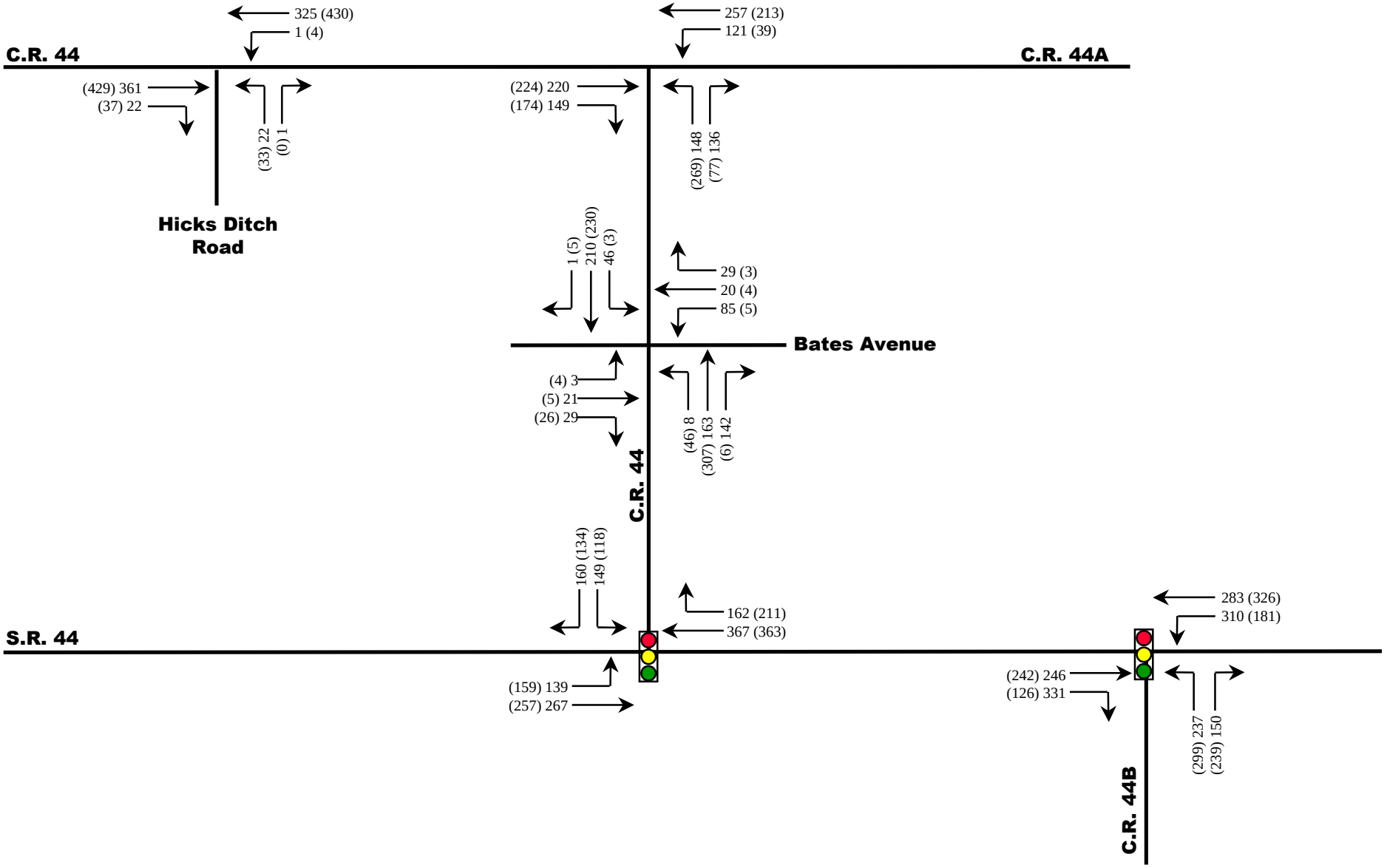


TEI Engineers & Planners	Figure No: 3.1	Page No: 8	(10) 20 (500) 250 (90) 50 - (PM) AM Turning Movement Volume	*2002 Existing Peak Hour Turning Movement Volumes* **CR 44: US 441 to CR 44B**

3.2 Approach Counts

To support the analysis of major sidestreets, twenty-four hour approach counts were collected in addition to turning movement counts. Twenty-four hour approach count locations include:

- US 441;
- CR 44 (Leg A)/Shady Acres Road;
- Silver Lake Road;
- Treasure Island Road;
- Poe Street;
- Radio Road;
- CR 473 (Haines Creek Road);
- Goose Creek Road;
- Harbor Shores Road;
- Chain O' Lakes Road;
- Fish Camp Road
- Grand Island Shores Road;
- CR 452;
- CR 19A;
- SR 19;
- CR 44A;
- SR 44; and,
- CR 44B.

Twenty-four hour approach count information is presented in Appendix B.

3.2 Historical Traffic Counts

Lake County maintains an extensive traffic data collection program and TEI was able to capitalize on these data sets as part of this study. The following Lake County count stations were used to support this study:

- Station 0031 - 0.55 miles North of US 441;
- Station 0029 - 0.10 miles South of Treasure Island Road;
- Station 0119 - 0.07 miles East of CR 473;
- Station 0045 - 0.39 miles West of Grand Island Shores;
- Station 0048 - 0.15 miles West of SR 19;
- Station 0047 - 0.14 miles East of SR 19;
- Station 0080 - 0.13 miles West of CR 44 & CR 44A; and,
- Station 0082 - 0.10 mile North of SR 44.

This information was used to assist in: the level of service analysis for segments of the CR 44 Corridor; the validation of travel demand model volumes; and, serve as a baseline for developing future traffic volumes. The historical traffic counts for the count stations are summarized in Table 3.3

Table 3.3
Historical Traffic Counts

	Section 1		Section 2	Section 3		Section 4		
	Sta. 0031	**Sta. 0029**	**Sta. 0119**	**Sta. 0045**	**Sta. 0048**	**Sta. 0047**	**Sta. 0080**	**Sta. 0082**
2002	9,629	9,954	16,123	12,114	13,244	9,723	8,738	7,002
2001	8,874	8,399	15,445	12,080	12,275	9,645	8,931	7,284
2000	8,923	7,365	15,563	10,983	10,125	9,807	8,370	6,379
1999	8,479	7,891	15,872	10,490	9,635	8,472	8,246	6,788
1998	8,430	7,978	13,677	11,704	11,489	8,473	8,076	6,717
1997	8,126	6,866	13,902	11,509	9,929	7,697	6,552	5,761
1996	7,979	7,685	13,582	9,457	7,642	6,666	6,192	5,479
1995	7,936	7,331	*N/A*	10,426	8,154	6,009	5,896	5,037

3.4 Crash History

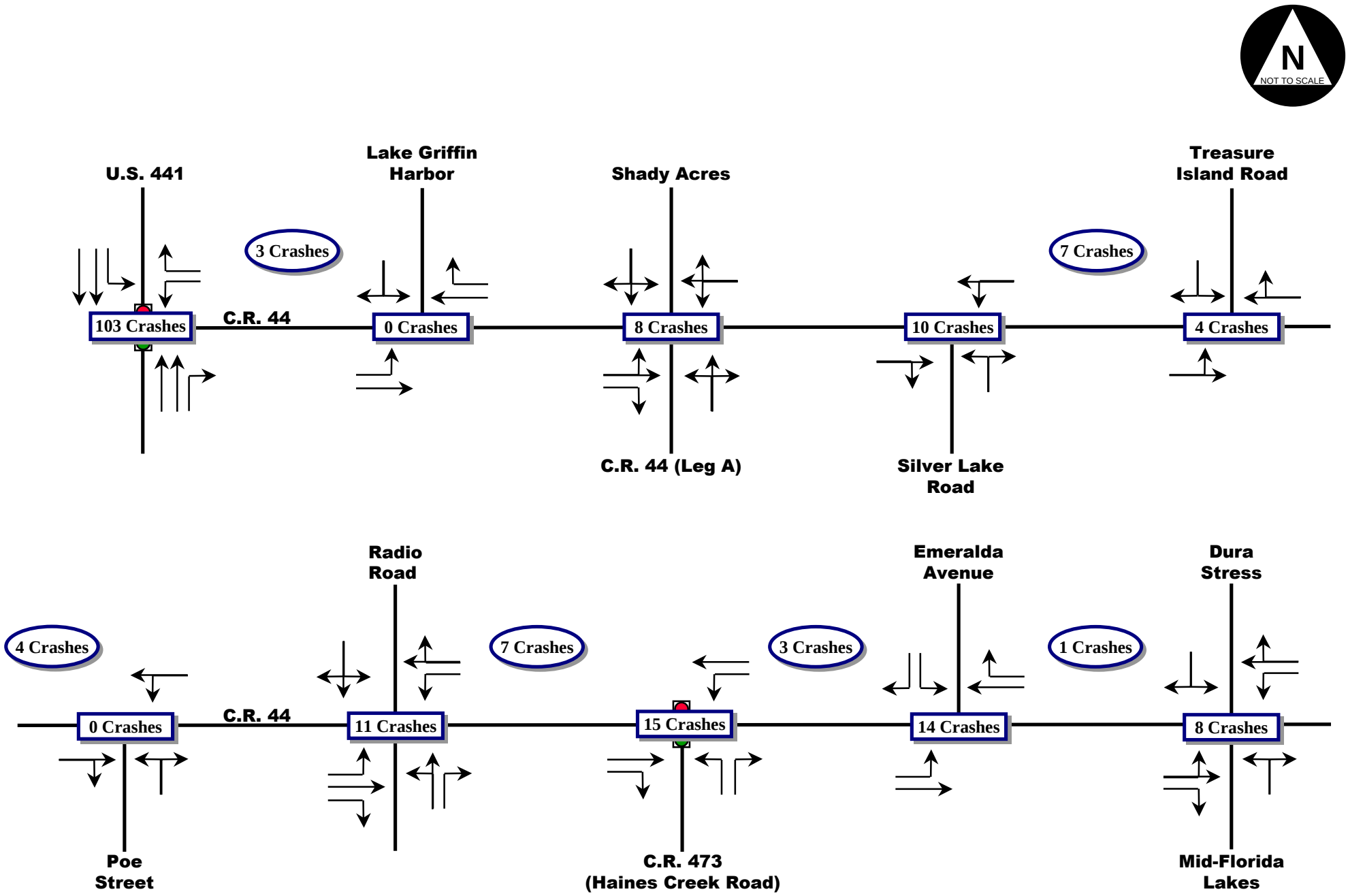
Three years of collision data was reviewed to determine potential safety deficiencies along the Corridor. The collision data was provided by Lake County and will serve as key input to the development of improvement strategies.

The study area has experienced a rather high number of crashes in recent years - 403 crashes over the past three (3) years. Figure 3.4 provides a graphical summary of the crash occurrences and their locations. Also included in Figure 3.4 are the intersection geometries. Tables in Appendix C provide a detailed evaluation of the crash cause, contributing factors, and injury/damage tabulations.

Table 3.4 presents a summary of crashes occurring within each of the study segments.

Table 3.4
Crash History by Segment

Segment	Crashes
Segment 1 (US 441 to just west of Radio Road)	139
Segment 2 (Radio Road to just west of Harbor Shores Road)	73
Segment 3 (Harbor Shores Road to SR 19)	132
Segment 4 (Just east of SR 19 to CR 44B)	59



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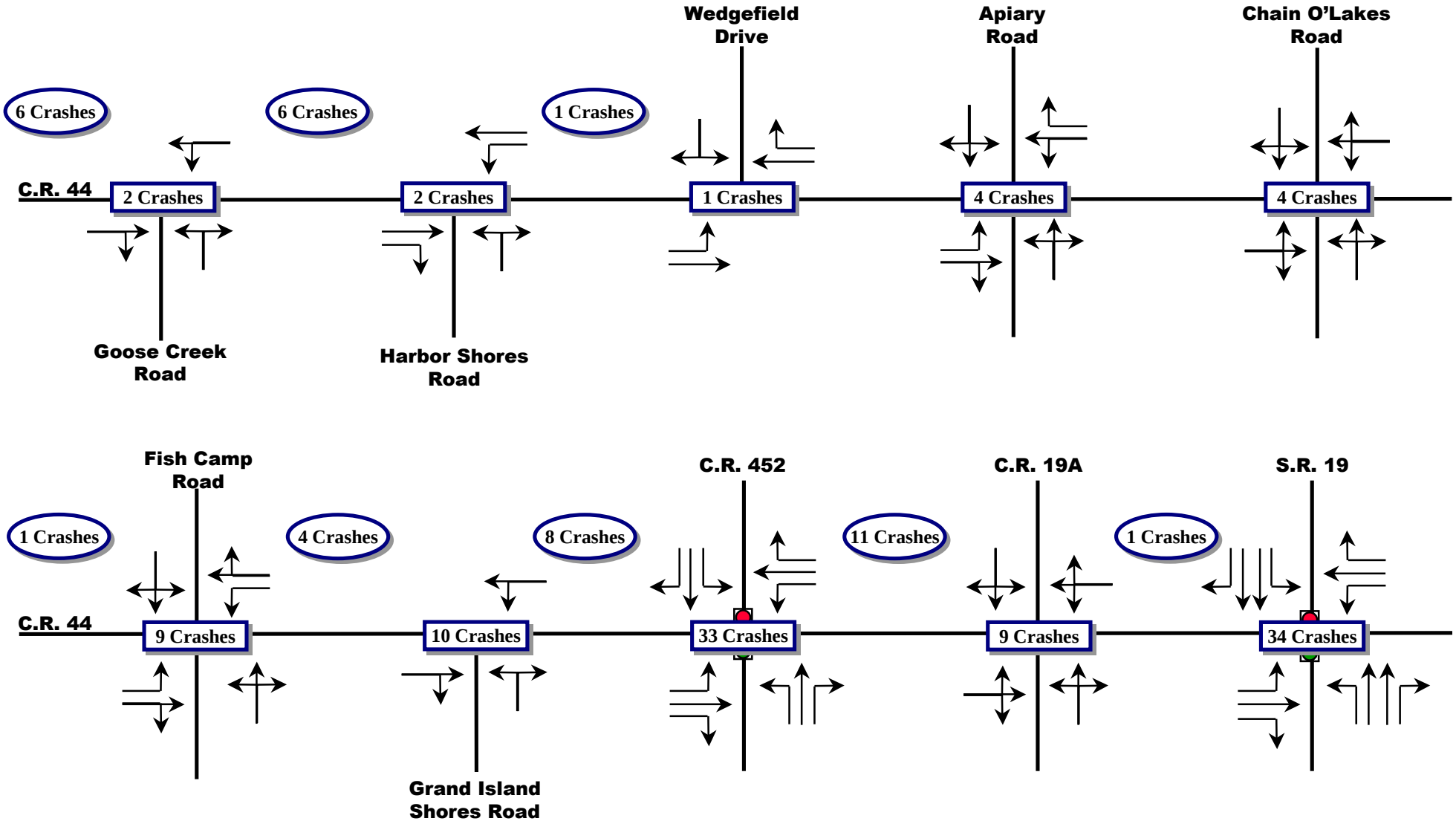
- Link Crashes
- Intersection Crashes

Crash Data - 1999, 2000, & 2001

Crash History

CR 44: US 441 to CR 44B



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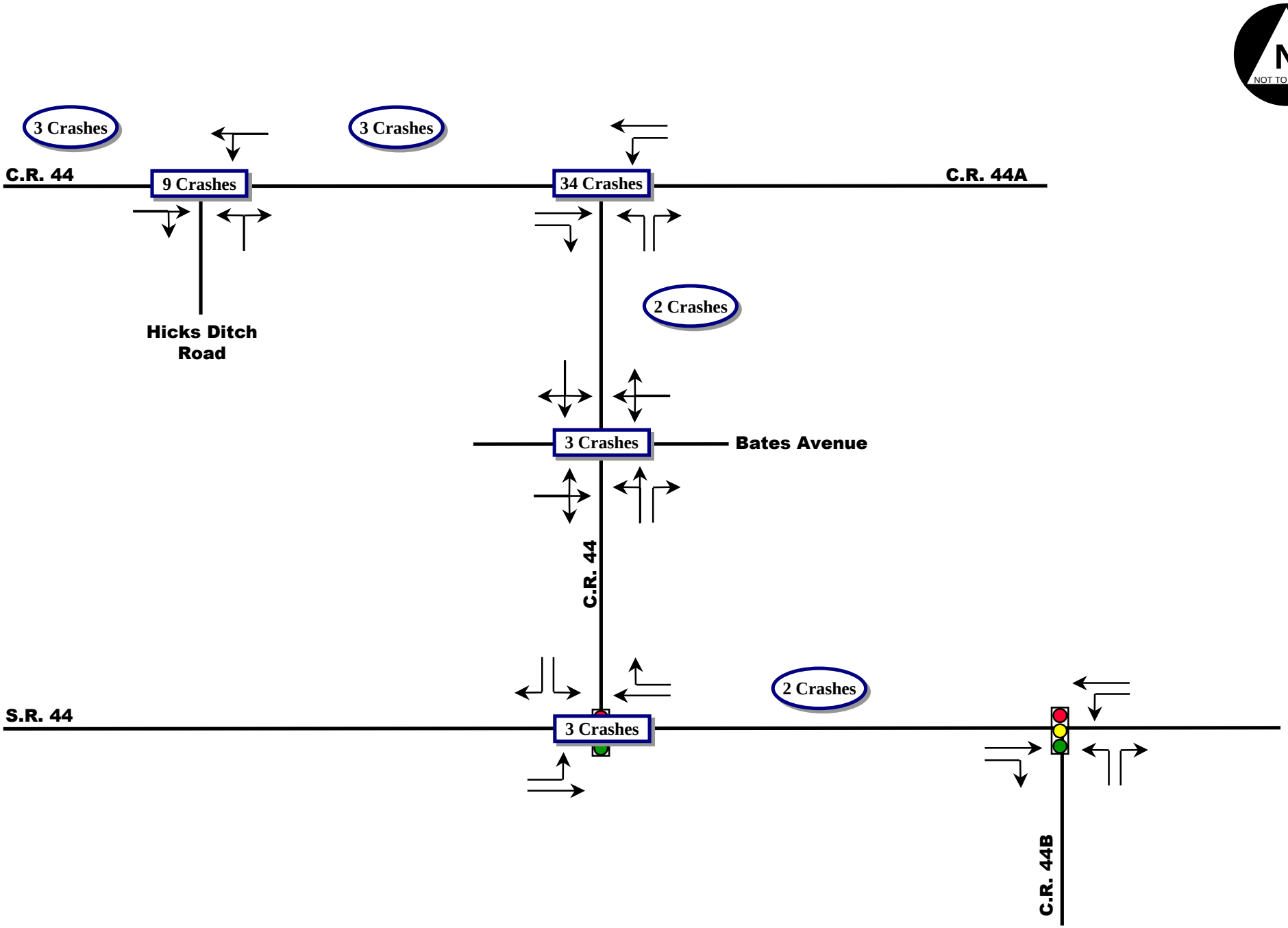
- Link Crashes
- Intersection Crashes

Crash Data - 1999, 2000, & 2001

Crash History

CR 44: US 441 to CR 44B



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- Link Crashes
- Intersection Crashes

Crash Data - 1999, 2000, & 2001

Crash History

CR 44: US 441 to CR 44B

Locations experiencing greater than 10 crashes over the three year period were flagged for potential safety deficiencies. As part of this study, these locations were field reviewed by an engineer and short and long term enhancements developed to address any deficiencies. The intent of this study is to address these areas with short and long term improvements. A benefit-cost analysis was performed on these to determine whether or not Federal Safety funds could be pursued to construct the proposed improvements.

Several locations experienced at least 10 crashes over the three year analysis period. Some locations with a high crash experience were:

- US 441;
- CR 473;
- Emeralda Avenue;
- CR 452;
- SR 19; and,
- CR 44A.

Recurring crash types at these locations include rear end, angle, left turn, and sideswipe crashes. Traffic congestion, pavement condition, lighting and permissive left turn traffic signal phasing tend to contribute to these crash types.

3.5 Typical Sections

An important aspect of the existing conditions analysis is to identify and review existing typical sections along the Corridor. Typical section information includes:

- Right of Way;
- Lane Widths;
- Bicycle and Pedestrian Facilities; and,
- Drainage Facilities.

This information will be used to analyze the roadway operating conditions and capacity, to determine if the existing typical section can accommodate existing and future traffic volumes along the Corridor. This information will be used as an input into the operational analysis and also serve as a critical factor when evaluating potential improvement alternatives.

CR 44 is currently classified as a ***major collector*** roadway in the Lake County Model. Due to the growth and development within the Corridor area, over the past 5-10 years it is likely that CR 44 functions as an arterial roadway. This functional class change is supported by daily traffic volumes (7,000-16,000) and posted travel speeds (45-55 mph). Based on this functional class change the existing typical section along CR 44 would be considered a sub standard rural cross section that is undivided. A majority of the

Corridor does not provide a paved shoulder or a curb and gutter drainage system. There are a few areas along the Corridor where sidewalk facilities exist. The typical travel lane width for the Corridor is twelve-feet wide and consists of asphalt pavement.

The existing right of way along the Corridor ranges from 66 to 100 feet. Generally the right of way (ROW) along the Corridor can be described as follows:

- CR 44
  - 66 feet from US 441 to CR 452
  - 100 feet from CR 452 to CR 44A
  - 66 feet from CR 44A to SR 44
- SR 44
  - 100 feet from CR 44 to CR 44B

The right of way and existing typical sections are shown in Figure 3.5. The ROW information will be used to: assist in the evaluation of alternatives; identify potential impacts associated with improvement alternatives; and, play a key role in the development of cost estimates.

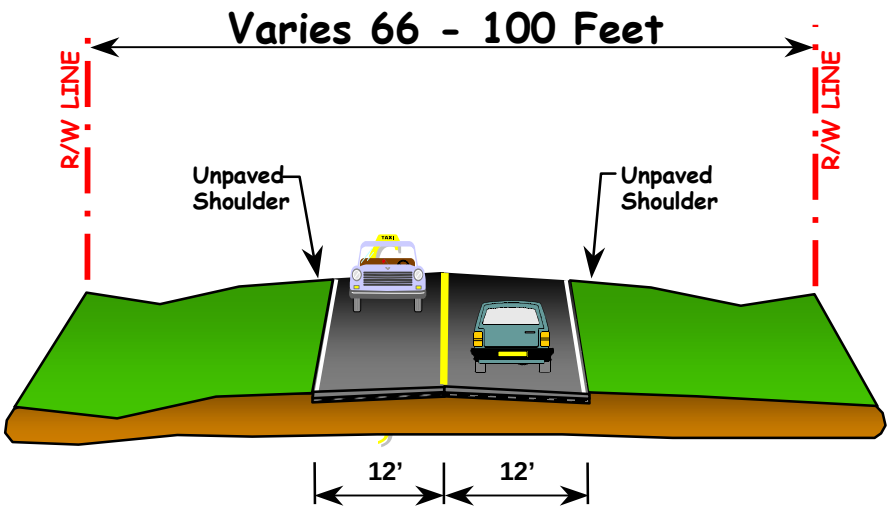
3.6 Multi-Modal Transportation

Transit services are provided by Lake County Transit and consist of a single route serving US 441. No fixed route service is currently provided along the CR 44 Corridor. More recently, Lake County Transit has been operating in a demand response capacity due to low ridership on the single existing fixed route. No expansion of fixed route service is anticipated in the near future.

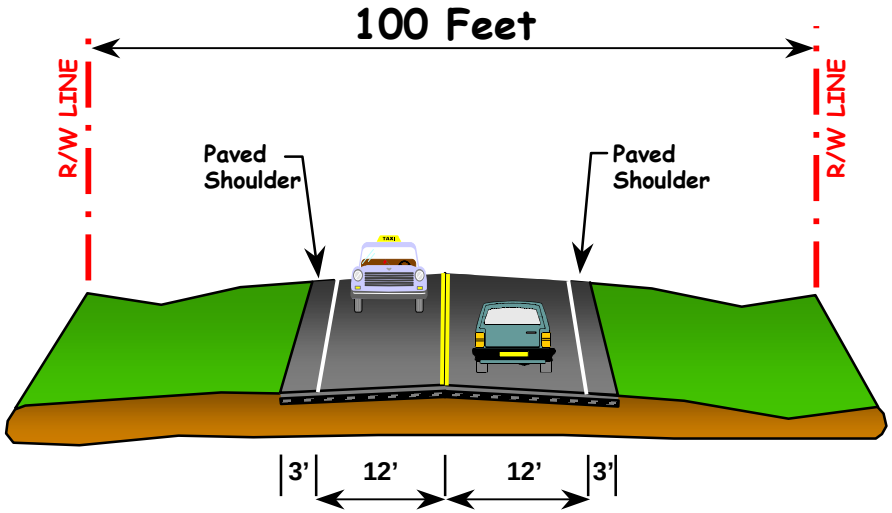
The CR 44 Corridor is currently not well served by either bicycle or pedestrian facilities. Sidewalks exist on SR 19 between Umatilla and US 441, and on CR 19A between SR 19 and CR 44. There is also a three foot paved shoulder along portions of CR 44 in the vicinity of SR 19.

3.7 Land Use

The CR 44 Corridor is a partially developed corridor with a suburban and rural residential character and a ready supply of vacant land available for future development. Currently, the Corridor contains mostly convenience retail uses, along with three neighborhood activity centers. It appears that adequate sites exist and are planned within the Corridor to serve surrounding residential development as well as pass-by traffic. Further, much of the Corridor has an established residential character that could be negatively impacted through the proliferation of commercial uses.



CR 44 - US 441 to SR 44



SR 44 - CR 44 to CR 44B

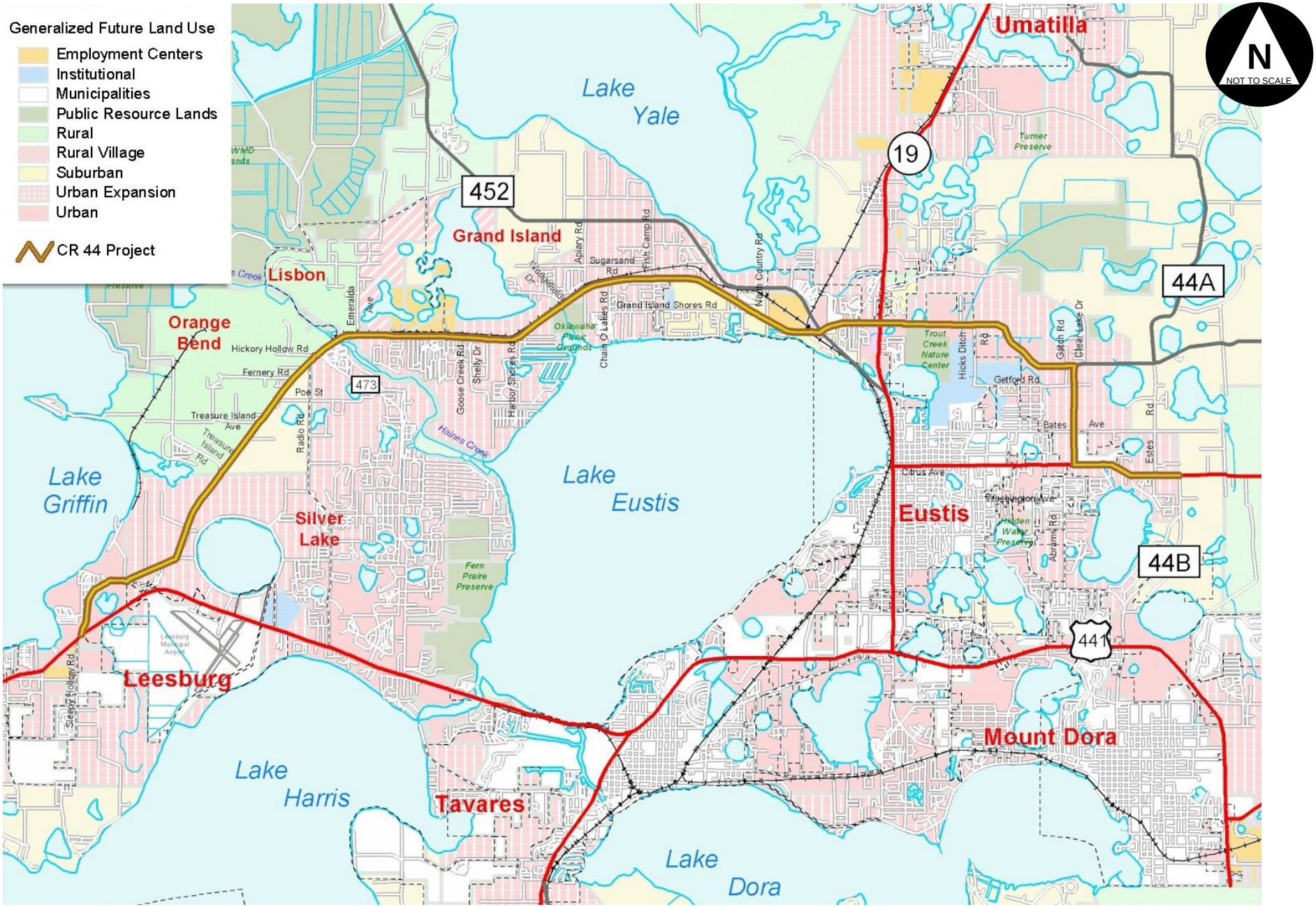
The Lake County Future Land Use Map designates most of the CR 44 Corridor for urban and suburban uses. The area in the western portion of the Corridor near the Orange Bend and Lisbon communities is designated Rural (1 unit/5 acres) and Rural Village (2 units/acre). The predominant future land use designation is Urban Expansion, which allows residential densities of up to 4 units/acre. Other more intense future land use designations are also present. Properties at the western end of the Corridor, north of US 441, and properties adjoining the Eustis City limits are designated as Urban (up 7 units/acre). The intersections of CR 44 with CR 473 and SR 44 with CR 44B are designated as Neighborhood Activity Centers. The industrial properties on the north side of CR 44, east of CR 473, are designated as an Employment Center. The Oklawaha Picnic Grounds, adjacent to Lake Eustis, are designated Public Resource Lands.

The residential future land use designations within the City of Eustis include Rural (less than 1 unit/acre), Suburban (1–5/units/acre), Mobile Home/Recreational Vehicle, and Urban (greater than 6 units/acre). Non-residential designations are oriented around intersections in the Corridor. The intersection of CR 44 with Fish Camp Road is designated Local Convenience Center Overlay. The intersection of CR 44 with CR 452 is designated for General Commercial, General Industrial, and Public/Institutional uses. Future land use designations in the corridor oriented to the SR 19 intersection include Neighborhood Commercial Center Overlay, General Commercial, and Mixed Commercial/Residential. The Trout Lake Nature Center, located on the south side of CR 44 is designated for Conservation use. The generalized future land uses are shown on Figure 3.7.

3.8 Drainage

The CR 44 Corridor contains a rural drainage system composed of shallow roadside swales that convey storm water to cross drain culverts that discharge to wetlands and lakes adjoining the road. There are no apparent storm water ponds or ditch blocks to retain the runoff to provide water quality treatment. However, the majority of the soils in the corridor are Astatula, Tavares, Lake and Pomello sands, which are well drained and work as natural filters for any pollutants in the runoff. The majority of the businesses and homes within the corridor do not provide treatment of storm water runoff prior to discharging to the CR 44 ditch system. Several of the newer businesses have detention ponds that have a control structure which discharges to the ditch.

In several locations, CR 44 is constructed above the adjacent ground at the right of way, particularly west of the intersection with CR 44A (Deland Road). The ditch is located between the shoulder and a berm built on the back slope of the ditch. This berm prevents offsite runoff from discharging to the swale. In the superelevated sections in the curves, there is ditch on the inside or lower side of the pavement which captures the runoff from the entire paved surface. In these constrained areas, any increase in the pavement width may make it difficult to reconstruct the ditch within the remaining right of way.



Engineers & Planners	Figure No: 3.7	Page No: 18	*Future Land Use Map* **CR 44: US 441 to CR 44B**

Alternate conveyance systems may be required including ditch pavement and storm sewer.

CR 44 traverses through several low-lying areas and wetlands immediately adjacent to the pavement. Some of these areas are consistent with designated floodplain areas. The concern with these areas is that any impact associated with widening may require mitigation or compensation for lost volume. The largest wetland crossings are east of SR 19 near Trout Lane, the northwest side of Lake Eustis, and the east end of Lake Griffin. The low-lying areas to the northwest are located near Pine Harbor and by Emeralda Avenue. The latter crossing is at Haines Creek, which connects Lake Eustis to Lake Griffin and is controlled by the Burrel lock and dam. The low area east of Lake Griffin is north of Silver Lake and along Treasure Island Road.

Storm water runoff along the roadway eventually drains toward a cross drain that conveys storm water to the receiving lake or wetland. The cross drains range in size from a single 18-inch pipe, to twelve 24-inch pipes east of SR 19, and to box culverts. Many of the pipes endwalls are outside the clear zone. Several of the culverts are shielded by a guardrail that is located close to the edge of pavement. There are some culverts that are within the clear zone and may require shielding in the future. Any widening in the area of the culverts will need to address culvert extensions and shielding. Because the right of way width is limited, full extension to the clear zone width may not be feasible, warranting the use of a guardrail.

4.0 Existing Traffic Conditions Analysis

Operational analysis was performed using the existing traffic volumes to identify deficiencies at intersections and along roadway links. Deficiencies identified as part of this effort provided key input to the short and long term improvement development process. Standard analysis tools such as Highway Capacity Software (HCS) and the 2002 Level of Service Handbook developed by the Florida Department of Transportation (FDOT) were used to assist in the operational analysis. Ultimately, this analysis will be used to produce improvement concepts for the Corridor.

4.1 Existing Intersection Analysis

The Highway Capacity Software (HCS) was used to analyze existing and future travel conditions in the study area at the intersection level. HCS is data dependent in that it is only as accurate as the input data. Key data can be divided into two primary categories – count data and geometric data. Count data includes: turning movement counts along intersection approaches; and vehicle classification counts. Geometric data includes number of lanes per intersection approach; left and right turn lane storage lengths; distance between intersections and signal timing and phasing. This data was collected for each signalized and major unsignalized intersection along the Corridor to support the operational analysis. The intersection geometries used for the analysis of existing conditions can be found in Figure 3.4

Table 4.1.1 and Table 4.1.2 document the existing operating conditions at the major intersections along the study Corridor. Intersections identified with a level of service (LOS) D or worse were considered strong candidates for upgrade based on Lake County's minimum acceptable LOS threshold. Intersections were assigned a LOS based on the weighted average delay experienced at a particular intersection. Complete HCS output is provided in Appendix D.

Table 4.1.1
Existing Operating Conditions
(Signalized Intersections)

Intersection with CR 44	Delay (Seconds)	Level of Service
US 441	**71.1**	**E**
CR 473	28.0	C
CR 452	**77.9**	**E**
SR 19	47.0	D
SR 44	18.8	B
CR 44B	22.1	C

Table 4.1.2
Existing Operating Conditions
(Unsignalized Intersections)

Intersection with CR 44	Delay (Seconds)	Level of Service
Lake Griffin Harbor	11.2	B
CR 44 (Leg A)/Shady Acres Road	16.0/11.7	C/B
Silver Lake Road	15.3	C
Treasure Island Road	19.5	C
Poe Street	16.8	C
Radio Road	23.2	C
Emeralda Avenue	20.2	C
Mid-Florida Lakes/Dura Stress	22.5/23.1	C/C
Goose Creek Road	16.6	C
Harbor Shores Road	18.9	C
Wedgefield Drive	13.3	B
Apiary Road	19.3	C
Chain O' Lakes Road	21.3/10.9	C/B
Fish Camp Road	22.4/19.7	C/C
Grand Island Shores Road	14.6	B
CR 19A	17.7/12.3	C/B
Hicks Ditch Road	15.7	C
CR 44A	16.8	C
Bates Avenue	13.3/11.2	B/B

Table 4.1.1 shows that most signalized intersections are currently operating or approaching an unacceptable LOS. Table 4.1.2 shows that a vast majority of the unsignalized intersections currently operate at an acceptable LOS. However, many unsignalized intersections are approaching LOS D (15 intersections operate at LOS C). As traffic volumes continue to increase, it is likely that many of these intersections will degrade to an unacceptable LOS.

4.2 Existing Link Analysis

The Florida Department of Transportation (FDOT) 2002 Level of Service Handbook was used to analyze existing and future travel conditions along the study area's roadway links. CR 44 was analyzed using the Standard Level of Service Tables for State Two Way Arterials (Class I). This facility type was identified as appropriate, even though the Lake County Model currently classes CR 44 as a collector. Land use changes, traffic volumes, and post speed, all support the designation of CR 44 as an arterial. Table 4.2 documents the existing operating conditions along the roadway links at the count stations for the Lake County Traffic Count Program. Links identified with a level of service (LOS) D or worse should be considered strong candidates for upgrade.

Table 4.2
Existing Link Operations

	Count Station	Link Volume	LOS
Segment 1	0031	9,629	C
	0029	9,954	C
Segment 2	0119	**16,123**	**E**
Segment 3	0045	12,114	C
	0048	13,244	D
Segment 4	0047	9,723	C
	0080	8,738	C
	0082	7,002	C

Similar to the intersection analysis, many of the roadway links operate at an acceptable level of service, however as traffic volumes increase it is likely that many links will degrade to an unacceptable LOS.

4.3 Identification of Existing Traffic Deficiencies

Based on the results of the intersection and link analysis, the following deficiencies were identified along the study Corridor:

- CR 44 and US 441 operates at LOS E
- CR 44 and CR 452 operates at LOS E
- Segment 2 operates at LOS E

It is likely that most, if not all, of these deficiencies could be addressed, short term, through signal retiming and minor geometric improvements.

The existing travel conditions along the Corridor are borderline deficient. The situation could continue for a short time before portions of the study Corridor operate at an unacceptable level of service at both the intersection and link level.

In addition to the intersection and link level of service analysis, an engineer conducted a qualitative assessment along the Corridor. This qualitative assessment resulted in the identification of the following deficiencies documented in Table 4.3.

Table 4.3
Qualitative Assessment

Intersection with CR 44	Deficiency
US 441	Visually intimidating intersection and potentially confusing to motorists unfamiliar with the area due to unusual geometry.
CR 44 (Leg A) & US 441	Non-standard intersection geometry. Limited sight distance. Low traffic volumes. Creates additional conflict points along US 441.
CR 44(Leg A)	Non-standard intersection geometry. Slow moving left turn vehicles.
Blue Bay Self Storage (east of Shady Acres Road)	Slowing moving left turn vehicles, including large trucks, accessing Blue Bay Self Storage.
Silver Lake Road	Westbound queuing due to left turning vehicles. Poor intersection operations.
Radio Road	Deficient eastbound right turn radius. TWLTL creates conflicts due to several driveways and close intersection spacing. Limited advance warning of Radio Road. Faded pavement markings.
CR 473	Westbound left turn storage is inadequate to accommodate left turn volumes.
Dura Stress (Western Driveway)	Slow moving heavy vehicles entering and exiting the travel lanes. Large segment of continuous access to travel lanes – no well defined driveway access/egress points.
Mid-Florida Lakes	Delay and difficulty with access/egress from Mid-Florida Lakes MHP.
Service Trucking Inc Driveway	Slow moving heavy vehicles entering and exiting the travel lanes.
Railroad Crossing (west of CR 452)	No gates provided at the railroad crossing just west of CR 452.

Intersection with CR 44	Deficiency
CR 452	Deficient westbound right turn radius. Considerable delay and queuing along all intersection approaches. No right turn overlap.
CR 19A	Very low volumes along CR 19A.
Hicks Ditch Road	Poor Sight Distance. Slow turning vehicles executing right turns from CR 44.
CR 44A	Faded pavement markings. Deficient eastbound to southbound right turn radius. No designated roadway or intersection lighting. High left turn volumes.
Bates Avenue	High pedestrian traffic. High volume of turning vehicles. Extreme delays during school access/egress periods.
SR 44	Faded pavement markings. Inadequate left turn storage east and westbound. No designated intersection or roadway lighting. Need for additional advance warning of CR 44A intersection and signage designating a bypass of Eustis.
CR 44B	Pavement rutting. Faded intersection markings. No designated roadway lighting.

These deficiencies were evaluated as part of the short term improvement development process. In addition each location will be evaluated based on safety standards and where applicable, short term and long term improvements will be identified for construction with safety funds. Corresponding benefits and costs will be estimated and a benefit\cost analysis conducted to justify improvement concepts. This information was documented as part of the alternative development screening and evaluation process.

5.0 Future Traffic Projections

A model review was conducted as a potential tool for predicting future traffic growth along the CR 44 Corridor. This analysis did not lead to a definitive approach for estimating the future traffic volumes. Documentation for the model review is available in the *CR 44 Future Traffic Volumes Memorandum*, dated August 2002, and the *CR 44 Corridor Study Corridor Analysis Report*, dated March 2003, also prepared by TEI.

Because the model review did not yield a definitive approach for estimating traffic volumes, a more traditional trends analysis was explored as a more appropriate predictive tool. The results of this analysis are documented in the section below.

5.1 Trends Analysis

The existing eight count stations along the CR 44 Corridor served as the basis for the trend analysis. Historical counts were obtained from Lake County for the years 1995 to 2002 and used as input into FDOT Trends Analysis Package. Ideally, at least ten years of data would be used for this analysis; however, accurate data dating to 1992 could not be located for all eight count stations. Using the available historic count data, a linear regression line and yearly growth rate were developed and traffic volumes projected for each count station for the years 2010, 2012, 2020, and 2022. The 2010 and 2020 traffic volume projections were calculated for comparison purposes with the Lake County Model. The 2012 and 2022 traffic volume projects were used to further analyses future conditions along the CR 44 Corridor.

The historical counts and the trends analysis are summarized in Table 5.1.1.

Table 5.1.1
Historical Traffic Counts and Trends Analysis

Year	Segment 1		Segment 2	Segment 3		Segment 4		
	Sta. 0031	Sta. 0029	Sta. 0119	Sta. 0045	Sta. 0048	Sta. 0047	Sta. 0080	Sta. 0082
2002	9,629	9,954	16,123	12,114	13,244	9,723	8,738	7,002
2001	8,874	8,399	15,445	12,080	12,275	9,645	8,931	7,284
2000	8,923	7,365	15,563	10,983	10,125	9,807	8,370	6,379
1999	8,479	7,891	15,872	10,490	9,635	8,472	8,246	6,788
1998	8,430	7,978	13,677	11,704	11,489	8,473	8,076	6,717
1997	8,126	6,866	13,902	11,509	9,929	7,697	6,552	5,761
1996	7,979	7,685	13,582	9,457	7,642	6,666	6,192	5,479
1995	7,936	7,331	N/A	10,426	8,154	6,009	5,896	5,037
FDOT's TRENDS ANALYSIS OUTPUT								
2010	11,100	11,200	19,800	14,100	18,100	14,700	12,900	9,700
2012	11,600	11,800	20,600	14,700	19,500	15,800	13,800	10,300
2020	13,400	14,000	24,200	16,800	24,900	20,300	17,500	12,700
2022	13,800	14,600	25,100	17,300	26,300	21,400	18,400	13,300
GROWTH RATES AND SUMMARY STATISTICS								
Growth Rate	2.42%	3.20%	2.75%	2.21%	5.35%	5.39%	5.00%	3.99%
R^2	92.50%	53.50%	75.10%	49.40%	74.20%	91.50%	88.70%	82.20%

The R^2 value shows the strength of a trend. The more closely traffic volumes are in a linear relationship, the stronger the trend. An R^2 value above 75% is considered an adequate predictor of the trends analysis. A majority of the count stations have an R^2 value above 75% and the growth rates obtained from the trends analysis can be considered reasonable. Detailed summary sheets documenting the trends analysis can be found in Appendix E.

Ultimately this information was used to calculate weighted growth rates for each CR 44 study segment. If more than one count location was located within a particular study segment, the growth rates were weighted by traffic volumes to derive the segment growth rate. Future traffic volumes for the side streets are calculated using the weighted growth rate for the study segment in which a particular side street is located. This information is presented in Table 5.1.2.

Table 5.1.2
Segment Growth Rates

Segment	Growth Rate
1	2.82%
2	2.75%
3	4.10%
4	4.90%

This analysis presents growth rates that are reasonable and consistent with the population and employment growth in Lake County. It appears that the trends analysis should be considered a reasonable prediction tool.

5.2 Lake County Model Versus Trends

A review of the Lake County Model showed that the 2010 and 2020 transportation models for Lake County are not the best tools for estimating future traffic volumes along the CR 44 Corridor. However, the Lake County Model should still be considered a very useful analysis tool for this study. While the Lake County Model is not the best predictor of volumes for all traffic count locations, it does provide a proven mechanism for distributing trips through the study area. This makes it useful for testing alternatives. When a potential improvement is coded into the Model and a future year Model run developed, the future traffic volumes along CR 44 are not likely to be as accurate as needed for operational analysis; however, the total change in traffic volumes along CR 44 should be correct. Consequently, the Lake County Model will be employed to analyze various improvement alternatives.

Additionally, it is useful to compare the Lake County Model projections to the Trend Analysis. This information is displayed in Table 5.2.1.

Table 5.2.1
Lake County Model Volumes Compared To Trend Analysis

Projection Method	Segment 1		Segment 2	Segment 3		Segment 4		
	Sta. 0031	Sta. 0029	Sta. 0119	Sta. 0045	Sta. 0048	Sta. 0047	Sta. 0080	Sta. 0082
LAKE COUNTY MODEL								
2010 Model	11,213	10,187	16,208	8,561	11,728	8,738	7,784	8,542
2020 Model	14,624	13,345	20,181	11,742	19,862	17,368	16,421	13,244
TREND ANALYSIS								
2010 Trend	11,100	11,200	19,800	14,100	18,100	14,700	12,900	9,700
2020 Trend	13,400	14,000	24,200	16,800	24,900	20,300	17,500	12,700
ADJUSTMENT FACTORS								
2010 Adjustment	0.99	1.10	1.22	1.65	1.54	1.68	1.66	1.14
2020 Adjustment	0.92	1.05	1.20	1.43	1.25	1.17	1.07	0.96

A comparison of the Lake County Model and the trends analysis yields the following discussion. Because of the trip distribution capabilities of the Lake County Model, an adjustment factor was developed to relate the 2010 and 2020 Lake County Models to the projected 2010 and 2020 volumes from the trend analysis. This adjustment factor was calculated as a ratio of the projected historic Lake County traffic counts to the Lake County Model volumes. Table 5.2.2 shows the adjustment factors calculated for each segment of the CR 44 Corridor.

Table 5.2.2
Model Adjustment Factors

Segment	2010 Adjustment	2020 Adjustment
1	1.04	0.98
2	1.22	1.20
3	1.59	1.32
4	1.49	1.07

An understanding of the strengths and limitations of the Lake County Model, coupled with an accepted method for determining future traffic volumes (FDOT Trends Analysis) provides a mechanism for evaluating improvement alternatives and assessing future travel conditions along the CR 44 Corridor.

6.0 No Build Traffic Conditions

To better assess the Corridor's needs, traffic volumes were developed for the mid-year, 2012, and the horizon year of the study, 2022. An understanding of future deficiencies allows for the development of alternatives that meet total Corridor needs as well as allows for the development of effective phasing and implementation programs.

6.1 Transportation Plans

The Lake County Transportation Program (2002-2006) and the Florida Department of Transportation 5-Year Transportation Plan for Lake County (2003- 2007) were reviewed for improvements within the study area. All programmed improvements were incorporated into the analysis of future travel conditions. Additionally, these plans and projects served as the baseline for the No Build and Build alternative screening and evaluation.

The following information was obtained from the Lake County Transportation Program for 2002 to 2006.

Table 6.1.1
Lake County Construction Program 2002-2006

Facility	From	To	Improvement
CR 452	CR 44	SR 19	Widen to 30' & Construct a 5' Sidewalk
CR 44	Grand Island Shores Road	SR 19	Widen to 4 Lanes with 3' Paved Shoulders
Bates Avenue	CR 44	Estes Road	Widen to 24' and Construct Sidewalk on the North Side
CR 44	Hicks Ditch Road	SR 44	Widen to 30'
CR 44A	CR 44	Estes Road	Widen to 30'
CR 44/Sleepy Hollow Road			Intersection Improvements

The Lake County 2020 Transportation Plan was also reviewed and contains the following planned improvement information:

Table 6.1.2
Lake County 2020 Transportation Plan

Facility	From	To	Improvement
Highway Needs Plan			
CR 44	US 441	CR 473	Widen to 4 Lanes
CR 44	CR 473	CR 452	Widen to 6 Lanes
CR 44	CR 452	SR 44	Widen to 4 Lanes
CR 44	US 441	SR 44	Widen to 4 Lanes
Eagles Nest Road	CR 466B	CR 44	Widen to 4 Lanes
Radio Road	US 441	CR 44	Widen to 4 Lanes
Cost Feasible Plan			
CR 44	Radio Road	CR 473	Widen to 4 Lanes
CR 44	CR 452	CR 44A	Widen to 4 Lanes
CR 44	CR 44A	SR 44	Widen to 4 Lanes
CR 44B	US 441	SR 44	Widen to 4 Lanes
Bicycle			
Bike Trail	US 441	CR 452	Rails to Trails
CR 44	Radio Road	CR 473	2020 Bicycle Enhancements
CR 44	CR 452	SR 44	2020 Bicycle Enhancements
CR 44B	US 441	SR 44	2020 Bicycle Enhancements
Pedestrian			
CR 44	CR 452	SR 44	Sidewalks
CR 44B	US 441	SR 44	Sidewalks

All improvements identified in the Lake County Construction Plan 2002-2006 were included in future No Build analysis. Planned improvements, while recognized, were not implied as part of the No Build analysis. These improvements will be considered during the Build analysis.

6.2 No Build Traffic Volumes

In order to effectively evaluate the preferred improvement alternative, it was necessary to develop 2012 and 2022 traffic volumes for the study Corridor and perform traffic operations analysis for each alternative. The future traffic volumes were generated using the following steps.

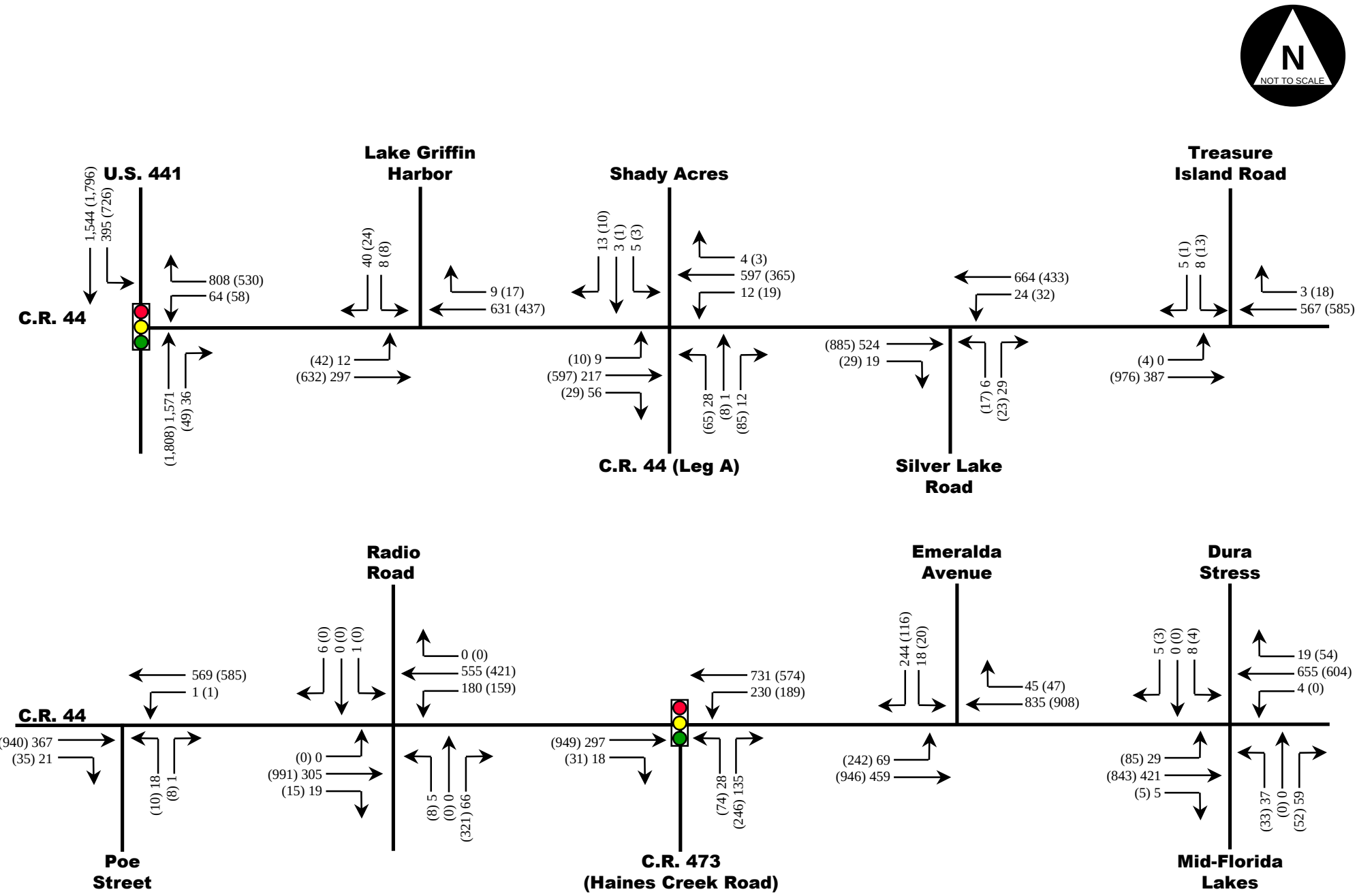
The 2002 traffic volumes collected (this information is available in the *Data Collection Report*, dated December 2002), and described previously, serve as the starting point for the analysis. In order to develop a growth factor, historic count data was obtained from the eight Lake County count stations listed below:

- Station 0031 – 0.55 mi N of US 441;
- Station 0029 – 0.10 mi S of Treasure Island Rd;
- Station 0119 – 0.07 mi E of CR 473;
- Station 0045 – 0.39 mi W of Grand Island Shores Rd;
- Station 0048 – 0.15 mi W of SR 19;
- Station 0047 – 0.14 mi E of SR 19;
- Station 0080 – 0.13 mi W of CR 44/CR 44A; and,
- Station 0082 – 0.10 mi N of SR 44.

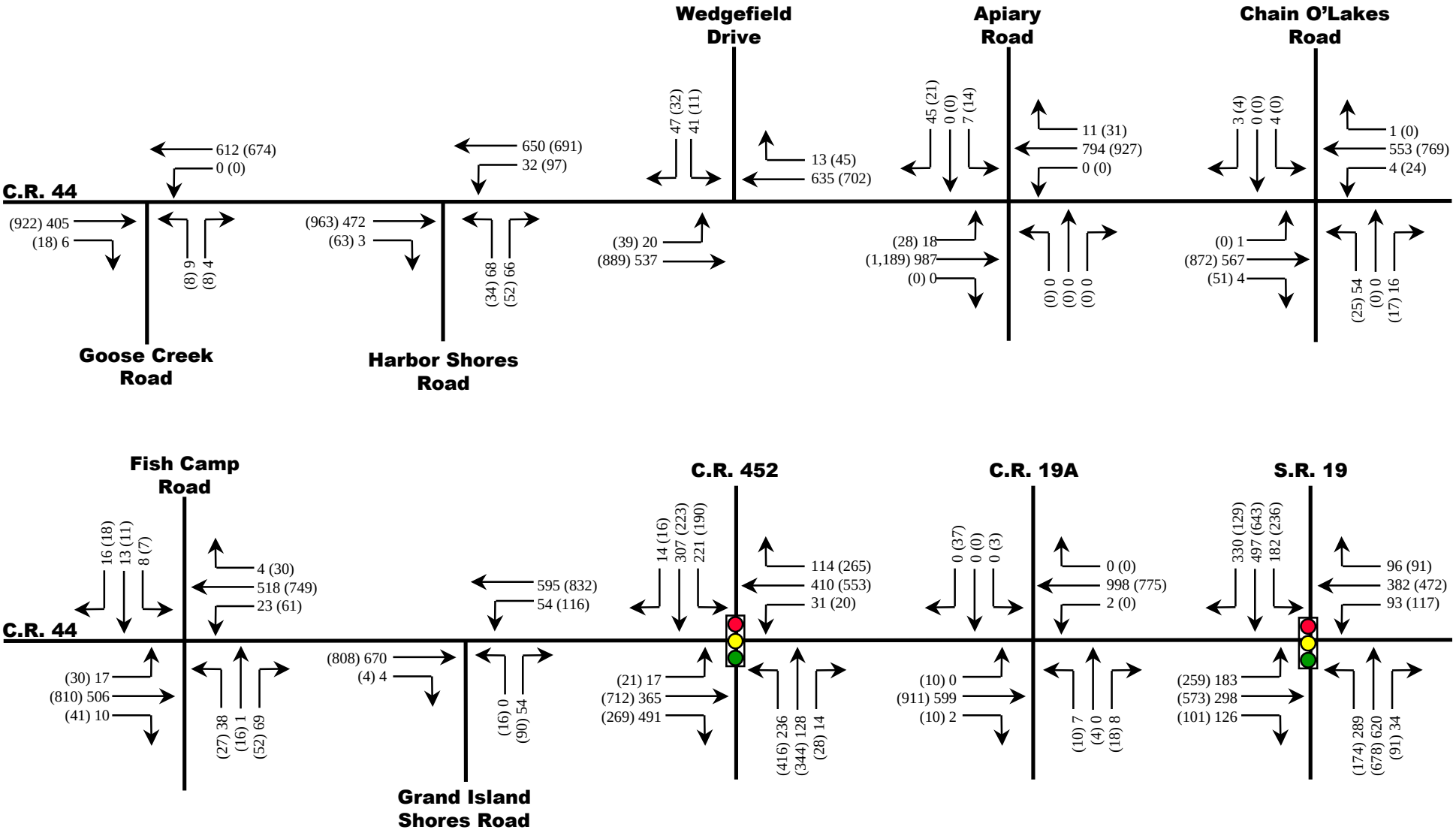
These count stations were used to develop a regression line that ultimately produced 2012 and 2022 traffic volumes. This analysis is presented in Section 5.0 Trends Analysis. Based on the results of this analysis, a growth rate was established for each segment of the Corridor and summarized as:

- Segment 1 – 2.82%
- Segment 2 – 2.75%
- Segment 3 – 4.10%
- Segment 4 – 4.90%

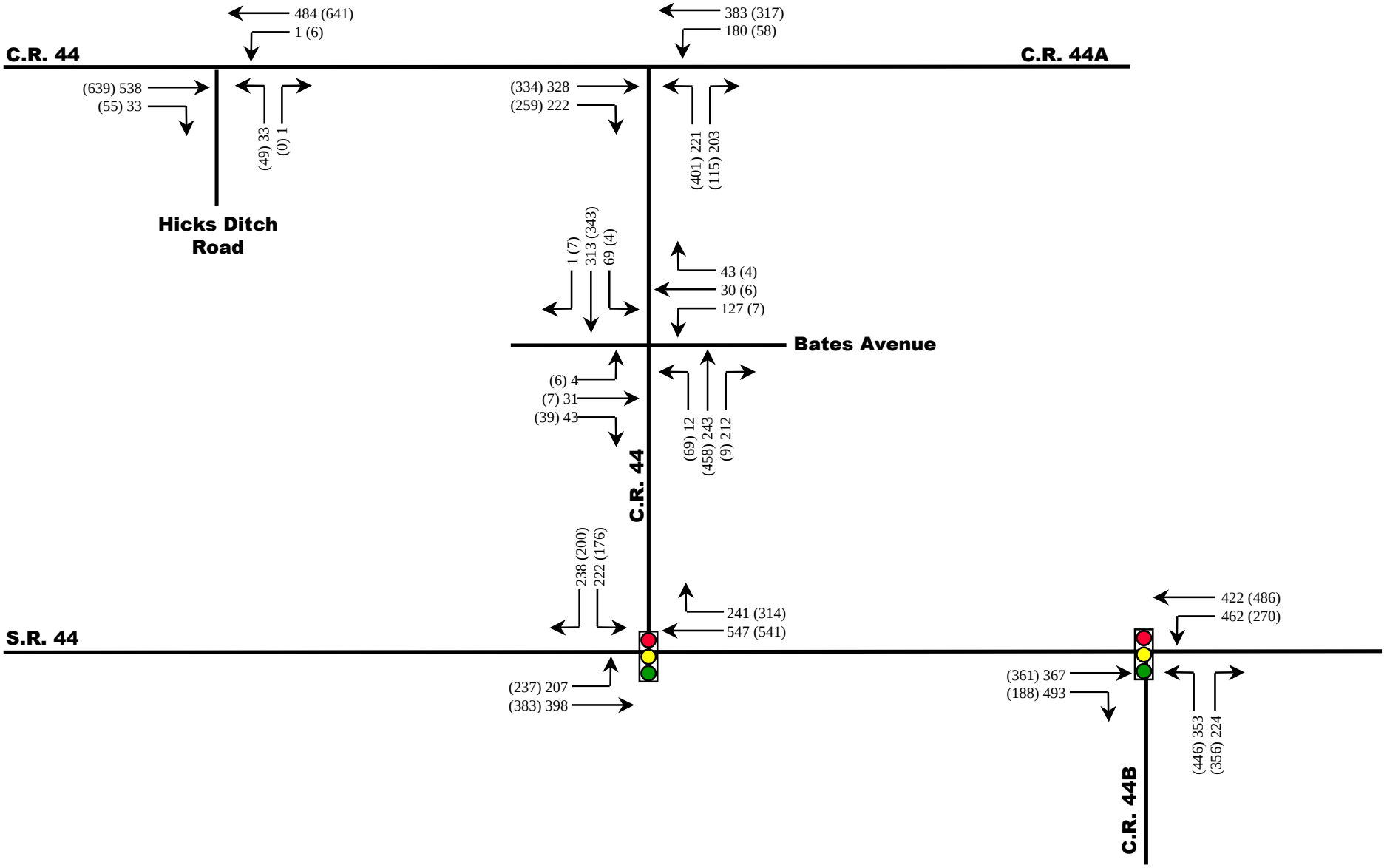
The historical growth factors were used to estimate future traffic volumes along the Corridor. The 2012 traffic volumes are displayed graphically in Figure 6.2.1 and the 2022 traffic volumes are displayed graphically in Figure 6.2.2.



TEI Engineers & Planners	Figure No: 6.2.1	Page No: 32	(10) 20 (500) 250 (90) 50 → - (PM) AM Turning Movement Volume	*2012 Peak Hour Turning Movement Volumes* **CR 44: US 441 to CR 44B**



Engineers & Planners	Figure No: 6.2.1	Page No: 33	(10) 20 (500) 250 (90) 50 - (PM) AM Turning Movement Volume	*2012 Peak Hour Turning Movement Volumes* **CR 44: US 441 to CR 44B**



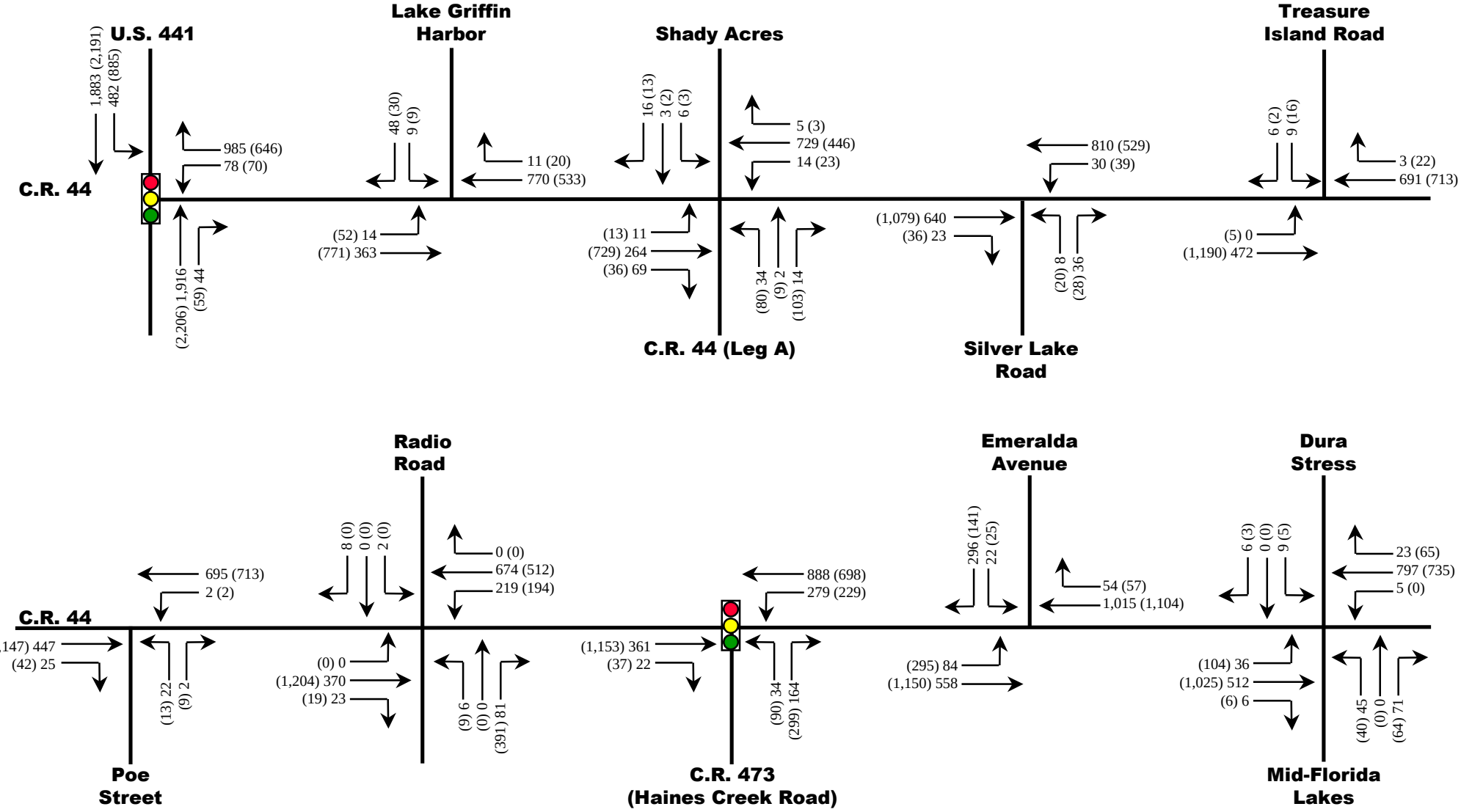
Engineers & Planners

Figure No:	Page No:
6.2.1	34

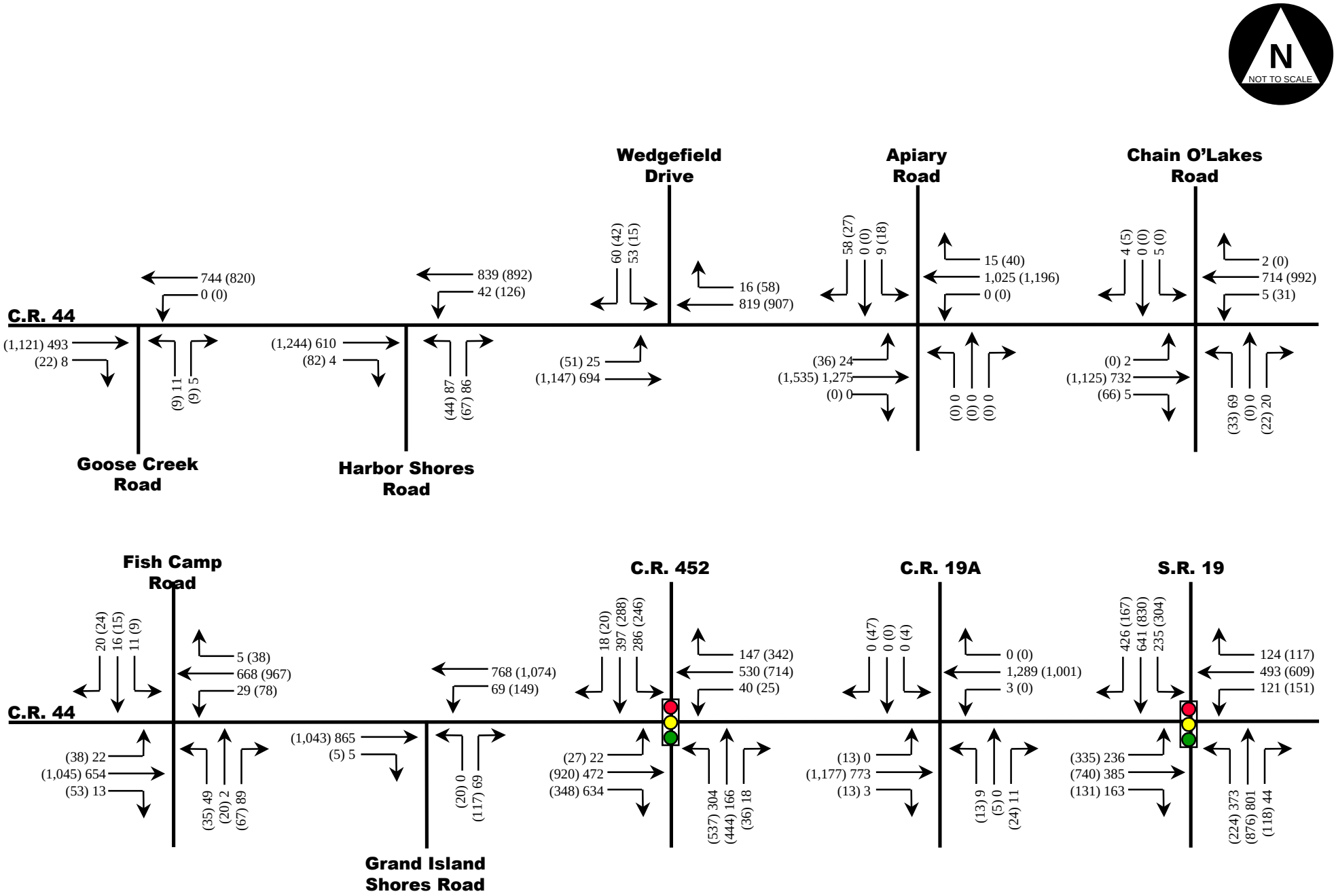
(10) 20
(500) 250 → - (PM) AM Turning Movement Volume
(90) 50

2012 Peak Hour Turning Movement Volumes

CR 44: US 441 to CR 44B



TEI Engineers & Planners	Figure No: 6.2.2	Page No: 35	(10) 20 (500) 250 (90) 50 - (PM) AM Turning Movement Volume	*2022 Peak Hour Turning Movement Volumes* **CR 44: US 441 to CR 44B**



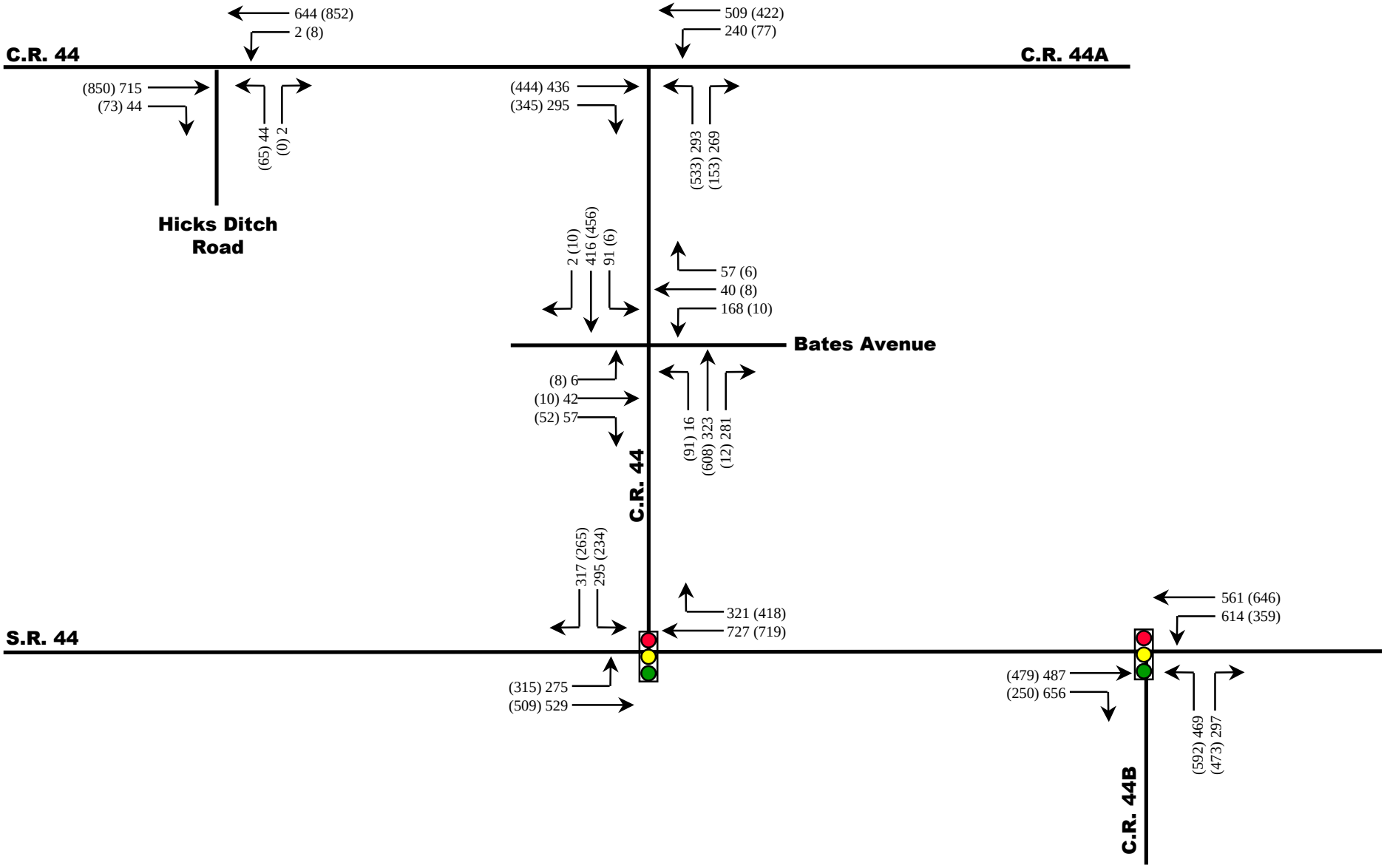
Engineers & Planners

Figure No:	Page No:
6.2.2	36

(10) 20
(500) 250 → - (PM) AM Turning Movement Volume
(90) 50

2022 Peak Hour Turning Movement Volumes

CR 44: US 441 to CR 44B



Engineers & Planners

Figure No:	Page No:
6.2.2	37

(10) 20
(500) 250 → - (PM) AM Turning Movement Volume
(90) 50

2022 Peak Hour Turning Movement Volumes

CR 44: US 441 to CR 44B

6.3 No Build Intersection Analysis

Using the traffic volumes developed with FDOT Trends Analysis Package, the future No Build intersection and link analysis was completed. The data generated for trends analysis was reviewed against output from the Lake County Model. Again, the comparative analysis suggests the trends analysis was a more appropriate tool and the Model will be employed for trip distribution purposes.

Table 6.3.1 and Table 6.3.2 document the 2012 and 2022 No Build operating conditions at the study intersections along the Corridor without any improvements. Intersections identified with a level of service (LOS) D or worse should be considered strong candidates for improvements. Complete 2012 and 2022 HCS output for the No Build alternatives is provided in Appendix F and Appendix G, respectively.

Table 6.3.1
2012 & 2022 No Build Operating Conditions
(Signalized Intersections)

Intersection with CR 44	2012 No Build		2022 No Build	
	Delay (Seconds)	**Level of Service**	**Delay (Seconds)**	**Level of Service**
US 441	**108.7**	**F**	**169.2**	**F**
CR 473	**68.1**	**E**	**122.2**	**F**
CR 452	54.6	D	**102.4**	**F**
SR 19	**63.7**	**E**	**81.0**	**F**
SR 44	22.6	C	32.8	C
CR 44B	31.3	C	**66.0**	**E**

Table 6.3.2
2012 & 2022 No Build Operating Conditions
(Unsignalized Intersections)

Intersection with CR 44	2012 No Build		2022 No Build	
	Delay (Seconds)	Level of Service	Delay (Seconds)	Level of Service
Lake Griffin Harbor	12.8	B	15.0	C
CR 44 (Leg A)/Shady Acres Road	24.8/13.7	D/B	**56.7/16.4**	**F/C**
Silver Lake Road	20.3	C	29.7	D
Treasure Island Road	28.4	D	**43.2**	**E**
Poe Street	22.9	C	33.7	D
Radio Road	**69.7**	**F**	**262.9**	**F**
Emeralda Avenue	**45.2**	**E**	**199.6**	**F**
Mid-Florida Lakes/Dura Stress	**48.7/38.0**	**E/E**	**247.2/88.3**	**F/F**
Goose Creek Road	22.4	C	32.2	D
Harbor Shores Road	**48.1**	**E**	**353.8**	**F**
Wedgefield Drive	19.3	C	34.7	D
Apiary Road	**39.7**	**E**	**156.3**	**F**
Chain O' Lakes Road	**48.1/12.6**	**E/B**	**237.0/14.8**	**F/B**
Fish Camp Road	**90.7/44.1**	**F/E**	**859.0/302.3**	**F/F**
Grand Island Shores Road	12.1	B	14.7	B
CR 19A	13.5/10.7	B/B	16.4/11.8	C/B
Hicks Ditch Road	26.7	D	**65.2**	**F**
CR 44A	**89.6**	**F**	**416.3**	**F**
Bates Avenue	23.4/13.5	C/B	**104.1/19.3**	**F/C**

The results of this analysis show that most intersections operate at an unacceptable level of service. The alternative development and screening process will address improvements for each of the deficient locations.

6.4 No Build Link Analysis

The Florida Department of Transportation (FDOT) 2002 Level of Service Handbook was used to analyze existing and future travel conditions along the study area's roadway links. CR 44 was analyzed using the Standard Level of Service Tables for State Two Way Arterials (Class I). Table 6.4 documents the 2012 and 2022 No Build operating conditions along the roadway links. Links identified with a level of service (LOS) D or worse should be considered strong candidates for upgrade.

Table 6.4
2012 & 2022 No Build Link Operations

	Count Station	2012 No Build		2022 No Build	
		Link Volume	LOS	Link Volume	LOS
Segment 1	0031	11,600	C	13,800	D
	0029	11,800	C	14,600	D
Segment 2	0119	**20,600**	**F**	**25,100**	**F**
Segment 3	0045	14,700	D	**17,300**	**F**
	0048	**19,500**	**F**	**26,300**	**F**
Segment 4	0047	**15,800**	**E**	**21,400**	**F**
	0080	13,800	D	**18,400**	**F**
	0082	10,300	C	13,300	D

The results of this analysis show that most roadway links operate at or near an unacceptable level of service. The alternative development and screening process will address improvements for each deficient roadway links.

6.5 Identification of No Build Traffic Deficiencies

Based on the results of the intersection and link analysis, the following deficiencies were identified along the study Corridor for the mid-year 2012:

- CR 44 and US 441 operates at LOS F
- CR 44 and CR 473 operates at LOS E
- CR 44 and SR 19 operates at LOS E
- CR 44 and Radio Road operates at LOS F

- CR 44 and Emeralda Avenue operates at LOS E
- CR 44 and Mid-Florida Lakes/Dura Stress operates at LOS E
- CR 44 and Harbor Shores Road operates at LOS F
- CR 44 and Apiary Road operates at LOS F
- CR 44 and Chain O' Lakes Road operates at LOS E
- CR 44 and CR 44A operates at LOS F
- Segment 2 operates at LOS F
- Most of Segment 3 operates at LOS F
- Most of Segment 4 operates at LOS E

Based on the results of the intersection and link analysis, the following deficiencies were identified along the study Corridor for the horizon year, 2022:

- CR 44 and US 441 operates at LOS F
- CR 44 and CR 473 operates at LOS F
- CR 44 and CR 452 operates at LOS F
- CR 44 and SR 19 operates at LOS F
- SR 44 and CR 44B operates at LOS E
- CR 44 and CR 44 (Leg A) operates at LOS F
- CR 44 and Treasure Island Road operates at LOS E
- CR 44 and Radio Road operates at LOS F
- CR 44 and Emeralda Avenue operates at LOS F
- CR 44 and Mid-Florida Lakes/Dura Stress operates at LOS F
- CR 44 and Harbor Shores Road operates at LOS F
- CR 44 and Apiary Road operates at LOS F
- CR 44 and Chain O' Lakes Road operates at LOS F
- CR 44 and Hicks Ditch Road operates at LOS F
- CR 44 and CR 44A operates at LOS F
- CR 44 and Bates Avenue operates at LOS F
- Segment 2 operates at LOS F
- Segment 3 operates at LOS F
- Most of Segment 4 operates at LOS F

The future travel conditions along CR 44 are deficient at both the intersection and link level along a majority of the study Corridor. It is likely that most, if not all, of these deficiencies will require major geometric capacity enhancements.

7.0 Development of Strategies

After the existing and future no build conditions were evaluated, strategies were identified that address the existing deficiencies. The requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA), the follow up legislation TEA-21, and the supporting Congestion Management System (CMS) regulations, guided the identification of potential strategies for the CR 44 Corridor. These strategies include demand management, operational management and capital-intensive approaches. The CMS regulations require that appropriate consideration be given to all reasonable alternatives and, more specifically, that consideration be given to strategies that reduce single occupant vehicle (SOV) travel. These requirements are consistent with the purpose and intent of the CR 44 Corridor Study. A comprehensive listing of potential strategies is contained in the CMS regulations. It is not, however, the intent of the regulations that all of these potential strategies be exhaustively studied. The key is to identify those strategies that are reasonable for the particular location or specific deficiency.

The CMS regulations include a comprehensive listing of strategies broken into twelve (12) categories or groups. The boundaries between these groups are not distinct and individual measures may be included in more than one category. For example, park-and-ride lots both encourage the use of high occupancy vehicles (HOVs) and transit. For the purposes of applying the ISTEA, TEA-21, and CMS requirements to the CR 44 Corridor Study, an attempt was made to separate potential strategies into a hierarchical order that considers first those actions which address the fundamental transportation and land use relationships that cause vehicle trips. If the reason for the trip can be eliminated, so can the trip and its contribution to congestion. In successive rounds, the residual trips not mitigated by previous levels of actions are successively dealt with using techniques aimed at the next higher level of concern. This process is described below:

- **Level One**: Actions that decrease the need for trip making (i.e. growth management, activity centers, congestion pricing, and some transportation demand management measures).
- **Level Two**: Actions that place trips into transit or other non-auto modes (i.e. public transit capital and operating improvements, and parking management).
- **Level Three**: Actions that put as many trips as possible into HOVs.
- **Level Four**: Actions that optimize the highway system's operation for SOV trips, and for all other trips using highway facilities/modes (traffic signalization modification, intelligent transportation systems, etc.).
- **Level Five**: Actions that increase the capacity of the highway system for SOVs by adding general-purpose lanes.

While it is not required that this process be followed in order (i.e., Level One then Level Two then Level Three, etc.), this hierarchy responds to the intent of the regulations, as well as the intent of the CR 44 Corridor Study.

7.1 Level One Strategies

The first level includes actions that decrease the need for making the trip by vehicle. This can be accomplished through growth management and the development of activity centers, congestion pricing and also certain types of transportation demand management.

7.1.1 Growth Management / Activity Centers

Land use strategies seek to achieve concurrence between transportation infrastructure and land development. These strategies are often viewed as key to the success of any regional transportation plan, and should be analyzed at the regional scale. Land use strategies that can reduce the demand for SOV travel include locating residential or commercial development along transit corridors and mixed-use development. Mixed-use can be at a micro scale (i.e. individual building or parcel level), or at a macro scale. In addition, growth management practices and activity centers can even eliminate vehicular trips by matching trip productions with attractions at the same site, or by providing good pedestrian, transit and bicycle accessibility. Components of a growth management plan could include:

- Land use policies/regulations, including growth boundaries;
- Stricter design/zoning standards which promote this strategy (such as density bonuses);
- Maintenance/development of a jobs/housing balance; and,
- Mixed-use developments.

Typical keys to success include strong political support for growth management and the promotion of activity centers; good public information and outreach regarding the benefits of this strategy; an emphasis on providing good pedestrian and bicycle accessibility, internal transit circulation, and permitting mixed use/compact development.

7.2 Level Two Strategies

The second level includes actions which attempt to place the trips not addressed in Level One into transit or other non-auto modes. This can be accomplished through capital investments in public transit, public transit operational improvements, intelligent transportation systems, methods to encourage the use of non-traditional modes and certain types of transportation demand management.

7.2.1 Public Transit Capital Improvements

Transit capital improvements are designed to increase ridership on transit lines by improving transit infrastructure or vehicles. These strategies are generally implemented to address regional or corridor transportation system deficiencies. Potential improvements could include:

- New rail lines, busways, or bus lanes (on exclusive right of way);
- Bus bypass ramps for preferential treatment of buses;
- Fleet expansion;
- Vehicle replacement/upgrades;
- Park-and-ride lots;
- New, expanded, or improved transit stations (intermodal facilities);
- Paratransit services; and,
- Increased transit security.

The main key to success in implementing any of these strategies is a thorough study and understanding of the complicated issues which affect the use of non-automobile modes. It is also important to evaluate the entire trip, from origin to destination, when determining the appropriate strategy for shifting vehicle trips away from the personal vehicle. For example, land use densities affect the ability to provide competitive transit travel times at attractive costs. In turn, outside factors, such as parking costs, can determine what is considered an attractive cost for transit service. Good intermodal connections are crucial to providing competitive travel times. These transfers should be efficient and often require coordination between the various modes accessing intermodal facilities to minimize transfer times. It is also important to consider the pedestrian element of any trip to achieve the complete evaluation of the entire trip, from origin to destination. The convenience of alternatives is important, such as the proximity / access of transfer points and the reliability of the system. Finally, transit security should not be overlooked (as required originally by ISTEA) as an important factor which has a direct impact on travelers' decisions to use alternative modes of travel.

7.2.2 Public Transit Operational Improvements

Like capital improvements, operational improvements to the transit system can increase the demand for transit, which reduces the number of vehicles on the road. Operational improvements can be implemented on specific routes or within transit corridors, although regional operational improvements are commonly developed. Some strategies are:

- Increases in service frequency;
- Longer operating hours;
- Improvements in service quality;
- Additional bus routes;

- Restructured or extended bus lines;
- Traffic signal preemption;
- Fare reductions;
- Improvement of coordination and transfers between systems and routes;
- Improved marketing of transit; and,
- Transit passenger information systems.

Several of the operational improvements require a reallocation of resources to allow for increased service frequencies, hours of operation, additional routes, extensions of current routes, or even farebox reductions on routes. To ensure that the reallocation is justified, it is important to conduct studies to determine the impact on ridership and the financial implications of the changes. These studies should include the consideration and potential implementation of the keys to success identified for the various strategies.

As identified above, it is important for alternative modes to provide competitive travel times. One way to accomplish this is by providing preferential treatment to transit vehicles using traffic signal preemption. This strategy requires multi-agency coordination and support, as well as planning and impact studies required to build this support.

One of the biggest keys to success for any of the improvement strategies is effectively communicating the benefits to the public. This can take place through marketing, using public and media education and outreach. Another tool is the use of transit information systems to better communicate the services provided and increase the convenience to the user.

7.2.3 Non-Motorized Modes

In many areas, walking and bicycling are a viable alternative to vehicle use. In some cases, demand for these non-traditional modes can be increased by improving the transportation system to better accommodate pedestrians and bicyclists. The scale of these measures ranges from a regional approach (i.e., land use strategies) to facility-specific improvements (i.e., bicycle paths). Strategies that can be used include:

- New pedestrian and bicycle facilities;
- Improved facilities (safety, aesthetic, or travel time improvements); and,
- Bicycle storage systems can be installed at transit terminals, on transit vehicles and at work sites.

The keys to these types of improvements include adequate planning to ensure the facilities are effectively implemented within the overall land use plan and transportation system, and public education and outreach to ensure the implemented improvements are consistent with public desires. Often, multi-agency coordination is required to achieve

the level of planning needed to fully integrate these strategies within the highway and transit systems.

7.3 Level Three Strategies

The third level includes actions which attempt to place the trips not addressed in Levels One and Two into high occupancy vehicles (HOVs). This can be accomplished through various strategies which encourage HOV use and certain types of transportation demand management.

The key to success with HOV strategies is a holistic approach which considers how to aggregate HOV riders at the residential trip end, how to provide preferential treatment of the line-haul portion of the trip (in terms of time and/or cost savings), preferential treatment on the work trip end (i.e. parking availability, location and costs), as well as flexibility (i.e. guaranteed rides home). Thus, strategies in this level, if constructed into packages, will be more successful than if independently evaluated and implemented.

7.3.1 Rideshare Matching Services

A transportation demand management strategy which is effective at shifting trips to higher occupancy vehicles includes providing ride share matching services. This strategy needs effective public education and marketing campaigns to stir interest. Rideshare matching services can be provided by existing agencies, or a new agency, such as a Transportation Management Organization. In addition, a common characteristic of successful ride sharing programs is high level employer support. This typically includes effective communication of the programs to employees as well as preferential treatment for ridesharers, such as special parking spaces and/or rates.

7.3.2 Vanpooling Programs

Another transportation demand management strategy which can be effective at shifting trips to higher occupancy vehicles is the provision of vanpooling programs. These programs are often linked to rideshare matching services, as they both require the same types of information, public education and marketing. As with rideshare matching, high level employer support is important for the program to be successful. This includes preferential treatment for vanpools, such as special parking spaces and/or rates. Vanpool programs typically require a seed agency to provide the initial financial support for the van purchase; however, they can be self supporting. One potential fatal flaw to avoid is to ensure there is adequate parking clearance for the vans -- many parking structures cannot accommodate larger vans.

7.4 Level Four Strategies

Despite the best possible results from strategies in the first three levels, a significant portion of trips on CR 44 will likely remain via the automobile. Thus, the fourth level includes actions to optimize the existing highway system's operation for these residual automobile trips, whether HOV or SOV. This can be accomplished through traffic operational improvements and management, access management and intelligent transportation systems.

7.4.1 Traffic Operational Improvements

Improvements in traffic operations are designed to allow more effective management of the supply and use of existing roadway facilities. These improvements can increase effective capacity by optimizing traffic operations, especially in recurring congestion conditions. Although some of these strategies may involve the construction of additional lanes, this category encompasses improvements intended to help "optimize" existing capacity on the road system, as opposed to "adding" new capacity. Depending on the specific strategy, traffic operations improvements can be appropriate for a region, corridor, or specific facility. Some strategies can include:

- Intersection geometric improvements, such as minor widenings to increase turning movement capacity, restriping, and channelization;
- Intersection turn restrictions to eliminate conflicting movements;
- Traffic signal improvements, such as adjustments to signal timing and phasing, and the installation and maintenance of actuated system components (i.e., loops and controllers);
- Traffic control centers, including coordinated signal systems on arterials, and regional control centers with communication systems to interconnected signal systems;
- Advanced traffic surveillance and control centers allow monitoring, dynamic updates to signal systems, and coordinated traffic signal control and can be used to support incident management and traveler information activities;
- Roadway widening, including auxiliary lanes, passing lanes, widened shoulders, and reversible lanes; and,
- Truck restrictions to increase roadway capacity.

The main keys to success for each of these strategies is thorough engineering studies to identify the appropriate strategy, and the application of appropriate engineering criteria in the design of the improvements. Another important factor is adequate maintenance of traffic signals and loops to ensure the system operates efficiently. Some of these strategies, such as turn and truck restrictions, require public education and outreach.

7.4.2 Access Management

These strategies are designed to improve arterial flow by controlling access to and from arterial roadways. Florida Department of Transportation (FDOT) has developed standards which govern road design and driveway connections. In general, these measures are appropriate for application on CR 44. However, local governments may wish to enforce more strict access management criteria through the site plan review process. Access management strategies can be used to plan for:

- Driveway control (residential and business);
- Median control; and,
- Frontage roads.

Each of these strategies requires the appropriate application of accepted engineering criteria. For new developments, this access control can be implemented during the permitting process. Retrofitting existing roadways typically requires studies to identify the impact of proposed changes and the identification of alternate access opportunities. Public outreach and education can be beneficial when implementing access control, with special attention placed on property directly impacted.

7.4.3 Intelligent Transportation Systems (ITS)

Intelligent Transportation Systems (ITS) include coordinated operational strategies implemented through technology. These systems can be applied to many of the strategies described above, especially in the areas of traffic operations, transit operations, and incident management. In addition, ITS can be applied throughout a region, along a transportation corridor, or on a specific facility. Samples of ITS effective in improving highway operations include:

- Automated toll collection systems to eliminate congestion and delays at toll booths;
- Advanced Traveler Information Systems (ATIS), which may include:
  - *Travel Planning* - Pre-trip multi-modal travel information and ride matching services can help travelers determine their optimal mode choice, departure time, and route before their trips;
  - *Traveler Information* - Real-time information to guide travelers during trips includes advisory services (to warn of traffic or transit congestion or delays), route guidance systems, and traveler services information;
- Commercial Vehicle Operations (CVO) include weigh station pre-clearance, automated safety inspections, on-board safety monitoring, and commercial fleet management; and,
- Advanced Vehicle Control Systems (AVCS) are being researched to assess the viability of technology that could greatly enhance roadway capacity and safety,

including systems for longitudinal collision avoidance, lateral collision avoidance, intersection crash warning and control, vision enhancement, impairment alert, and fully automated vehicles.

One of the keys to success for implementing ITS strategies is the availability of affordable, proven technology. Public outreach and education are also important when implementing new technologies. Some ITS strategies, such as advanced traveler information systems and commercial vehicle operations require multi-agency coordination.

7.5 Level Five Strategies

The fifth level includes strategies to increase the capacity of the highway system by providing additional general purpose lanes.

7.5.1 Addition of General Purpose Lanes

General purpose lanes may be used by all vehicular traffic modes (i.e., SOVs, HOVs, transit, and trucks). The addition of general purpose lanes may include the addition of lanes to an existing facility or the construction of a new facility. These infrastructure improvements may be the best approach to congestion management in some cases, as long as appropriate elements of the other strategies are incorporated into the design and operation of the new or expanded facility. It should also be noted that several measures that would increase the number of general purpose lane miles are also identified under traffic operational improvements (Level Four). The improvements in that section generally refer to smaller scale additions (i.e., turn lanes) or those for specific purposes (i.e., passing lanes).

7.6 Applicable Strategy Screening

Based on this preliminary strategy screening analysis, the long list of almost 60 strategies has been narrowed to 22 strategies that are applicable to the CR 44 Corridor. Table 7.6 documents acceptable strategies and further designates the most appropriate improvement strategies for improving traffic operations along the CR 44 Corridor. Three terms are used to further describe applicable strategies for improving operation along the CR 44 Corridor:

- **Immediate** (Short Term) - Strategies addressing existing operating deficiencies within the 2007 time frame.
- **Long Term** (2012) - Strategies based on existing operating deficiencies and existing services but are contingent upon attainment of certain development thresholds that are likely to be reached but currently are not sufficient to warrant this strategy.

- **Potential** (2022) - Strategies that address some aspect of existing operating deficiencies and make use of some existing services but are contingent upon the development of conditions and services that do not currently exist but are likely to exist in the future.

Table 7.6
Applicable Strategy Screening

Level	Strategy	Screening
1	Land Use Policies / Regulations	Immediate
1	Design Standards	Immediate
1	Locations of Jobs and Housing	Immediate
2	Fleet Expansion	Long Term
2	Transit Park and Ride Facilities	Long Term
2	Service Enhancement / Expansion	Long Term
2	Bicycle Facilities	Immediate
2	Pedestrian Facilities	Immediate
3	Ride Share Matching Services	Immediate
3	Vanpooling	Long Term
4	Intersection Widening	Immediate
4	Channelization	Immediate
4	Intersection Turn Restrictions	Immediate
4	Signalization Improvements	Immediate
4	Computerized Signal System	Long Term/Potential
4	Roadway Widening	Immediate/Long Term
4	Truck Restrictions	Long Term/Potential
4	Driveway Control	Immediate
4	Median Control	Immediate
4	Frontage Roads	Immediate
4	Advanced Traveler Information	Long Term/Potential
5	Construct Arterial Lanes	Immediate/Long Term/Potential

Documentation for the full screening process is available in the *CR 44 Development of Strategies for Strategy Screening and Development of Alternatives for Alternative Screening*, dated June 2003, also prepared by TEI.

8.0 Alternatives Development

Based on the results of the strategy screening analysis; input from the Study Advisory Group; and, information obtained through the public involvement process, seven major alternatives were developed to address needs and deficiencies along the CR 44 Corridor. Many different types of improvements resulted from the screening process; however, they are best characterized by the following seven alternatives.

Alternative #1 – No Build (Do Nothing)

Alternative #2 – Traffic Operations Enhancements

Alternative #3 - Traffic System Management, Transportation Demand Management, Integrated Transportation – Land Use Decision Making

Alternative #4 – Widen CR 44 Along Existing Alignment

Alternative #5 – Widen CR 44 Along a New Alignment

Alternative #6 – Widen CR 44 Along a Partial New and Partial Existing Alignment

Alternative #7 – Bicycle and Pedestrian Enhancements

These seven alternatives were evaluated against objectives established by the Study Advisory Group to designate the preferred improvement alternative. The study objectives relate each alternative to performance criteria that reflect the goals and objectives of roadway users and Lake County residents. Each of the seven improvement alternatives is documented in additional detail in the following sections. It is possible that one or more of these alternatives will be combined to produce the preferred alternative.

8.1 Alternative #1 – No Build

The No Build alternative does not provide any enhancements, other than programmed improvements and routine maintenance, along the CR 44 Corridor through the horizon year of the study, 2022.

Although this alternative was a product of the screening analysis, it was removed from consideration by the Study Advisory Group because it does not address study objectives: Lake County's established goals for the Corridor; and was not identified as a viable alternative through the public involvement process.

8.2 Alternative #2 - Traffic Operations Enhancements

Traffic operations improvements were applied to the Corridor to address existing and future operational and safety deficiencies. Typical proposed traffic operations improvements include:

- Intersection geometric improvements such as minor roadway widening to increase turning movement capacity, restriping, and channelization;
- Intersection turn restrictions to eliminate conflicting movements;
- Traffic signal improvements, such as adjustments to signal timing and phasing, and the installation and maintenance of actuated components (i.e. loops and controllers);
- Minor roadway widening to including auxiliary lanes, passing lanes, widened shoulders, and reversible lanes; and,
- Truck restrictions to increase roadway capacity.

It is important to note that traffic operations improvements implemented as a stand alone alternative do not address all deficiencies along the CR 44 Corridor. The traffic operations improvements tend to address deficiencies in intersections areas and fail to address link capacity deficiencies.

Table 8.2 below documents proposed traffic operations improvements and locations. Further documentation for the proposed traffic operations improvements can be found in the *Preliminary Short Term Improvements,* dated December 2002.

Table 8.2
Traffic Operations Improvement Locations

Intersection	Improvement Type and Location	Anticipated Benefit
Segment #1		
CR 44 & US 441	Construct EB dual left turn lanes Remove WB free flow right turn lane	Reduce EB left turn delay Reduce driver confusion Reduce conflict points/crash reduction
US 441 & CR 44 (Leg A)	Convert full median opening to an EB left turn directional median opening Eliminate SB left turn	Reduction in left turn and rear end crashes along CR 44 (Leg A) as well as US 441.
CR 44 & CR 44 (Leg A)	Lengthen WB left turn lane Realign intersection with Shady Acres Road	Remove left turn vehicles from through lanes Reduce conflict points Improve intersection operations
CR 44 & Silver Lake Road[1]	Construct WB left turn lane	Remove left turn vehicles from through lanes Reduce conflict points Improve intersection operations
Segment #2		
CR 44 & Radio Road	Construct concrete separator from Radio Road to CR 473	Reduce conflict points Improve intersection operations
CR 44 & CR 473[2]	Lengthen WB left turn lane Realign Hickory Hollow Road with CR 473	Increase storage capacity Improve intersection operations

Intersection	Improvement Type and Location	Anticipated Benefit
CR 44 & Dura Stress / Mid-Florida Lakes	Align Dura Stress driveway with Mid-Florida Lakes Construct EB left turn lane Construct WB right turn lane Construct concrete separator along EB approach	Reduce driver confusion Reduce delay Reduce conflict points Improve safety conditions
Segment #3		
CR 44 & Service Trucking Inc Driveway	Construct EB left turn lane Construct WB right turn lane	Remove turning vehicles from through travel lanes Reduce delay
CR 44 & Florida Food Products, Inc.	Construct EB left turn lane Construct WB right turn lane	Remove trucks from through travel lanes Reduce delay
CR 44 & CR 452	Construct right turn acceleration lanes	Reduce intersection delay
CR 44 & CR 19A	Convert CR 19A to right in/right out access only	Reduce conflict points
Segment #4		
CR 44 & Trout Lake Nature Center	Construct WB left turn lane Construct EB right turn lane	Increase safety for school buses Reduce delay
CR 44 & Hicks Ditch Road	Construct EB right turn lane Clear vegetation within the maintained right of way	Reduce conflict points Enhance sight distance
CR 44 & CR 44A	Upgrade pavement markings Install traffic signal Improve right turn radius Install intersection area lighting	Reduce intersection delay Reduce conflict points
CR 44 & Bates Avenue	Construct SB left turn lane Construct WB left turn lane Construct sidewalk on north side of Bates Avenue Provide pedestrian crossing	Reduce intersection delay Reduce conflict points Enhance pedestrian safety
CR 44 & SR 44	Extend WB left turn lane and traffic separator Extend EB right turn lane Install intersection area lighting Install advance warning for Bypass	Reduce delay Reduce conflict points Encourage use of Bypass
SR 44 & CR 44B	Resurface and upgrade intersection markings Install intersection lighting	Improve intersection operations Reduce nighttime crashes

1 - CR 44 & Silver Lake Road Improvement is not included in the *Preliminary Short Term Improvements,* dated December 2002.

2 - The proposed realignment of Hickory Hollow Road was changed from Radio Road to CR 473

8.3 Alternative #3 – Traffic System Management, Transportation Demand Management, Integrated Transportation – Land Use Decision Making

This alternative incorporates travel demand management and transportation system management techniques that increase the useful life of the CR 44 Corridor without substantial capital investment. Most of these strategies focus on trip reduction and management as opposed to capacity expansion for single occupant vehicles (SOV). Several transportation management techniques were identified for this improvement alternative, such as traffic system management, transportation demand management, and an integrated transportation and land use decision-making framework. Some of these transportation management techniques include:

- Intersection geometric improvements such as minor roadway widening to increase tuning movement capacity, restriping, and channelization;
- Traffic signal improvements, such as adjustments to signal timings and phasing, and the installation and maintenance of actuated components (i.e. loops and controllers); and,
- Critical land uses were identified along the Corridor and strategies developed to reduce trip-making characteristics.

Based on the existing land use and development patterns only a limited number of transportation demand management strategies are appropriate for the CR 44 Corridor. As population and traffic volumes increase along CR 44 additional transportation demand management strategies will become practical. Similar to the strategy screening process, three terms were identified to describe applicable TDM strategies for improving operation of the CR 44 Corridor.

- **Immediate** (Short Term) - Strategies addressing existing operating deficiencies within the 2007 time frame.
- **Long Term** (2012) - Strategies based on existing operating deficiencies and existing services but are contingent upon attainment of certain development thresholds that are likely to be reached but currently are not sufficient to warrant this strategy.
- **Potential** (2022) - Strategies that address some aspect of existing operating deficiencies and make use of some existing services but are contingent upon the development of conditions and services that do not currently exist but are likely to exist in the future.

Table 8.3 presents appropriate TDM strategies for the CR 44 Corridor.

Table 8.3
TDM Strategies

TDM Strategy	Action	Implementation Time Frame
Minor Operations and Geometric Improvements	At select locations along the Corridor enhance intersection and link capacity with minor improvements within the existing right of way including: intersection widening, channelization, intersection turn restrictions, signalization improvements, and driveway control.	Immediate
Land Use Policies	Encourage nodal development to reduce need for trip making	Immediate
Design Standards	Develop standards to ensure that as development occurs adequate provision is made for: bike-ped facilities, shared parking, access management and buildings patterns and form consistent with the long range vision for the CR 44 Corridor.	Immediate/Mid-Term
Bicycle Facilities	Identify appropriate locations for bicycle and pedestrian facilities – linking major origins and destinations	Immediate
Ride Share Matching Services	Develop a rideshare database to facilitate carpooling and reduce single occupant vehicles trips along the Corridor.	Immediate/Mid-Term
Vanpooling Programs	Create a vanpool program to service older and aging driver population; reduce single occupant vehicles trips and link key Corridor origins and destinations.	Mid-Term/Long Term
Access Management	This strategy includes driveway control, median control and frontage roads.	Immediate/Mid-Term and Long-Term
Provision of Transit Amenities	Provide bus shelters, electronic/digital transit information, and transit service coordination.	Long-Term

Many TDM strategies are low cost, stand-alone improvements making them strong candidates for inclusion with other improvement alternatives. Consequently, it is recommended that the TDM alternative or components of it be included with the preferred alternative.

8.4 Alternative #4 – Widen CR 44 Along Existing Alignment

This improvement includes the widening of the CR 44 Corridor along its existing alignment. This widening alternative is generally expected to contain a four-lane divided typical section providing four, twelve-foot travel lanes separated by a raised median varying in width from fifteen to twenty-two feet. At selected, heavily developed locations with restricted right of way, the typical section will shift to provide a five-lane section including four, twelve-foot travel lanes and a twelve-foot two way left turn lane (TWLTL). The widening improvement is expected to improve intersection operations as well as link capacities along the CR 44 Corridor.

Table 8.4 presents the sections recommended for widening as well as the anticipated year of implementation.

Table 8.4
Alternative #4 - Widening Program

From	To	Year of Implementation
US 441	Treasure Island Avenue	Beyond 2022
Treasure Island Avenue	Emeralda Avenue	2012
Emeralda Avenue	Grand Island Shores Road	2022
Grand Island Shores Road	SR 19	2012
SR 19	SR 44	2022
SR 44	CR 44B	2012

Enhancing the CR 44 Corridor to a four-lane divided section requires an access management strategy. Access management improves arterial flow by controlling access to, from, and across arterial roadways. FDOT has developed standards (Rule Chapters 14-96 and 14-97) that govern road design and driveway connections. In general, these measures are appropriate for application to CR 44. Access management strategies can be used to regulate:

- Driveway control (business and residential);
- Median control; and,
- Frontage roads.

Some major access management principles include: limiting the number of conflict points; separating conflict points; remove turning volumes from through movements; and reduction of excessive queuing in through travel lanes. These strategies benefit many road users. Drivers benefit from fewer conflict points and reduced travel times to destinations. Businesses benefit from an increased market area and greater traffic volumes passing by on a daily basis. Another beneficiary is governmental agencies that can deliver efficient transportation at a lower cost.

Additionally, hard statistical evidence shows that access management can produce an improvement in traffic safety – reducing the number of crashes along a four-lane corridor by approximately 35%. Further, FDOT analysis shows that a typical four-lane arterial with access management can handle approximately 10,000 more vehicles per day than the same four-lane road without access management.

One major drawback associated with this alternative is a significant right of way acquisition would be required to accommodate 4 through travel lanes. The existing right of way along CR 44 is typically 66 feet. This is not sufficient right of way to accommodate a four-lane divided section. In many areas the right of way considered for the widening alternative is 120 feet, which is an optimum width.

8.5 Alternative #5 – Widen CR 44 Along a New Alignment

This improvement includes the widening of the CR 44 Corridor along a new alignment. This widening alternative is generally expected to contain a four lane, divided typical section providing four, twelve-foot travel lanes separated by a raised median varying in width from fifteen to twenty-two feet.

Although this alternative is a product of the screening analysis, it was removed from further consideration after preliminary analysis identified: high construction costs, significant environmental impacts and general disapproval from the public involvement process.

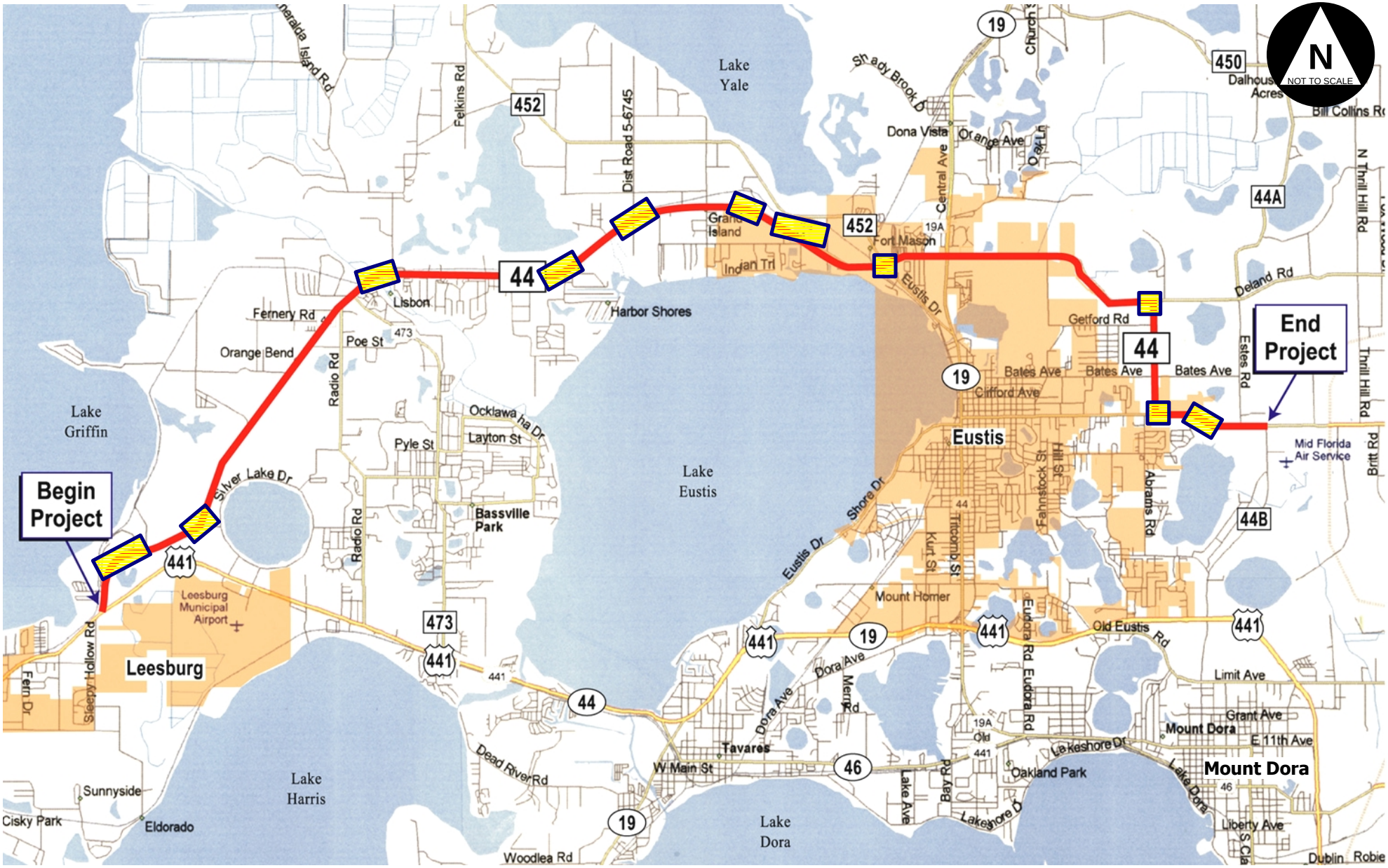
8.6 Alternative #6 – Widen CR 44 Along a Partial New and Partial Existing Alignment

This alternative is a variation of Alternative #4 and Alternative #5. This widening alternative is generally expected to contain a four-lane, divided typical section providing four, twelve-foot travel lanes separated by a raised median varying in width from fifteen to twenty-two feet. The typical section will vary throughout the length of the project to minimize impacts. At selected, heavily developed locations with restricted right of way, the typical section will shift to provide a five-lane section including four, twelve-foot travel lanes and a twelve-foot two way left turn lane (TWLTL). This widening improvement is expected to improve intersection operations as well as link capacities along the CR 44 Corridor.

The proposed new alignment locations were identified based on two key factors: the need to address capacity deficiencies at key congested locations; and, input from the public involvement process identifying several curves with perceived geometric or operational deficiencies. Key locations with changes in alignments include:

- Between US 441 and CR 44 (Leg A);
- Silver Lake Road;
- Haines Creek Bridge;
- Harbor Shores Road;
- CR 452;
- CR 44A; and,
- SR 44.

These locations are displayed in Figure 8.6.



- Potential Realignment

TEI Engineers & Planners	Figure No: 8.6	Page No: 58	*Potential Widening Along New Alignments* **CR 44: US 441 to CR 44B**

It is likely that the new or shifted alignments identified as part of this alternative are also appropriate for incorporation with other improvement alternatives. Consequently, it is recommended that, as appropriate, portions of this alternative be included with the preferred alternative.

Enhancing the CR 44 Corridor to a four-lane divided section along a partial new and partial existing alignment also requires a strategy for access management as previously derived for Alternative #4.

8.7 Alternative #7 – Bicycle and Pedestrian Enhancements

Enhanced bicycle and pedestrian facilities can provide a safer community with better access to public and recreational facilities and connectivity between land uses. It is the intent of this study to enhance the bicycle and pedestrian facilities along the CR 44 Corridor. This alternative is an applicable component of the previous six alternatives and is expected to be included with the preferred alternative.

There are several bicycle and pedestrian enhancements that can be applied to the Corridor, including:

- No Build;
- Optimum Bicycle and Pedestrian Facility Design;
- Bicycle and Pedestrian Facilities at Select Locations; and,
- Multi-Use Trail.

8.7.1 No Build

The No Build alternative implies no significant improvement to the system of bicycle and pedestrian facilities along the Corridor. Existing facilities would continue to be maintained in good condition. Currently, sidewalks exist on SR 19 between Umatilla and US 441, and on CR 19A between SR 19 and CR 44. There is also a three-foot paved shoulder along portions of CR 44 in the vicinity of SR 19.

8.7.2 Optimum Design

This alternative assumes an optimum scenario for the system of bicycle and pedestrian facilities. Five-foot wide sidewalks would be constructed along both sides of CR 44 for the entire length of the Corridor. Sidewalks would also be constructed along collector streets in residential areas providing connectivity to sidewalks on CR 44. Providing bicycle and pedestrian connectivity to Lake Sumter Community College and Lake Square Shopping Center was considered a high priority in this scenario. Sidewalks are proposed for the following locations:

- Estes Road;
- Abrams Road;
- Bates Avenue;
- Fish Camp Road;
- Goose Creek Road;
- Radio Road; and,
- Silver Lake Drive.

This alternative also provides for connections to Lake Sumter Community College and CR 473 between CR 44 and US 441.

Sidewalks would be constructed with adequate horizontal and vertical grade separation from high-speed automobile traffic. A four-foot wide marked and signed bike lane would be constructed along both sides of CR 44 for the entire length of the Corridor. The Optimum Design Alternative is illustrated in Figure 8.7.2.

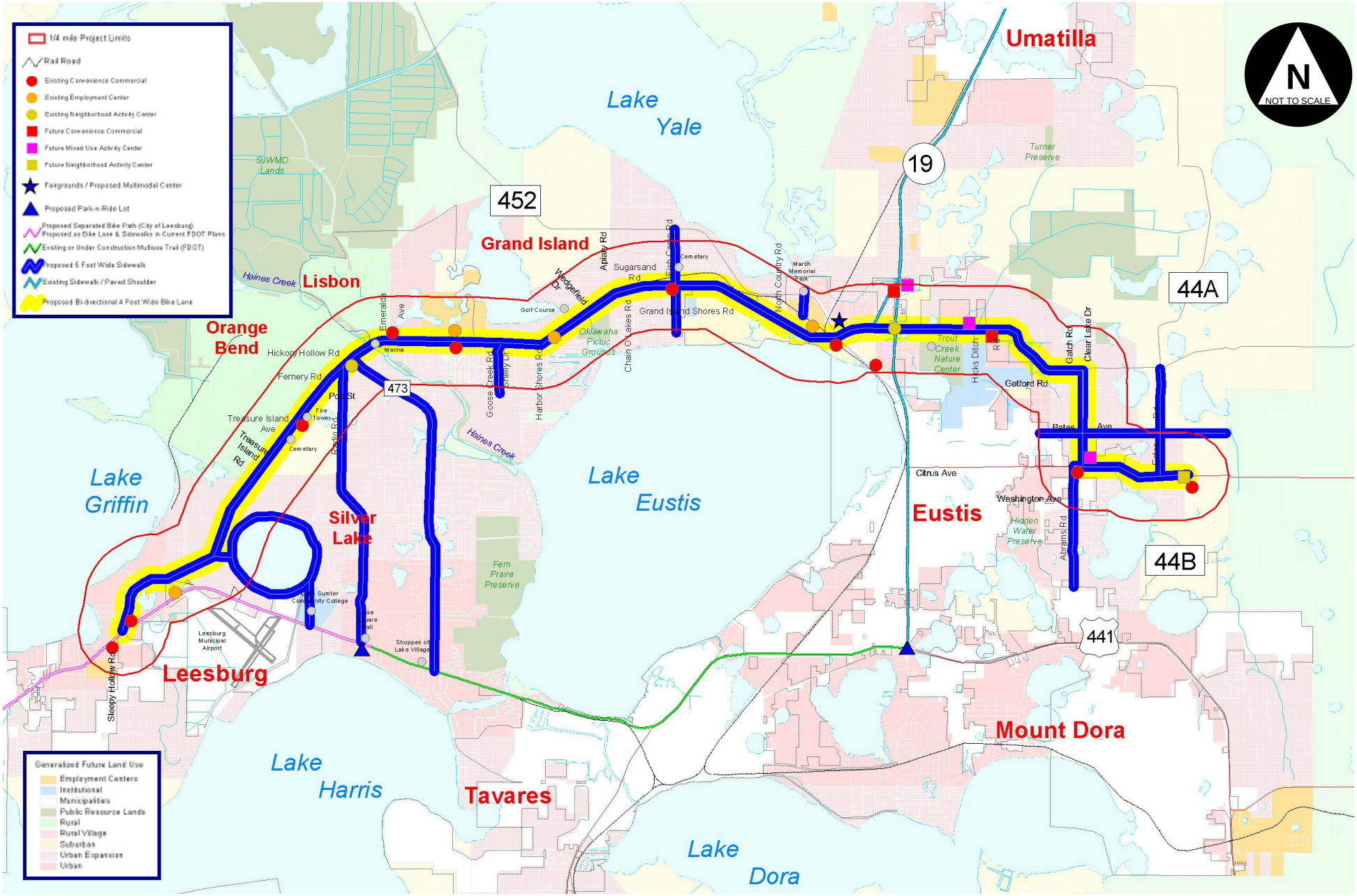
8.7.3 Select Locations

Sidewalks would be constructed only at select locations in this alternative, as part of the CR 44 Corridor Study. Pedestrian improvements would be constructed to provide linkage between residential areas and existing convenience commercial centers, key employments centers, and the two schools where attending children are old enough to walk or ride a bicycle. Because of safety considerations, bicycle lanes are not proposed at select locations for this alternative. Discontinuous bicycle lanes that do not connect to other bicycle friendly facilities or roadways pose a safety hazard to users. The Select Locations Alternative is shown in Figure 8.7.3.

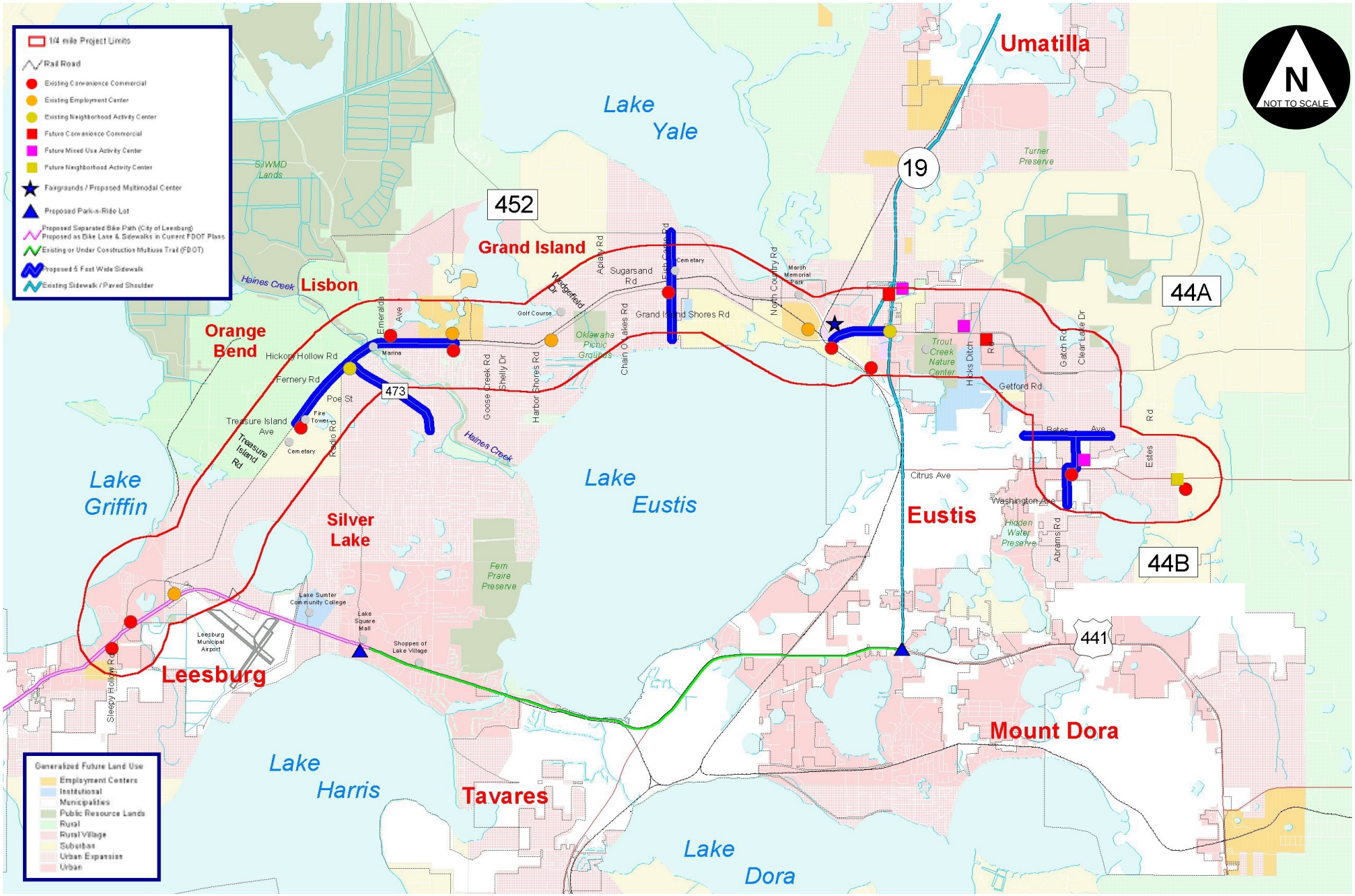
8.7.4 Multi-Use Trail

The abandoned railroad right of way in the vicinity of the Corridor provides an opportunity for the County to obtain a continuous corridor linking existing and new recreation uses located in the vicinity of CR 44. Sections of the railroad right of way have already been obtained by private parties, highlighting the need for the County to take action before this opportunity is lost. The City of Leesburg has already taken steps to acquire the railroad right of way within that jurisdiction for the purpose of trail construction.

This alternative includes the construction of a multi-use trail within the existing CSX Railroad corridor and along public right of way, between US 441 near Leesburg to Downtown Eustis. The first leg of the proposed multi-use recreation trail would extend north from downtown Mount Dora along CR 44B, turns west on CR 44 and continues along local streets to downtown Eustis. The trail would continue north from Eustis along the railroad corridor to the County Fairgrounds. From the Fairgrounds the trail continues



Engineers & Planners	Figure No: 8.7.2	Page No: 61	*Optimum Bicycle and Pedestrian Facility Design* **CR 44: US 441 to CR 44B**

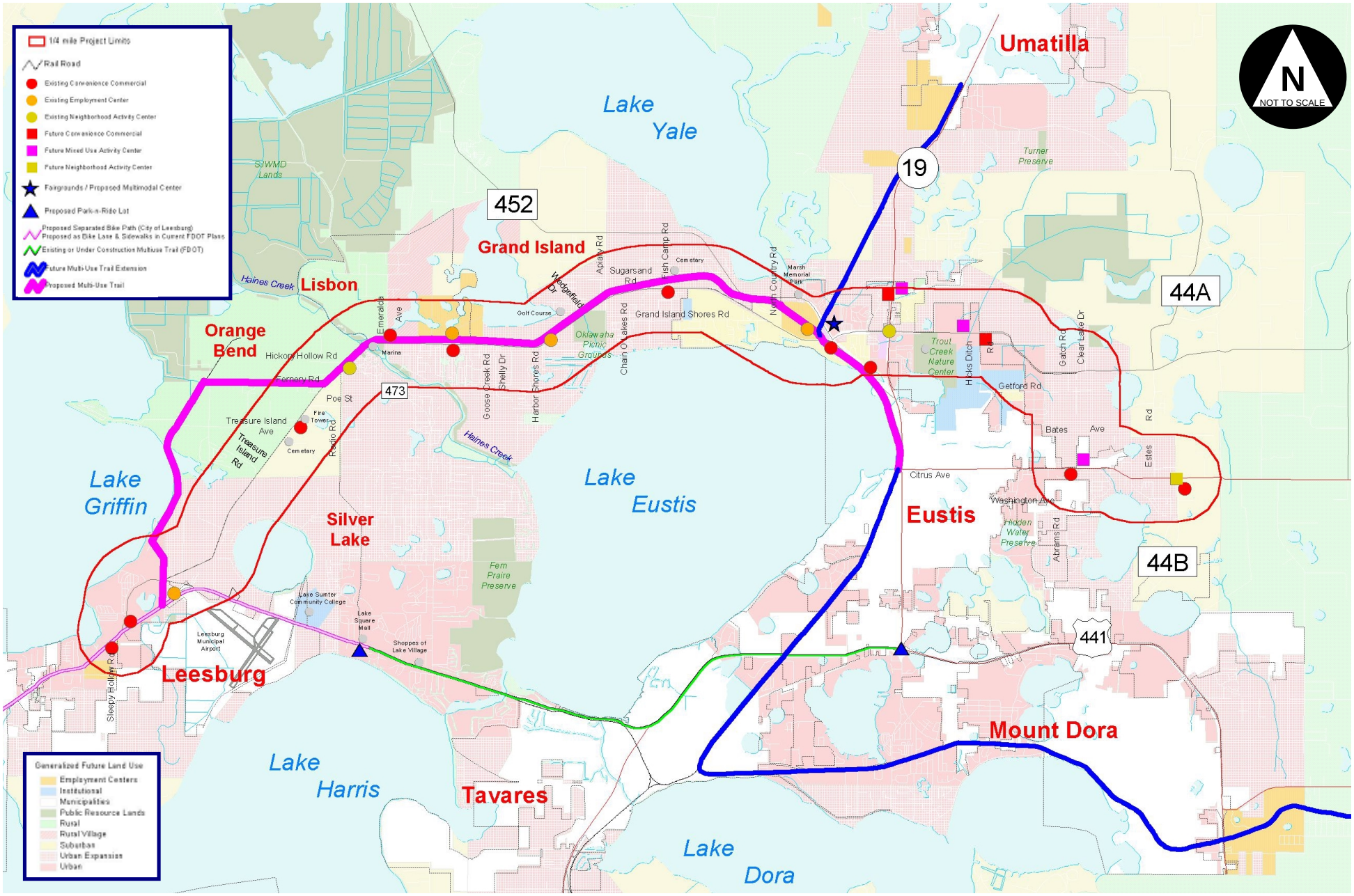


Engineers & Planners	Figure No: 8.7.3	Page No: 62	***Bicycle and Pedestrian Facilities at Select Locations*** **CR 44: US 441 to CR 44B**

west along the railroad corridor providing access to the Oklawaha Picnic Grounds and Haines Creek. The trail would then continue south along the outer edge of the CR 44 right of way to Fernery Road. The trail would continue west along Fernery Road to connect with a section of abandoned railroad. A detour is proposed at this juncture to connect the trail with the Tanner Preserve on Lake Griffin. The trail continues south at first along the abandoned rail line and finally along Shady Acres Road to connect with the bicycle and pedestrian facilities proposed for US 441.

This alternative assumed that the portions of the CSX corridor extending north to Umatilla and south to Mount Dora would be constructed at a future date because these segments are outside the CR 44 Corridor Study limits. Figure 8.7.4 illustrates the Multi-Use Trail Alternative.

Many bicycle and pedestrian improvements are low cost, stand-alone improvements making them strong candidates for inclusion with other improvement alternatives. Consequently, it is recommended that the bicycle and pedestrian alternative, or components of it, be included with the preferred alternative.



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8.7.4	64

Engineers & Planners

Multi-Use Trail

CR 44: US 441 to CR 44B

9.0 Evaluation of Alternatives

This section presents an evaluation of the seven alternatives against selected study performance measures.

9.1 Study Performance Measures

Based on input from the Study Advisory Group, and the public involvement process, a set of performance measures was developed to evaluate improvement alternatives. Some performance measures sought to evaluate each alternative by assessing the operation of projected traffic through the CR 44 Corridor. Other performance measures related alternatives to critical measures that would impact operations but were not directly associated with traffic analysis output. The following sections describe the performance measures and how they were used to evaluate each alternative.

Eighteen performance measures were identified for evaluating the proposed improvement alternatives; the first four were identified as **critical** by the Study Advisory Group. An alternative failing to meet all four critical criteria was identified as "fatally flawed" and excluded from further consideration.

1. **Improves Link LOS** - Based on the results of the traffic analysis, an assessment of the operating conditions for each roadway link within the study was completed. A goal for the Corridor Study was to reduce the number of deficient approaches to signalized intersections with a particular emphasis placed on improving the operation of the CR 44 approaches during the peak travel period. Based on this performance measure, the better the level of service of the CR 44 approaches to signalized intersections, the more favorably an alternative was ranked.

2. **Improves Intersection LOS** - Based on the results of the simulation analysis, an assessment of the level of service for each signalized intersection was completed. An alternative was more favorably considered based on the number of intersections that were projected to operate at LOS "D" or better in the horizon year, 2022.

3. **Improves Safety** - A consideration of this study was the number of crashes occurring along CR 44. The crashes not only decrease safety but also negatively impact the operation of the Corridor. An alternative that included documented safety improvements such as: turn lanes; access management; and the construction of medians, was viewed more favorably than alternatives without improvements documented to improve safety.

4. **Accommodates Future Capacity** - Based on the results of the traffic analysis, an assessment of the roadway capacity for each roadway link within the study was completed. A goal for the Corridor Study was to increase the capacity of the

Corridor. Based on this performance measure, the better the level of service of the CR 44 roadway links, the more favorably an alternative was ranked.

The remaining performance measures, although important tools for evaluating each alternative were not given as high a priority based on input from the Study Advisory Group and the public involvement process.

5. **Design Costs -** The costs associated with the design of minor improvements included: small links of new road construction to shift and align intersection approaches; right and left turn lane construction; median construction; signalization costs; maintenance of traffic costs, and mobilization costs. The higher the improvement costs for an alternative, the lower an alternative was ranked. For alternatives adding lane miles of improvements the following variables were taken into consideration: project length; typical section; median width; lane width and sod. Costs with these improvements also included: engineering costs; construction costs; maintenance of traffic costs; and mobilization costs. The higher the improvement cost for an alternative, the lower the alternative was ranked.

6. **Construction Costs -** The costs associated with the construction of minor improvements included: small links of new road construction to shift and align intersection approaches; right and left turn lane construction; median construction; signalization costs; maintenance of traffic costs, and mobilization costs. The higher the improvement costs for each alternative, the lower an alternative was ranked. For alternatives adding lane miles of improvements the following variables were taken into consideration: project length; typical section; median width; lane width and sod. Costs with these improvements also included: engineering costs; construction costs; maintenance of traffic costs; and mobilization costs. The higher the improvement cost for an alternative, the lower the alternative was ranked.

7. **Right of Way Impacts -** Right of way along CR 44 is restricted and portions of the Corridor have development approaching the edge of right of way – particularly along Segment 3. Alternatives with typical sections that require the acquisition of significant right of way were ranked less highly than alternatives with typical sections that required minimal or no right of way acquisition. Significant right of way acquisition would negatively impact businesses and residents as well as introduce high construction costs.

8. **Environmental Impacts –** Several areas of the CR 44 Corridor run along or through wetlands. One of the goals for CR 44 Corridor Study is the preservation and enhancement of these resources. Consequently, alternatives that provided fewer impacts to these resources were ranked higher than alternatives that substantially impacted these features.

9. **Drainage Impacts –** Because much of the CR 44 Corridor is lined with existing development and natural features, limited opportunities exist to address drainage issues associated with Corridor expansion or enhancement. Alternatives that require right of way acquisition or substantial costs to address drainage issues were ranked lower than alternatives that could be accommodated with the existing drainage infrastructure.

10. **Utility Impacts –** Much of the CR 44 Corridor is lined with utilities including water, overhead power, and gas. Alternatives that provided minimum impact or relocation costs to these utilities were ranked higher than alternatives that required significant utility relocations. Alternatives that relocated utilities below ground were considered more favorable than alternatives that simply relocated pole mounted utilities.

11. **Social Impacts –** As part of this study, cultural features in the study area were documented including schools, churches, and recreational facilities. One of the goals for the CR 44 Corridor Study is the preservation and enhancement of these resources. Consequently, alternatives that provided fewer impacts to these resources were ranked higher than alternatives that substantially impacted these features.

12. **Neighborhood Impacts –** The CR 44 Corridor is lined with a number of neighborhoods that contribute to the vitality and character of the Corridor. Some of these neighborhoods contain unique demographics that afford special protection. Alternatives that impact fewer neighborhoods were scored more favorably than alternatives that required taking homes or property from multiple developments.

13. **Improves Aesthetics** - The CR 44 Corridor is a primary route through Lake County, and as such, the appearance of the Corridor is significant to both the public officials and citizens. An aesthetically pleasing Corridor suggests a high quality of life and enhances both property values and residents' perception of Lake County. Consequently, alternatives that enhanced the aesthetics of the Corridor were ranked higher than alternatives that only increased capacity but did not improve the appearance of the Corridor.

14. **Accommodates Future Transit –** Transit services are anticipated to increase along the Corridor throughout the design year of this study. Alternatives that provided for and enhance transit operations were viewed more favorably. Further, alternatives that incorporated transit or development ordinances that encourage multi-modalism were viewed more favorably than alternatives that simply enhanced capacity.

15. **Accommodates Future Land Use Plan-** Land use along the Corridor is anticipated to change throughout the design year of this study. It was important to preserve potential uses for both undeveloped and redeveloping properties along CR 44. Alternatives that maintained adequate access and did not curtail potential land uses were viewed more favorably than those that limited future land use through restricted

access or right of way acquisition. Further, alternatives that incorporated detailed land use policies or development ordinances that encourage either multi-modalism or compact development patterns were viewed more favorably than alternatives that simply enhanced capacity.

16. **Available Existing Funding** - Alternatives that could be constructed based on existing funding sources were ranked higher compared to alternatives which required additional funding sources.

17. **Consistent with Transportation Plan –** Lake County recently updated its Transportation Element of the Comprehensive Plan and as part of this effort established a vision, priority, and schedule for transportation enhancements through the study area. Alternatives that complement the Transportation Element of the Comprehensive Plan were ranked higher than alternatives that fail to support the Plan.

18. **Stand Alone Project –** Alternatives that addressed deficiencies without supplemental projects were ranked higher than alternatives that required multiple complimentary improvements.

9.2 Evaluation of Alternatives Against Study Performance Measures

Table 9.2 compares each of the seven alternatives resulting from the screening process to performance measures established by the Study Advisory Group. The seven alternative improvement concepts are:

1. No Build (Do Nothing)
2. Traffic Operation Enhancements
3. Traffic System Management, Transportation Demand Management, Integrated Transportation – Land Use Decision Making
4. Widen CR 44 Along Existing Alignment
5. Widen CR 44 Along a New Alignment
6. Widen CR 44 Along a Partial New and Partial Existing Alignment
7. Bicycle and Pedestrian Enhancements

The purpose of this evaluation is to identify critical flaws with an alternative to eliminate it from further consideration. The Study Advisory Group identified eighteen performance measures. Of these, four were established as critical to the CR 44 Corridor:

- Improves Link Level of Service
- Improves Intersection Level of Service
- Improves Safety
- Accommodates Future Capacity

Each alternative was qualitatively evaluated against each performance measure. If an alternative failed to satisfy one of these critical performance measures it was eliminated from consideration. The result of this analysis was documentation of the preferred improvement alternative. Shaded areas represent failure of an alternative to satisfy requirements of a critical performance measure.

Input from the Study Advisory Group and public concluded that Alternative #7, Bicycle and Pedestrian Enhancements, was essential to any improvements proposed along the Corridor. As a result, this alternative will be included in conjunction with any other recommended improvements. It is not evaluated as part of the Alternative Evaluation Matrix presented on the following page. A separate evaluation is provided to determine the most appropriate bicycle and pedestrian improvements. This analysis is presented in Section 9.3 – Multi-Modal Alternatives Development.

Table 9.2
Alternative Evaluation Matrix

Study Performance Measure	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5	Alternative #6
Improves Intersection LOS	Likely to decline	Will improve as additional turn lanes are added in the intersection areas.	Will improve as additional turn lanes are added in the intersection areas.	Will improve as additional turn and through travel lanes are added in the intersection areas. Signal timing improvements will enhance capacity.	Will improve as additional turn and through travel lanes are added in the intersection areas. Signal timing improvements will enhance capacity.	Will improve as additional turn and through travel lanes are added in the intersection areas. Signal timing improvements will enhance capacity.
Improves Link LOS	Likely to decline	Will not improve as link capacity remains unchanged and traffic volumes increase	Minimal improvement	Likely to improve additional link capacity constructed.	Likely to improve additional link capacity constructed.	Likely to improve additional link capacity constructed.
Improves Safety	Crashes likely to increase as more queuing and delay occur along CR 44.	Minor decrease in crashes anticipated as queues should be reduced in intersection areas and turning vehicles are removed from through travel lanes in the intersection areas.	Minor decrease in crashes anticipated due to reduced traffic volumes and queues should be reduced in intersection areas and turning vehicles are removed from through travel lanes.	Decrease in crashes anticipated due to improved intersection and link geometry.	Maximum decrease in the number of crash occurrences.	Decrease in crashes anticipated due to improved intersection and link geometry.
Accommodates Future Capacity	Likely to decline	Adds minimal additional capacity.	Adds minimal additional capacity.	Four-lane widening will accommodate higher capacities.	Four-lane widening will accommodate higher capacities.	Four-lane widening will accommodate higher capacities.
Design Costs	None	Moderate Costs	Moderate Costs	High Costs	Highest Cost Alternative	High Costs
Construction Costs	None	Moderate Costs	Moderate Costs	High Costs	Highest Cost Alternative	High Costs

Study Performance Measure	Alternative #1	Alternative #2	Alternative #3	Alternative #4	Alternative #5	Alternative #6
Right of Way Impacts	None	Minor acquisition possible required in intersection areas.	Minor acquisition possibly required in intersection areas.	Acquisition required that will potentially impact the existing residential and commercial properties along the Corridor.	Major acquisition required that will significantly impact the existing residential and commercial properties along the Corridor.	Acquisition required that will potentially impact the existing residential and commercial properties along the Corridor.
Environmental Impacts	None	Low	Low	Moderate	High	Moderate
Drainage Impacts	None	Low	Low	Moderate	High	Moderate
Utility Impacts	None	Minimal	Minimal	Moderate - High	Moderate - High	Moderate - High
Social Impacts	None	None	None	Moderate - High	High	Moderate - High
Neighborhood Impacts	None	Minimal	Minimal	Moderate	Moderate - High	Moderate
Improves Aesthetics	No	No	No	Landscaped medians along a majority of the Corridor.	Landscaped medians along the entire length of the Corridor.	Landscaped medians along a majority of the Corridor.
Accommodates Future Transit	No	Yes	Yes with special transit provisions.	Yes, no special transit provisions	Yes, no special transit provisions	Yes, no special transit provisions
Accommodates Future Land Use Plan	No	Supports the intent of the land use plan.	Does supports the land use plan.	Does supports the land use plan.	Does supports the land use plan.	Does supports the land use plan.
Available Existing Funding	None required	Yes	Yes	No	No	No
Consistent with Transportation Plan	Not consistent with Transportation Plan	Yes	Yes	Yes	Yes	Yes
Stand Alone Project	Not Applicable	Yes	Yes	Yes	Yes	Yes

9.3 Multi-Modal Alternatives Development

Because bicycle and pedestrian were heavily emphasized by the public throughout the study, a separate multi-modal alternatives analysis was conducted to determine the most appropriate improvements. All of these improvements are associated with Alternative #7 – Bicycle and Pedestrian Enhancements.

The following four alternatives were evaluated in this multi-modal alternatives analysis:

- No Build;
- Optimum Bicycle and Pedestrian Facility Design;
- Bicycle and Pedestrian Facilities at Select Locations; and,
- Multi-Use Trail.

The multi-modal alternatives analysis provides a comparison of the four multi-modal alternatives and ranks those alternatives using multi-modal performance measures. Eleven performance measures were selected based on their applicability to the unique character of the CR 44 Corridor. Multi-modal alternatives and evaluation measures are described below in detail. Related multi-modal issues that were considered for the CR 44 Corridor are also discussed.

9.3.1 Multi-Modal Study Objectives

Multi-modal performance measures are intended to predict the likelihood that facilities that promote alternative modes of transportation could or should be implemented in the CR 44 Corridor. Alternative modes of transportation in the context of this analysis refer to bicycle and pedestrian amenities and facilities. The following performance measures were used to evaluate the potential for implementing non-auto roadway improvements:

- Accessibility and Connectivity Measures
  - Number of schools within ¼ mile
  - Number of commercial centers within ¼ mile
  - Number of employment centers within ¼ mile
  - Number of parks within ¼ mile
  - Pedestrian accessibility (Population within ¼ mile of sidewalks or multi-use paths)
  - Pedestrian connectivity (Number of sidewalk termini per square mile)
  - Bicycle accessibility (Population within ½ mile of a bike lanes or multi-use paths)
- Public Safety Measures
  - Proximity to bicycle/pedestrian involved crashes (Length of bike lanes, sidewalks and/or multi-use trails within ¼ mile of bicycle/pedestrian crashes)

  - Miles of bicycle/pedestrian facility separated or buffered from high speed auto traffic
- Qualitative Measures
  - Perceived pleasantness of travel
- Costs Measures
  - Estimated right of way and construction costs

9.3.2 Multi-Modal Alternatives Scoring and Prioritization

The results of the multi-modal performance measure analysis are summarized below in Table 9.3.2.1 for each measure. The multi-modal alternatives were subsequently ranked for each performance measure in Table 9.3.2.2, based on its performance relative to the other three alternatives. The ranked scores were then totaled for each alternative to arrive at a total alternative score. The lower the score the better the performance of the alternative.

Table 9.3.2.1
Multi-Modal Performance Measure Results

Performance Measures	Multi-Modal Alternatives			
	No Build	Optimum	Selective	Multi-Use Trail
Number of School Walk Zones within ¼ mile	0	2	2	0
Number of Shopping Centers within ¼ mile	2	12	9	10
Number of Employment Centers within ¼ mile	0	4	2	4
Number of Parks within ¼ mile	1	2	1	2
Connectivity Index (Miles of connected sidewalks, bike lanes, or multi-use trail segments)	2.04	30.63	9.28	14.32
Pedestrian Accessibility Index (Population within ¼ mile of sidewalks or multi-use paths)	1,157	13,591	5,358	11,834
Bicycle Accessibility Index (Population within ½ mile of bike lanes or multi-use paths)	829	10,136	829	21,789
Proximity of Multi-modal Facilities to Bicycle/Pedestrian Involved Crashes (linear miles)	0.00	2.25	0.25	1.00
Linear miles of Bicycle/Pedestrian Facilities Separated or Buffered from High Speed Auto Traffic	2.04	34.00	7.24	14.32
Perceived Pleasantness of Travel	Poor	Good	Moderate	Good
Estimated Construction Costs	$0	$17,473,732	$1,372,885	$6,769,536

Table 9.3.2.2
Multi-Modal Performance Measure Ranking

Performance Measures	Multi-Modal Alternatives			
	No Build	**Optimum**	**Selective**	**Multi-Use Trail**
Number of School Walk Zones within ¼ mile	2	1	1	2
Number of Shopping Centers within ¼ mile	4	1	3	2
Number of Employment Centers within ¼ mile	3	1	2	1
Number of Parks within ¼ mile	2	1	2	1
Connectivity Index (Miles of connected sidewalks, bike lanes, or multi-use trail segments)	4	1	3	2
Pedestrian Accessibility Index (Population within ¼ mile of sidewalks or multi-use paths)	4	1	3	2
Bicycle Accessibility Index (Population within ½ mile of bike lanes or multi-use paths)	3	2	3	1
Proximity of Multi-modal Facilities to Bicycle/Pedestrian Involved Crashes (linear miles)	4	1	3	2
Linear miles of Bicycle/Pedestrian Facilities Separated or Buffered from High Speed Auto Traffic	4	1	3	2
Perceived Pleasantness of Travel	3	1	2	1
Estimated Construction Costs	1	4	2	3
Total Ranking Score	34	15	27	19
Alternative Rank	**4**	**1**	**3**	**2**

The "Optimum" alternative ranked highest followed by the Multi-Use Trail alternative using the measures described above. This analysis implies that the "Optimum" alternative provides the greatest multi-modal benefit to residents and employees in the CR 44 Corridor. The "Optimum" alternative also requires the greatest costs in terms of financial investment. Conversely, the Multi-Use Trail alternative provides significant multi-modal benefits at roughly 40% the cost of the "Optimum" alternative.

The multi-modal transportation analysis provides a general picture of the required costs and benefits that would be realized by investing in facilities and amenities for non-automotive modes of transportation. The sections of abandoned railroad right of way along the Corridor present an opportunity for the County to connect with the expanding system of bicycle and pedestrian trails in the region. The corridor trail system could ultimately be linked to existing multi-use trails in Orange and Seminole Counties. A network of trails would enhance local recreational opportunities and could serve as an economic stimulus for the communities linked by the trail.

10.0 Preferred Alternative

The alternatives analysis resulted in a combination of several improvement alternatives as the most appropriate to satisfy travel demands along the CR 44 Corridor. The preferred alternative recommended for CR 44 is to widen along a partial new and partial existing alignment. In addition, it is recommended that several other improvement alternatives, or subsets of them be incorporated into the preferred improvement concept.

- Bicycle and pedestrian improvements were identified as critical enhancement to the CR 44 Corridor.

- To address the critical operational and safety issues, and extend the useful life of CR 44, it is recommended that the traffic operations improvements be included as part of the preferred alternative.

- Transportation demand management components represent cost effective, practical approaches to addressing congestion along CR 44 while at the same time increasing the useful life of the existing geometry and increasing the quality of life. It is recommended that as appropriate population, employment and development thresholds are reached along the CR 44 Corridor, the appropriate TDM measure or measures be implemented.

The following sections refine the preferred alignment to further meet the needs of the CR 44 Corridor.

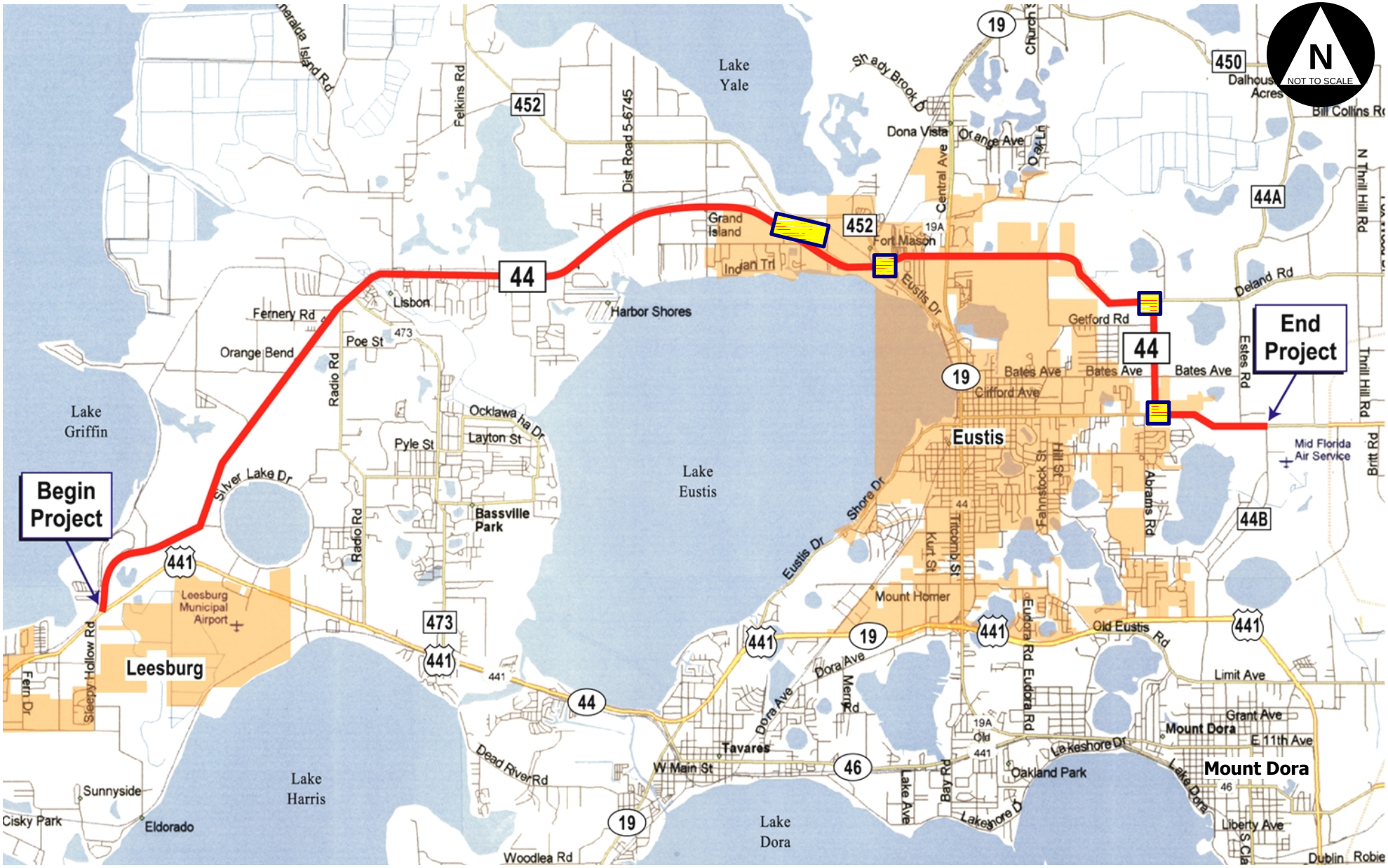
10.1 New Alignments

Refinements were necessary for the preferred alternative developed by this study to establish the final alignment. Figure 8.6 previously showed the potential areas where the widening of the CR 44 Corridor would follow a new alignment. It was determined that several of these locations were not necessary for realignment or produced significant impacts.

The following locations were determined appropriate locations for roadway widening along a new alignment:

- Area in the vicinity of CR 44 and CR 452;
- Intersection of CR 44 and CR 452;
- Intersection of CR 44 and CR 44A; and,
- Intersection of CR 44 and SR 44.

These locations can be found in Figure 10.1



- Potential Realignment

Figure No:	Page No:
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Proposed Widening Along New Alignments

CR 44: US 441 to CR 44B

10.2 Preferred Alternative Initial Impact Analysis

To establish a base for the impacts analysis, a 120 foot typical section was used along the preferred alignment. This typical section represents the standard for a four-lane divided road within an urban or transitioning area. An urban typical section was used because of the development expected within the next 20 years along the Corridor. Figure 10.2 displays the 120 foot typical section used for the initial impact analysis.

Initially 3 scenarios were developed for the impact analysis:

- Left Widening (North);
- Center Widening; and,
- Right Widening (South).

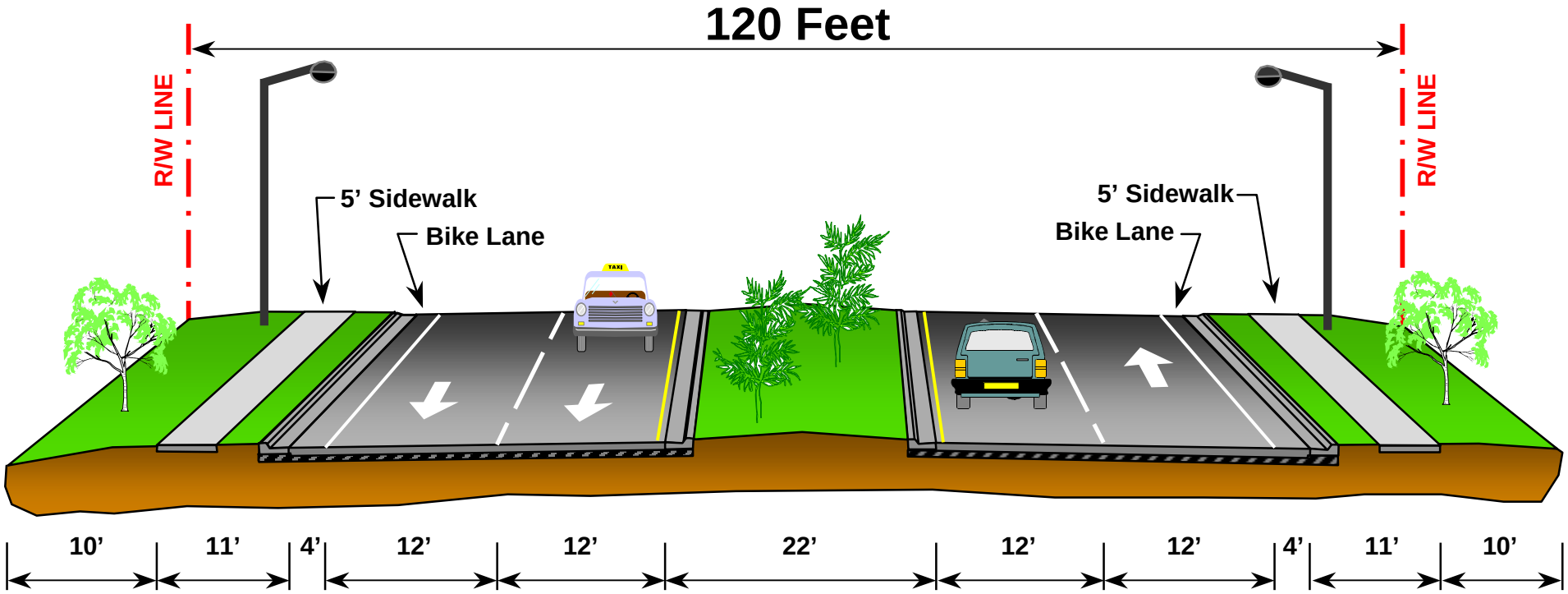
The following situations were considered in the impact analysis:

- Number of Residences Displaced;
- Number of Agricultural Land Displaced;
- Number of Businesses Displaced;
- Number of Other (Community) Sites Displaced;
- Number of Known Historical/Archaeological Sites Displaced;
- Impacts to Utilities;
- Impacts to Wetlands; and,
- Impacts to Recreation/Parks.

Tables 10.2.1 to 10.2.3 display the results of the left, center, and right widening alternatives.

Table 10.2.1
Left Alignment Widening Impacts

CR 44 Segments		Displacements (#)					Environmental and Physical Impacts (Yes/No)		
From	To	Residential	Agricultural	Business	Other (Community)	Historical / Archaeological Sites	Utilities	Wetlands	Recreation / Parks
Treasure Island Ave	Emeralda Ave	3	1	2	0	0	Yes	Yes	No
Emeralda Ave	Grand Island Shores Rd	7	0	4	0	0	Yes	Yes	No
Grand Island Shores Rd	SR 19	6	0	4	1	0	Yes	Yes	No
SR 19	SR 44	3	6	0	0	0	Yes	Yes	No
SR 44	CR 44B	0	0	0	0	0	No	No	No



Desirable Urban Section

Design Speed = 50 mph

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Figure No:	Page No:
10.2	78

120′ Typical Section

CR 44: US 441 to CR 44B

Table 10.2.2
Center Alignment Widening Impacts

CR 44 Segments		Displacements (#)					Environmental and Physical Impacts (Yes/No)		
From	To	Residential	Agricultural	Business	Other (Community)	Historical / Archaeological Sites	Utilities	Wetlands	Recreation / Parks
Treasure Island Ave	Emeralda Ave	15	3	5	2	0	Yes	Yes	No
Emeralda Ave	Grand Island Shores Rd	44	7	4	0	0	Yes	Yes	No
Grand Island Shores Rd	SR 19	2	0	1	2	0	Yes	Yes	No
SR 19	SR 44	7	7	0	0	0	Yes	Yes	No
SR 44	CR 44B	0	0	0	0	0	No	No	No

Table 10.2.3
Right Alignment Widening Impacts

CR 44 Segments		Displacements (#)					Environmental and Physical Impacts (Yes/No)		
From	To	Residential	Agricultural	Business	Other (Community)	Historical / Archaeological Sites	Utilities	Wetlands	Recreation / Parks
Treasure Island Ave	Emeralda Ave	6	1	2	1	0	No	Yes	No
Emeralda Ave	Grand Island Shores Rd	45	3	2	1	0	No	Yes	Yes
Grand Island Shores Rd	SR 19	7	0	1	0	0	Yes	No	Yes
SR 19	SR 44	11	8	0	0	0	No	Yes	No
SR 44	CR 44B	0	0	0	0	0	No	No	No

Review of the results from the initial impact analysis shows that a 120 foot typical section has significant impacts to the Corridor. There are several considerations that would reduce the number of impacts, such as a hybrid alignment, which would transition between a left, center, and right alignment to avoid impacts, and reducing the typical section in constrained areas.

10.3 Preferred Alignment

The first consideration in reducing the number of impacts along the Corridor is choosing an alignment that traverses the left, center, and right alignments. This hybrid alignment would allow the roadway widening to occur along an optimum alignment and potentially reduce several of the impacts associated with the left, center, and right alignments.

A second consideration for the roadway widening is to vary the typical section, especially in constrained areas. The 120 foot typical section used in the initial impact analyses is the standard typical section for a four-lane divided urban section. The 120 foot typical section can be reduced to a 97.5 foot typical section and even further reduced to a constrained 83.5 foot typical section. An additional typical section considered would be a five-lane section, which only requires a 90 foot typical section. Figure 10.3 displays the additional typical sections.

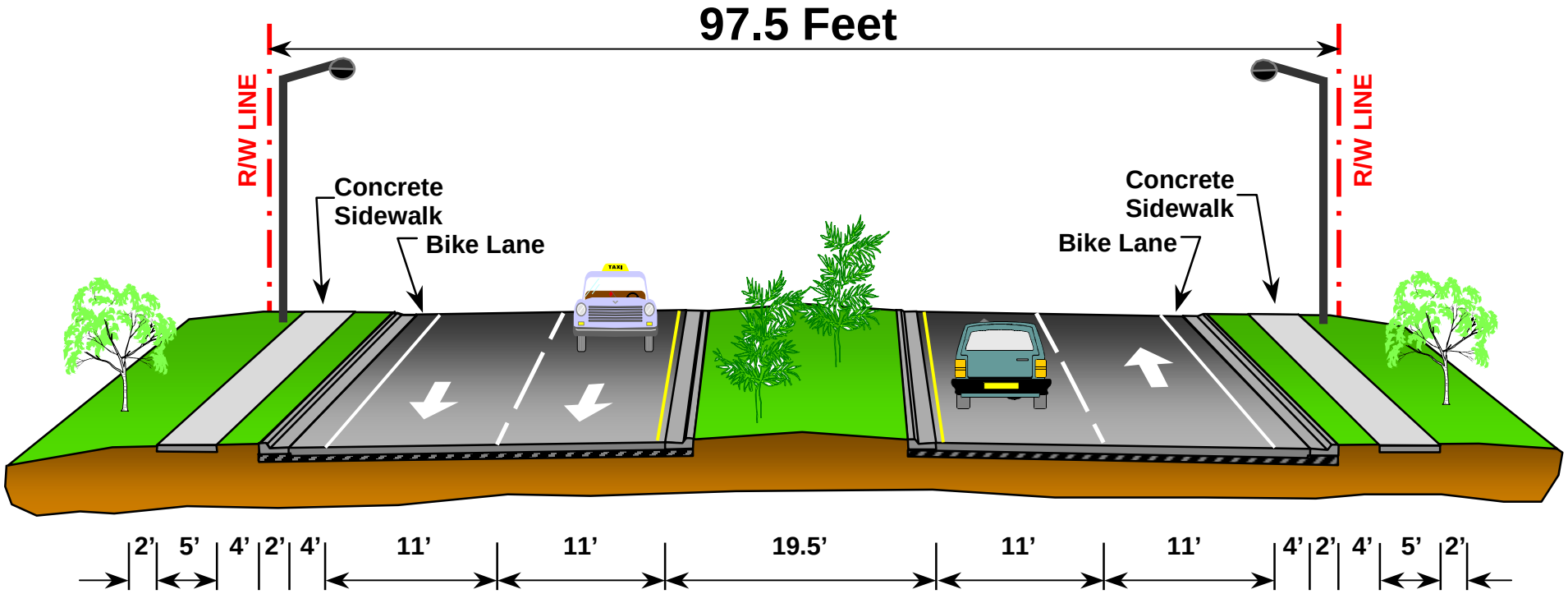
The preferred alignment can be found on a series of aerials in Appendix H.

10.4 Preferred Alternative Final Impact Analysis

The impact analysis was conducted with the hybrid alignment and varying the typical sections in constrained areas, forming the preferred alignment. Table 10.4 displays the impacts associated with the preferred alignment, as well as the remaining segment of the Corridor, from US 441 to Treasure Island Avenue.

Table 10.4
Preferred Alignment Widening Impacts

CR 44 Segments		Displacements (#)					Environmental and Physical Impacts (Yes/No)		
From	To	Residential	Agricultural	Business	Other (Community)	Historical / Archaeological Sites	Utilities	Wetlands	Recreation / Parks
US 441	Treasure Island Ave	2	7	0	0	0	Yes	Yes	No
Treasure Island Ave	Emeralda Ave	1	2	0	0	0	Yes	No	No
Emeralda Ave	Grand Island Shores Rd	0	5	0	0	0	Yes	Yes	No
Grand Island Shores Rd	SR 19	0	0	1	0	0	Yes	No	No
SR 19	SR 44	1	6	0	0	0	Yes	Yes	No
SR 44	CR 44B	0	2	0	0	0	Yes	No	No



Minimum Urban Section

Design Speed = 50 mph

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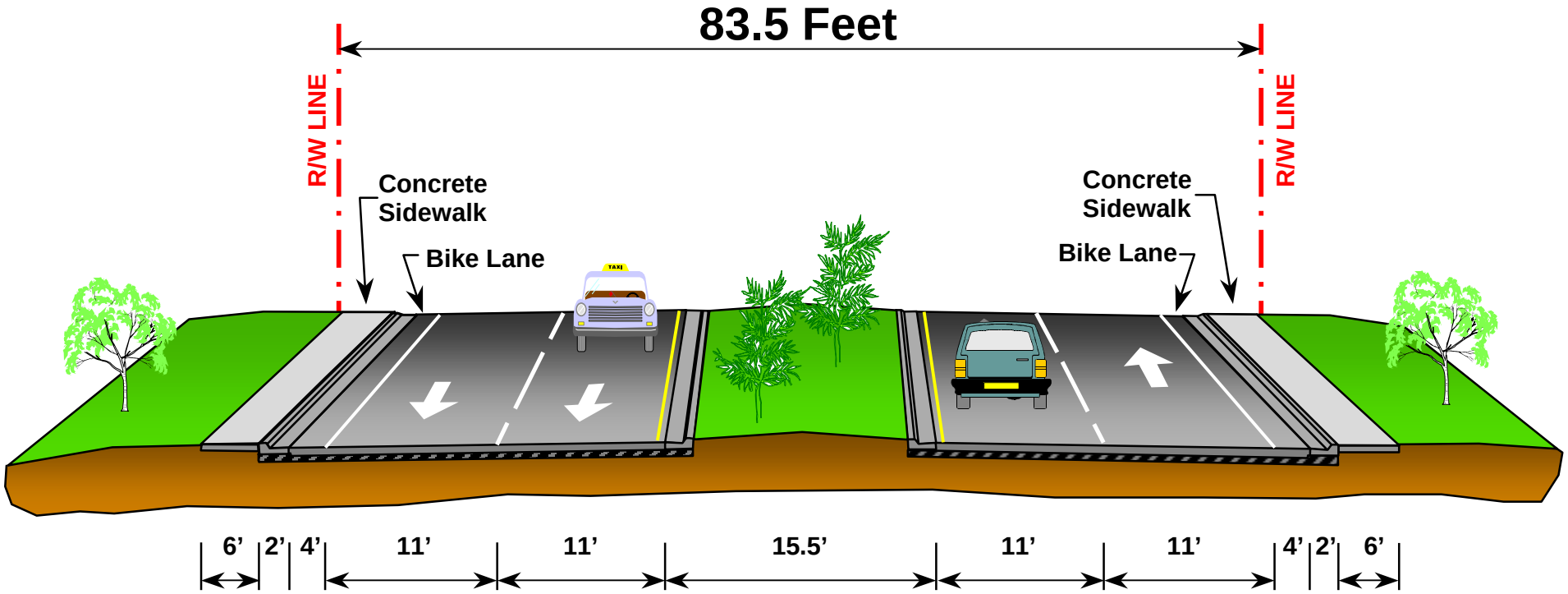
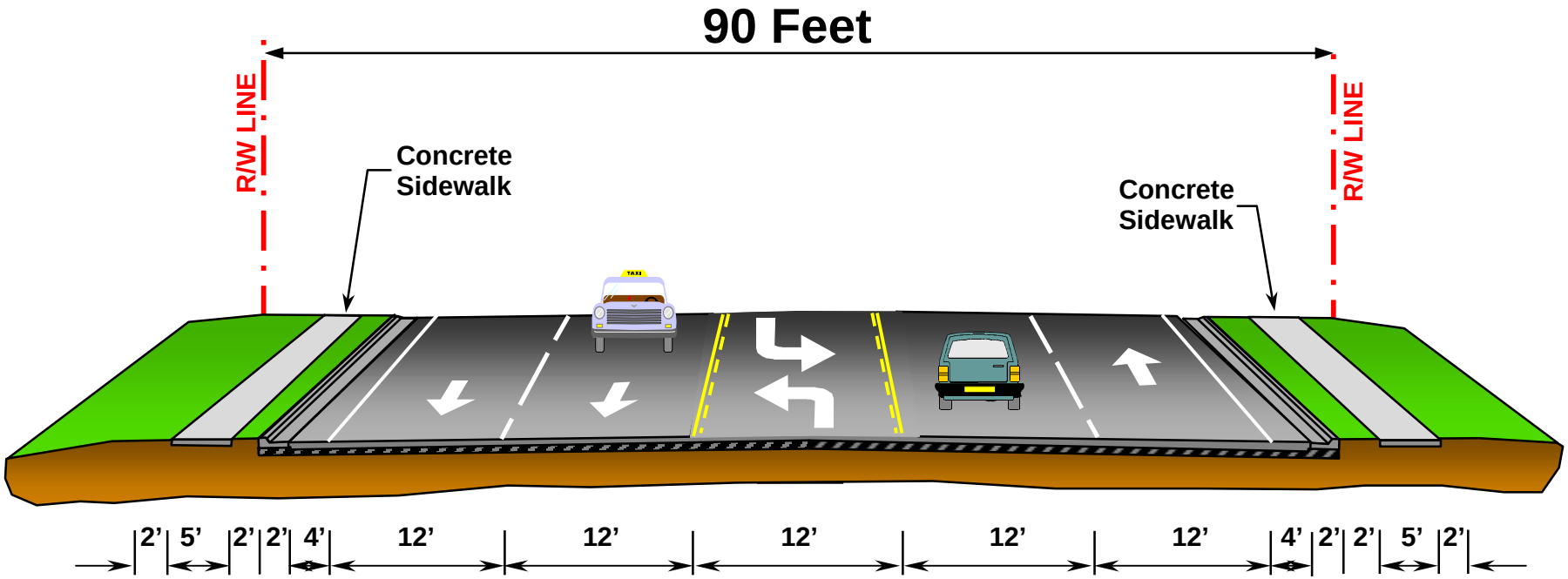
Preferred Typical Section

CR 44: US 441 to CR 44B



Constrained Urban Section

Design Speed = 45 mph



Desirable 5-Lane Section

Design Speed = 40 mph

It can be seen that the impacts were significantly reduced and considered acceptable for a 15-mile corridor. It is unreasonable to assume that a roadway widening with limited right of way would yield no impacts.

10.5 Implementation of the Preferred Alternative

The alignment for the roadway widening has been determined, now it is necessary to determine which segments of the Corridor require widening sooner than other segments. This is a key factor in the Implementation Plan. Documentation for the implementation plan is available in the *CR 44 Implementation Plan*, dated July 2003, also prepared by TEI.

Review of the No Build link deficiencies was used to establish which areas of the Corridor would require enhancements first. Three segments of the CR 44 Corridor are characterized by operating under unsatisfactory conditions by the mid-year, 2012. These segments include:

- CR 44: Treasure Island Avenue to Emeralda Avenue
- CR 44: Grand Island Shores Road to SR 19
- SR 44: CR 44 to CR 44B

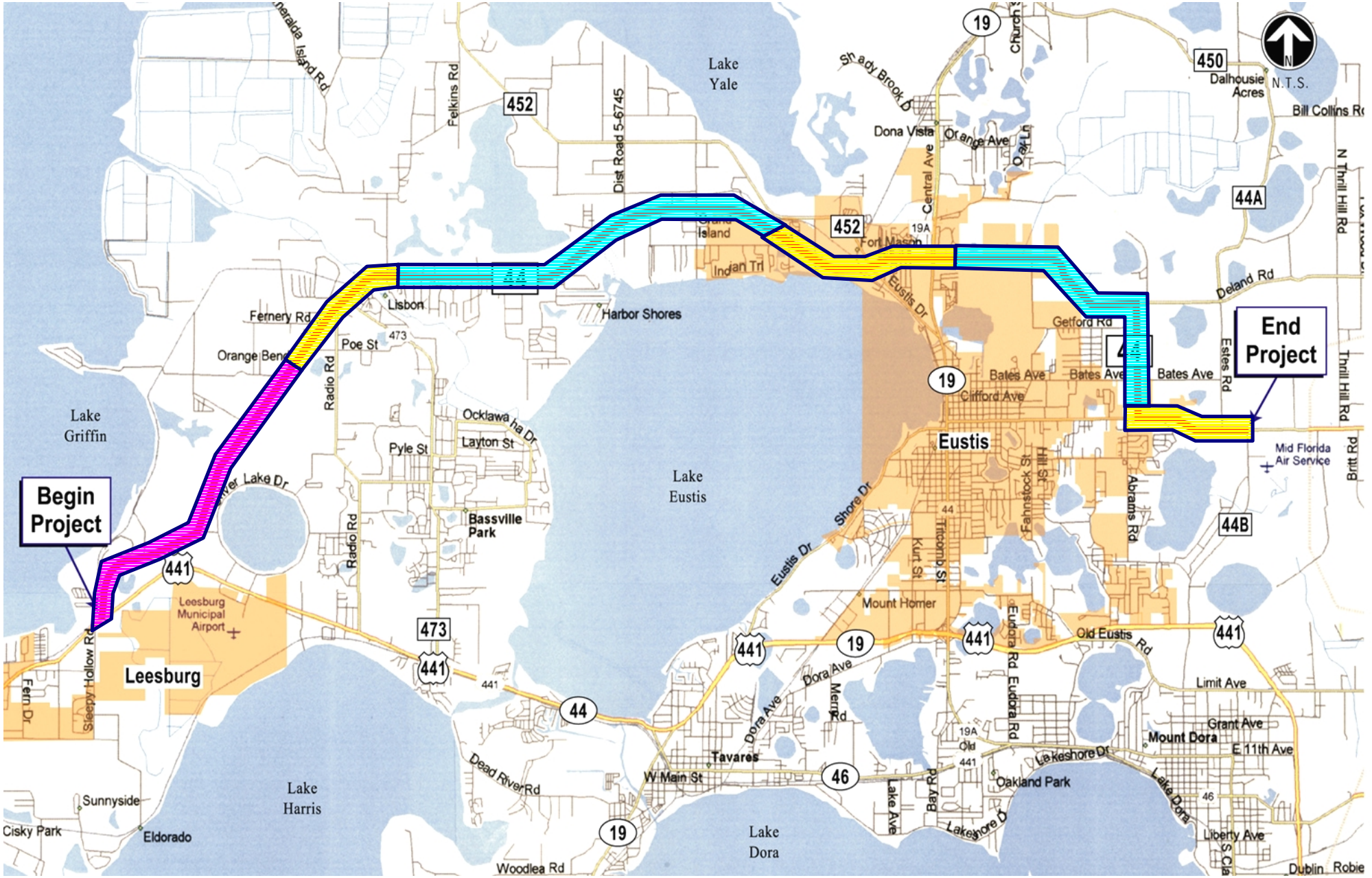
The remaining segments between Treasure Island Avenue and CR 44B are characterized by operating under unsatisfactory conditions by the horizon year, 2022. The segment between US 441 and Treasure Island Avenue is not expected to require roadway widening until after the horizon year, 2022.

The phasing of these improvements can be found in Figure 10.5.

10.6 Drainage

To meet the needs of the improvements along the CR 44 Corridor an enhanced drainage system is recommended. The preferred alignment was analyzed with the water basins and elevations along the Corridor. Fifteen (15) locations were determined as potential pond sites and are documented in Table 10.6.

The soils along the Corridor are well drained, therefore a soil factor of 0.20 was used and a pond depth of 2 and 3 feet was used in determining the pond size. For the purpose of this report, a majority of the ponds were designed as square ponds, however Ponds 5, 8, and 9 required special consideration, due to potential impacts and availability of land, and were sized as rectangular ponds. The drainage assessment contained here is preliminary and provides for rough impact and cost analysis.



- 2012 Widening
- 2022 Widening
- Beyond 2022 Widening

TEI Engineers & Planners	Figure No: 10.5	Page No: 85	*Preferred Alternative Implementation* **CR 44: US 441 to CR 44B**

Table 10.6
Potential Pond Sites

Pond	Drainage Basin	Impervious Area (ft^2)	Soil Factor	Pond Depth (ft)	Effective Pond		
					Area (ft^2)	Length (ft)	Width (ft)
1	Haines Creek Basin	271,800	0.2	3	11,182	106	106
2	Haines Creek Basin	201,600	0.2	2	11,370	107	107
3	Haines Creek Basin	105,300	0.2	2	4,524	67	67
4	Lake Eustis Basin	998,400	0.2	2	78,747	281	281
5	Lake Eustis Basin	364,800	0.2	2	24,224	311	78
6	Lake Eustis Basin	552,000	0.2	3	26,558	163	163
7	Lake Yale Outlet Canal Basin	445,200	0.2	3	20,567	143	143
8	Lake Yale Outlet Canal Basin	438,375	0.2	3	20,188	284	71
9	Lake Eustis Basin	445,500	0.2	3	20,583	287	72
10	Trout Lake Outlet Basin	344,700	0.2	2	22,592	150	150
11	Trout Lake Outlet Basin	394,800	0.2	2	26,680	163	163
12	Trout Lake Outlet Basin	793,200	0.2	3	40,437	201	201
13	Trout Lake Outlet Basin	141,375	0.2	3	4,653	68	68
14	Lake Joanna Basin	492,375	0.2	3	23,198	152	152
15	Lake Joanna Basin	525,600	0.2	3	25,066	158	158

The locations of the pond sites can also be found on the preferred alignment on a series of aerials in Appendix H.

10.7 Noise Walls

The construction of noise walls along the Corridor was brought up several times throughout the public involvement process. An area of particular concern is along SR 44 in the vicinity of CR 44B for the residence of Joanna Park Place. The area, along CR 44, in the vicinity of Grand Island Shores Road was also recommended by the public as a potential location for noise walls.

It is recommended that the needs and feasibility for noise walls be completed during the design process for the Corridor.

10.8 Cost Estimates

The initial cost estimates started with Florida Department of Transportation's (FDOT's) 2002 Transportation Costs, dated March 2003. This reference is based on FDOT's Long Range Estimate System statewide costs and therefore consideration should be taken when applying these costs to the CR 44 Corridor.

The 2002 Transportation Costs lists a four-lane divided urban roadway as $4,273,200 per mile of new roadway and a five-lane undivided urban roadway as $3,305,100 per mile of new roadway. The reference also lists the estimated cost of a continuous span bridge as $60-$85 per square foot and the average engineering costs as 36% of the construction costs.

The estimated cost for a four-lane divided roadway appears to be high and was reduced to 3,500,000 which is consistent with cost estimates conducted by Seminole County. The estimated cost used for the bridge is $80 per square foot due to the possible issues associated with the Haines Creek Bridge. Also, the engineering costs were reduced to 27%, which is consistent to the values used by FDOT District 5.

Table 10.8.1 below present the costs used for the initial cost estimate for the CR 44 Corridor.

Table 10.8.1
Roadway Construction Unit Costs

Construction Type	Urban Section
4/5 Lane Roadway	
New Construction (Undivided) with 5' Paved Shoulders with 12' Auxiliary Lane	$3,305,100 per mile
New Construction (Divided) with 5' Paved Shoulders	$3,500,000 per mile
Bridge	
Reinforced Concrete Flat Slab Continuous Span	$80 per ft^2

Using costs and the staging of the CR 44 Corridor, Table 10.8.2 presents the estimated costs for the construction and design of the preferred alternative. These values represent present costs and are merely an estimate of the costs associated with a widening project such as the CR 44 Corridor.

Table 10.8.2
Roadway Improvement Costs

Improvement	Dimension	Cost
2012		
Treasure Island Ave to Emeralda Avenue	1.55 mi	$5,122,905
Grand Island Shores Road to SR 19	1.47 mi	$4,858,497
CR 44 to CR 44B	1.11 mi	$3,885,000
Haines Creek Bridge (ft^2)	39,562 ft^2	$3,164,960
Sub Total	4.13 mi	$17,031,362
Engineering (PECEI)	27%	$4,598,468
Total		$21,629,830
2022		
Emeralda Avenue to Grand Island Shores Road	4.63 mi	$16,205,000
SR 19 to SR 44	3.21 mi	$11,235,000
Sub Total	7.84 mi	$27,440,000
Engineering (PECEI)	27%	$7,408,800
Total		$34,848,800
Beyond 2022		
US 441 to Treasure Island Avenue	3.20 mi	$11,200,000
Sub Total	3.20 mi	$11,200,000
Engineering (PECEI)	27%	$3,024,000
Total		$14,224,000
Total Project Cost	**15.17 mi**	**$70,702,630**

The estimated cost for the acquisition of right of way required for the widening of the CR 44 Corridor is approximately $22,350,000. This additional right of way also includes the land required for the potential ponds.

10.9 Preferred Alignment Option

An option to preferred alignment was developed through the public involvement process in the vicinity of CR 44 and CR 452. This improvement option would connect CR 44 with CR 452 approximately 1.2 miles northwest of the existing intersection, in the vicinity of Sparrow Lane. The new intersection is recommended to incorporate a new driveway for Service Trucking, Inc. CR 44 would maintain a portion of CR 452's alignment then extend southeast following the abandoned rail right of way until it connects with CR 44's existing alignment just east of CR 44 and CR 452. It is recommended that Country Road be developed to service the businesses and residences along the CR 44 between Grand Island Shores Road and CR 452.

This improvement option eliminates the impacts associated with the proposed constrained typical section in this area along CR 44. The owner of Florida Food Products, Inc. acknowledged this improvement alternative and expressed his willingness to assist the County and donate the necessary land within his parcel for the realignment alternative.

This improvement option for the preferred alignment is displayed graphically on an aerial in Appendix I.

11.0 Build Traffic Conditions

The results of the No Build analysis identified numerous operational and safety deficiencies along the CR 44 Corridor through the horizon year, 2022. The No Build analysis serves as the basis for comparing the improvements associated with the preferred alternative.

11.1 Build Traffic Volumes

In order to effectively evaluate the Build alternatives with the No Build alternatives, it was determined that the same traffic volumes develop for the 2012 and 2022 No Build analysis would be appropriate. This allows for comparative analysis between the two alternatives and distinguishes the enhancements presented by the Build alternative.

11.2 2012 Build Analysis

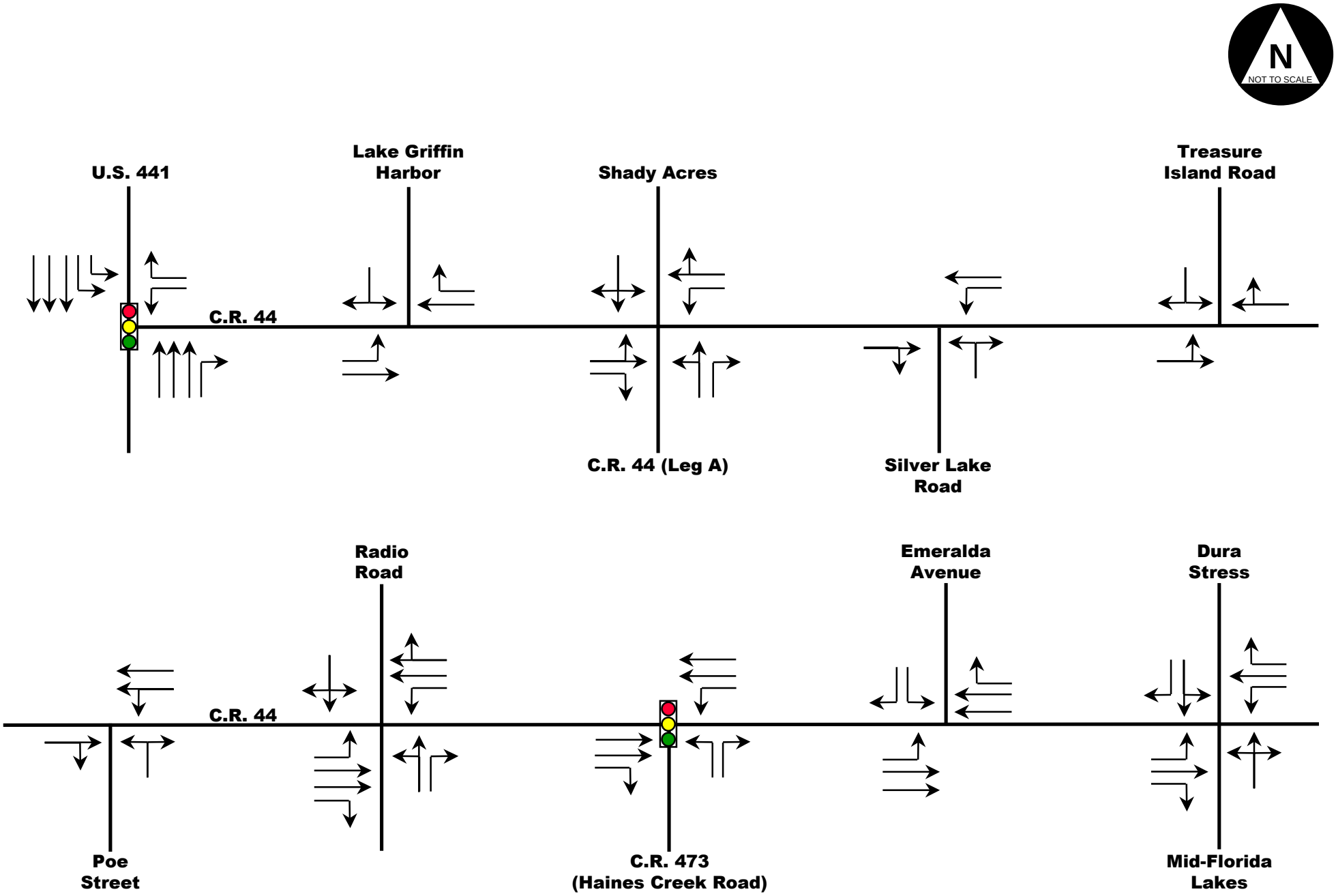
Using the traffic volumes developed from the No Build analysis, the 2012 Build intersection and link analysis was completed and documented in the following sections. The geometry used for the 2012 Build analysis can be found in Figure 11.2.

11.2.1 2012 Build Intersection Analysis

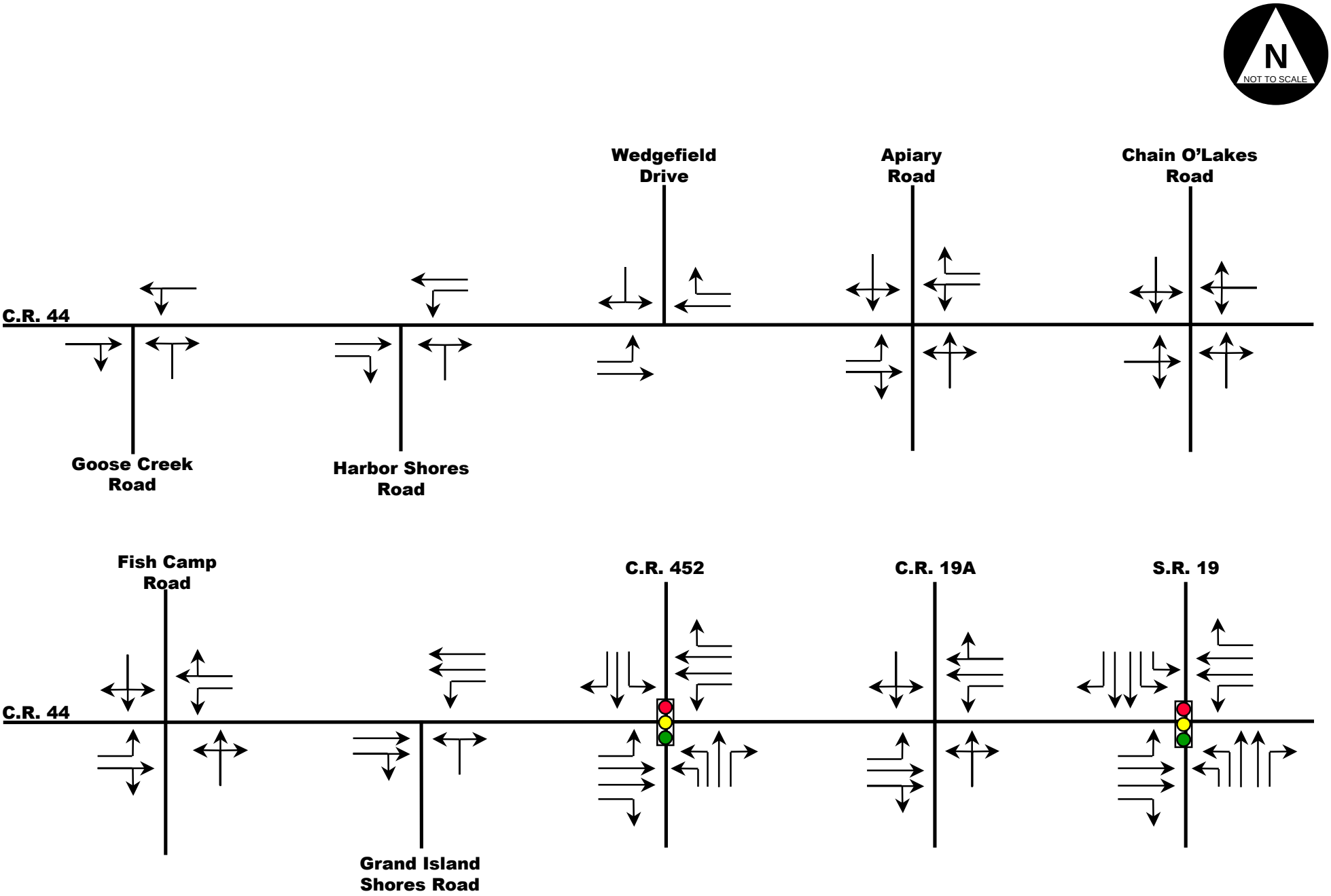
Table 11.2.1.1 and Table 11.2.1.2 document the comparison of 2012 No Build and 2012 Build operating conditions at the study intersections along the Corridor. Complete 2012 Build HCS output is provided in Appendix J.

Table 11.2.1.1
2012 No Build & 2012 Build Operating Conditions
(Signalized Intersections)

Intersection with CR 44	2012 No Build		2012 Build	
	Delay (Seconds)	Level of Service	Delay (Seconds)	Level of Service
US 441	**108.7**	**F**	52.4	D
CR 473	**68.1**	**E**	18.1	B
CR 452	54.6	D	44.9	D
SR 19	**63.7**	**E**	46.2	D
SR 44	22.6	C	22.6	C
CR 44B	31.3	C	31.3	C



Engineers & Planners	Figure No: 11.2	Page No: 91	*2012 Build Geometry* **CR 44: US 441 to CR 44B**


N
NOT TO SCALE
Wedgefield Drive
Apiary Road
Chain O'Lakes Road
C.R. 44
Goose Creek Road
Harbor Shores Road
Fish Camp Road
C.R. 452
C.R. 19A
S.R. 19
C.R. 44
Grand Island Shores Road

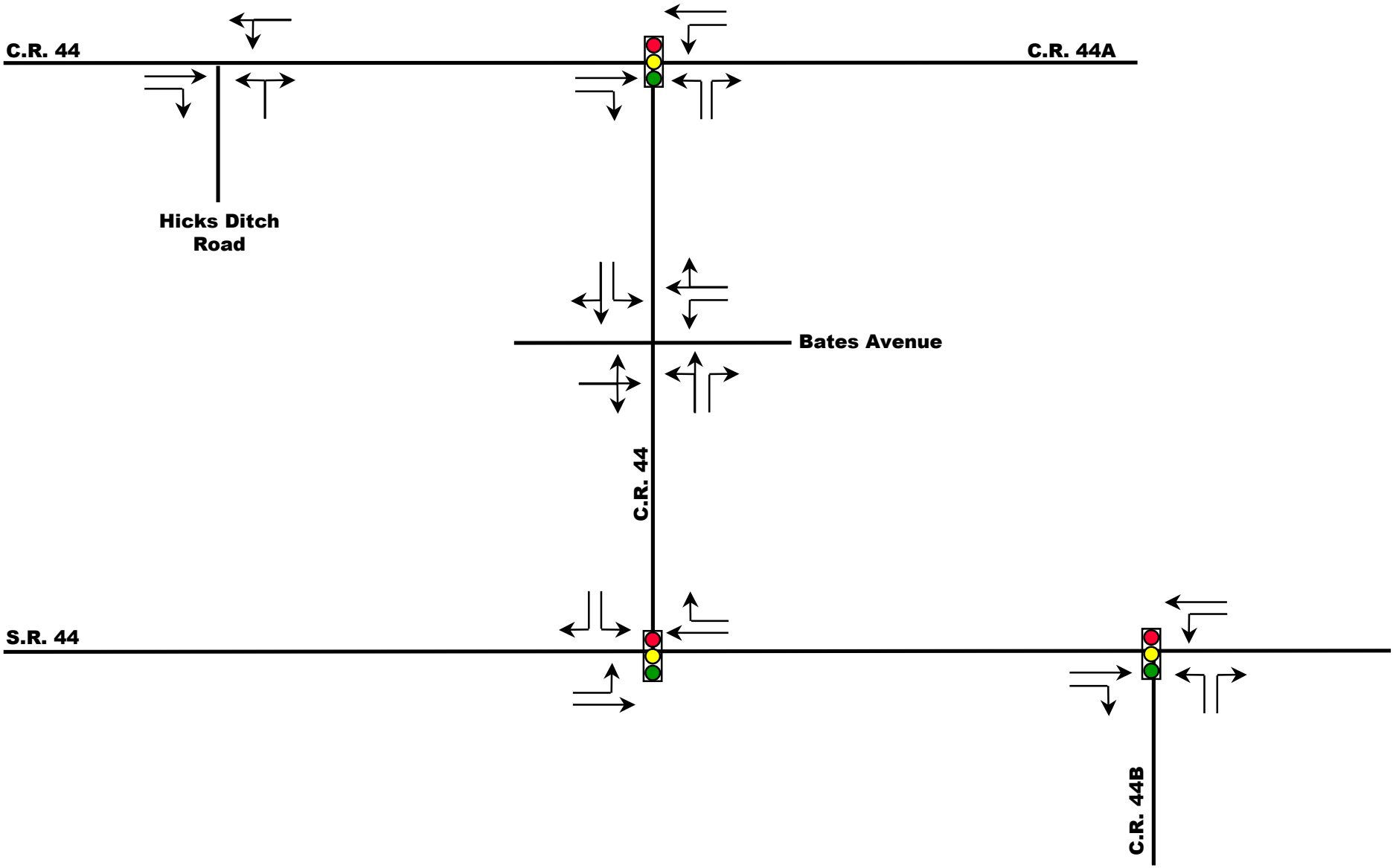

N
NOT TO SCALE
C.R. 44
C.R. 44A
Hicks Ditch Road
Bates Avenue
C.R. 44
S.R. 44
C.R. 44B

Table 11.2.1.2
2012 No Build & 2012 Build Operating Conditions
(Unsignalized Intersections)

Intersection with CR 44	2012 No Build		2012 Build	
	Delay (Seconds)	Level of Service	Delay (Seconds)	Level of Service
Lake Griffin Harbor	12.8	B	12.8	B
CR 44 (Leg A)/Shady Acres Road	24.8/13.7	D/B	19.1/13.7	C/B
Silver Lake Road	20.3	C	20.3	C
Treasure Island Road	28.4	D	28.4	D
Poe Street	22.9	C	22.9	C
Radio Road	**69.7**	**F**	17.4	C
Emeralda Avenue	**45.2**	**E**	13.2	B
Mid-Florida Lakes/Dura Stress	**48.7/38.0**	**E/E**	**43.4/33.7**	**E/D**
Goose Creek Road	22.4	C	22.4	C
Harbor Shores Road	**48.1**	**E**	**48.1**	**E**
Wedgefield Drive	19.3	C	19.3	C
Apiary Road	**39.7**	**E**	**39.7**	**E**
Chain O' Lakes Road	**48.1/12.6**	**E/B**	**48.1/12.6**	**E/B**
Fish Camp Road	**90.7/44.1**	**F/E**	**90.7/44.1**	**F/E**
Grand Island Shores Road	12.1	B	12.1	B
CR 19A	13.5/10.7	B/B	13.5/10.7	B/B
Hicks Ditch Road	26.7	D	25.7	D
CR 44A*	**89.6**	**F**	12.4	B
Bates Avenue	23.4/13.5	C/B	23.4/13.5	C/B

* Intersection is signalized under Build conditions

The results of this analysis show that the 2012 Build alternative enhances the operations of several deficient intersections observed in the 2012 No Build alternative. A few of the unsignalized intersections are expected to operate at an unacceptable level of service and are potential candidates for signalization and should be monitored.

11.2.2 2012 Build Link Analysis

The Florida Department of Transportation (FDOT) 2002 Level of Service Handbook was used to analyze existing and future travel conditions along the study area's roadway links. CR 44 was analyzed using the Standard Level of Service Tables for State Two Way Arterials (Class I). Table 11.2.2 documents the comparison of 2012 No Build and 2012 Build operating conditions along the roadway links.

Table 11.2.2
2012 No Build & 2012 Build Link Operations

	Count Station	2012 No Build		2012 Build	
		Link Volume	LOS	Link Volume	LOS
Segment 1	0031	11,600	C	11,600	C
	0029	11,800	C	11,800	C
Segment 2	0119	**20,600**	**F**	20,600	B
Segment 3	0045	14,700	D	14,700	D
	0048	**19,500**	**F**	19,500	B
Segment 4	0047	**15,800**	**E**	15,800	B
	0080	13,800	D	13,800	C
	0082	10,300	C	10,300	C

The results of this analysis show that all of the roadway links operate at an acceptable level of service for the 2012 Build alternative.

11.3 2022 Build Analysis

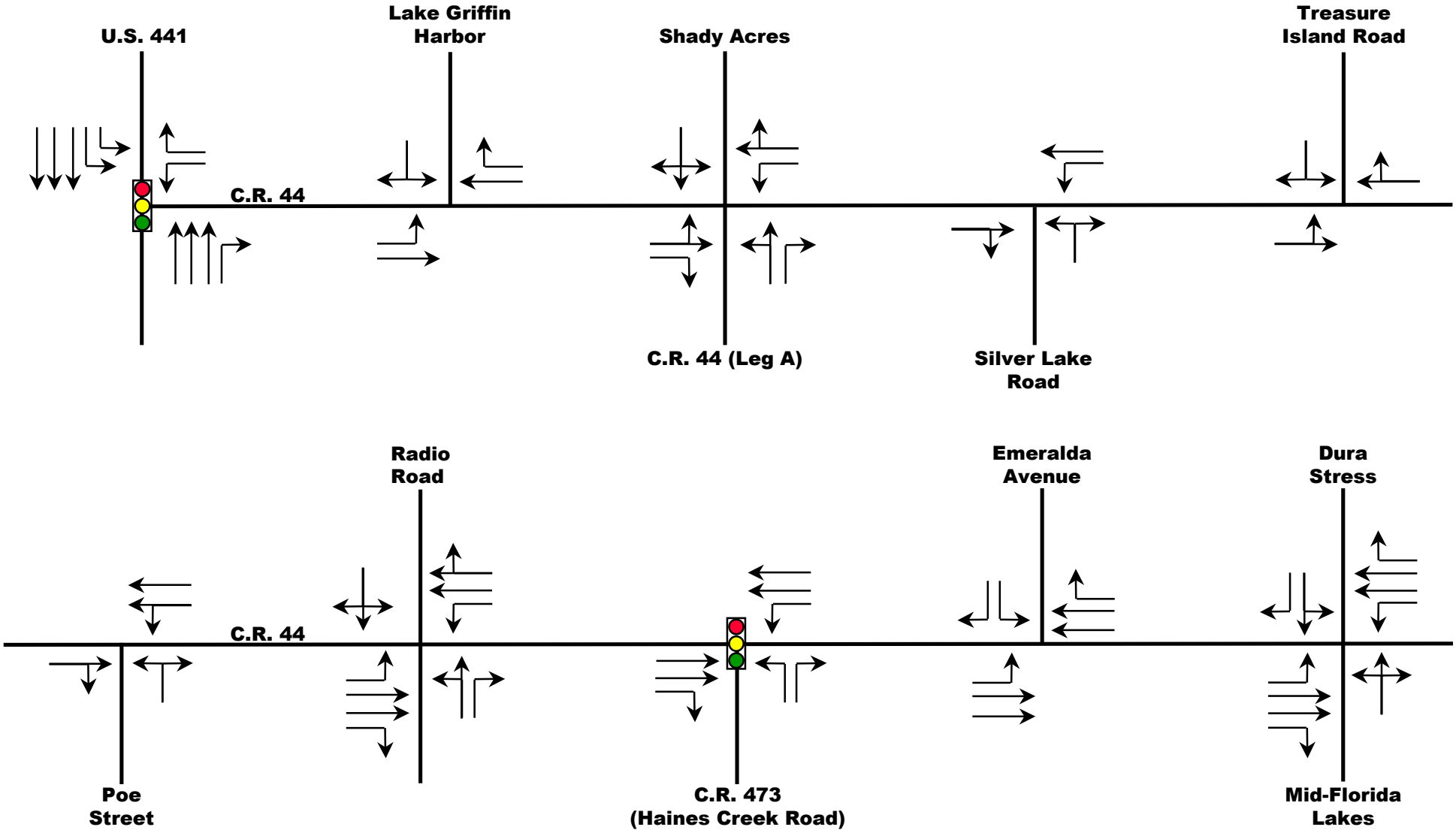
Using the traffic volumes developed from the No Build analysis, the 2022 Build intersection and link analysis was completed. The geometry used for the 2022 Build analysis can be found in Figure 11.3

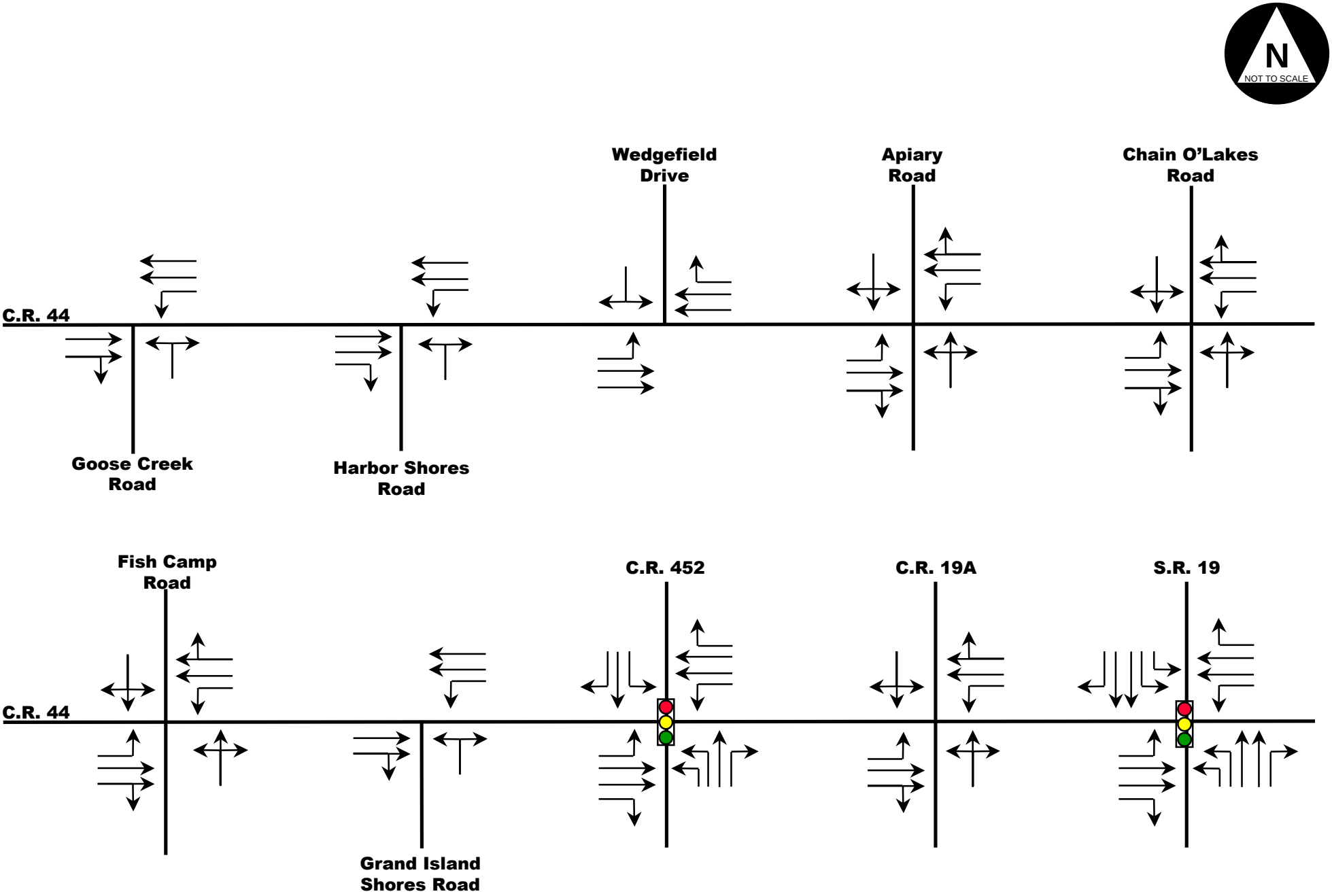
11.3.1 2022 Build Analysis

Table 11.3.1.1 and Table 11.3.1.2 document the comparison of 2022 No Build and 2022 Build operating conditions at the study intersections along the Corridor. Complete 2022 Build HCS output is provided in Appendix K.

Table 11.3.1.1
2022 No Build & 2022 Build Operating Conditions
(Signalized Intersections)

Intersection with CR 44	2022 No Build		2022 Build	
	Delay (Seconds)	Level of Service	Delay (Seconds)	Level of Service
US 441	**169.2**	**F**	**97.7**	**F**
CR 473	**122.2**	**F**	22.0	C
CR 452	**102.4**	**F**	51.4	D
SR 19	**81.0**	**F**	**61.0**	**E**
SR 44	32.8	C	29.4	C
CR 44B	**66.0**	**E**	39.0	D


N
NOT TO SCALE
U.S. 441
Lake Griffin Harbor
Shady Acres
Treasure Island Road
C.R. 44
C.R. 44 (Leg A)
Silver Lake Road
Radio Road
Emeralda Avenue
Dura Stress
C.R. 44
Poe Street
C.R. 473 (Haines Creek Road)
Mid-Florida Lakes



TEI Engineers & Planners	Figure No: 11.3	Page No: 98	*2022 Build Geometry* **CR 44: US 441 to CR 44B**

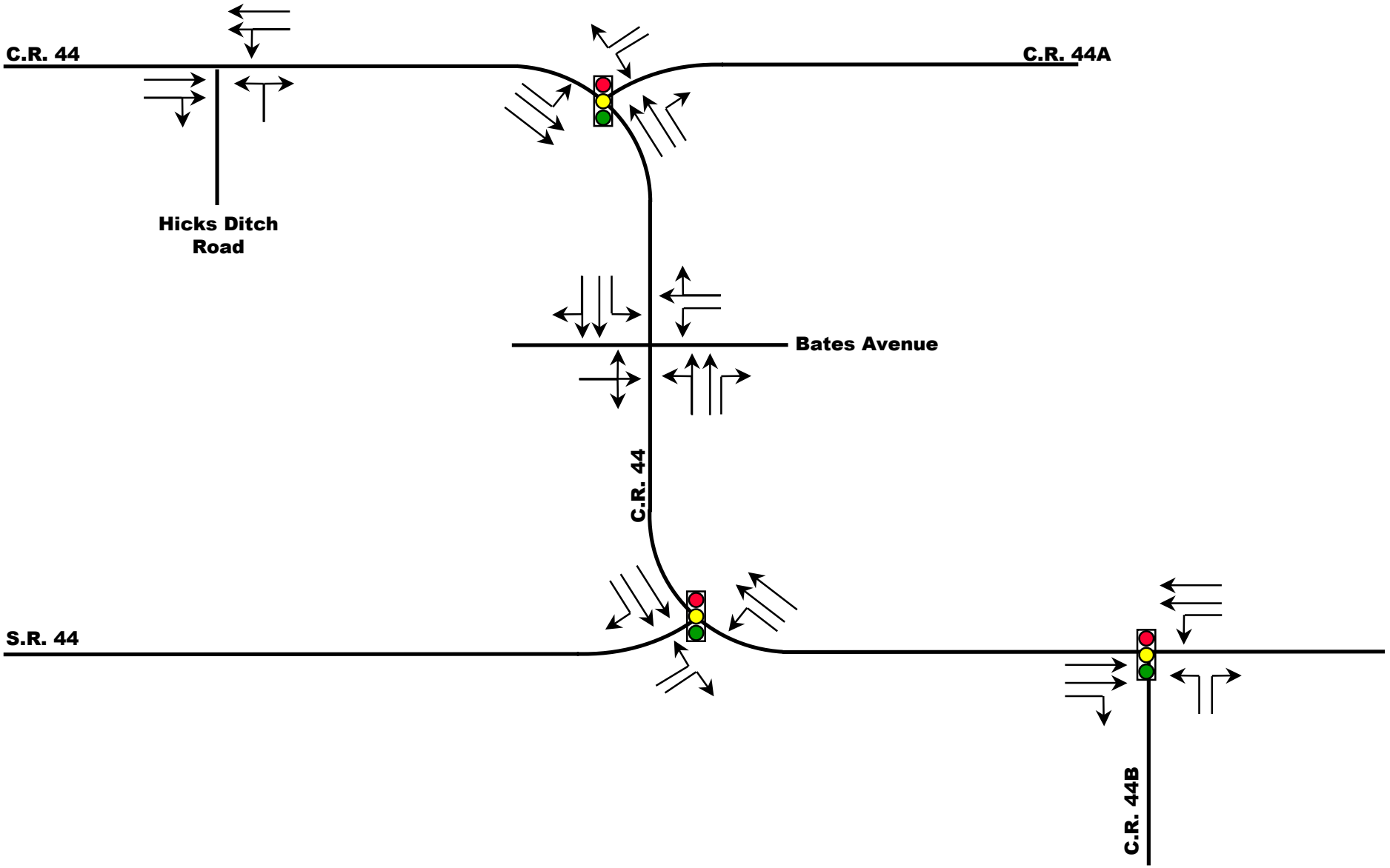

N
NOT TO SCALE
C.R. 44
C.R. 44A
Hicks Ditch Road
Bates Avenue
C.R. 44
S.R. 44
C.R. 44B

Table 11.3.1.2
2022 No Build & 2022 Build Operating Conditions
(Unsignalized Intersections)

Intersection with CR 44	2022 No Build		2022 Build	
	Delay (Seconds)	Level of Service	Delay (Seconds)	Level of Service
Lake Griffin Harbor	15.0	C	15.0	C
CR 44 (Leg A)/Shady Acres Road	**56.7/16.4**	**F/C**	30.8/16.4	D/C
Silver Lake Road	29.7	D	29.7	D
Treasure Island Road	**43.2**	**E**	**43.2**	**E**
Poe Street	33.7	D	33.7	D
Radio Road	**262.9**	**F**	28.5	D
Emeralda Avenue	**199.6**	**F**	17.0	C
Mid-Florida Lakes/Dura Stress	**247.2/88.3**	**F/F**	19.6/14.7	C/B
Goose Creek Road	32.2	D	13.6	B
Harbor Shores Road	**353.8**	**F**	18.8	C
Wedgefield Drive	34.7	D	12.4	B
Apiary Road	**156.3**	**F**	15.3	C
Chain O' Lakes Road	**237.0/14.8**	**F/B**	18.4/10.7	C/B
Fish Camp Road	**859.0/302.3**	**F/F**	24.0/20.7	C/C
Grand Island Shores Road	14.7	B	14.7	B
CR 19A	16.4/11.8	C/B	16.4/11.8	C/B
Hicks Ditch Road	**65.2**	**F**	15.4	C
CR 44A*	**416.3**	**F**	17.5	B
Bates Avenue	**104.1/19.3**	**F/C**	30.5/18.1	D/C

* Intersection is signalized under Build conditions

The results of this analysis show that the 2022 Build alternative enhances the operations of nearly all of the deficient intersections observed in the 2022 No Build alternative.

11.3.2 2022 Build Link Analysis

The Florida Department of Transportation (FDOT) 2002 Level of Service Handbook was used to analyze existing and future travel conditions along the study area's roadway links. CR 44 was analyzed using the Standard Level of Service Tables for State Two Way Arterials (Class I). Table 11.3.2 document the comparison of 2022 No Build and 2022 Build operating conditions along the roadway links.

Table 11.3.2
2022 No Build & 2022 Build Link Operations

		2022 No Build		2022 Build	
	Count Station	Link Volume	LOS	Link Volume	LOS
Segment 1	0031	13,800	D	13,800	D
	0029	14,600	D	14,600	D
Segment 2	0119	**25,100**	**F**	25,100	B
Segment 3	0045	**17,300**	**F**	17,300	B
	0048	**26,300**	**F**	26,300	B
Segment 4	0047	**21,400**	**F**	21,400	B
	0080	**18,400**	**F**	18,400	B
	0082	13,300	D	13,300	B

The results of this analysis show that all of the roadway links operate at an acceptable level of service for the 2022 Build alternative.

11.4 Identification of Build Traffic Deficiencies

Based on the results of the intersection and link analysis, the following deficiencies were identified along the study Corridor for the mid-year, 2012:

- CR 44 and Mid-Florida Lakes\Dura Stress operates at LOS E
- CR 44 and Harbor Shores Road operates at LOS E
- CR 44 and Apiary Road operates at LOS E
- CR 44 and Chain O' Lakes Road operates at LOS E
- CR 44 and Fish Camp Road operates at LOS F

All of these locations are unsignalized, and should be monitored as potential signal locations. If warranted, the signalization of these intersections could be expected to enhance the LOS to an acceptable level.

Based on the results of the intersection and link analysis, the following deficiencies were identified along the study Corridor for the horizon year, 2022:

- CR 44 and US 441 operates at LOS F
- CR 44 and SR 19 operates at LOS E
- CR 44 and Treasure Island Road operates at LOS E

The signalized intersections of US 441 and SR 19 provided service to a large volume of vehicles. A considerable amount of delay experienced at these intersections can be attributed to the traffic along US 441 and SR 19 compared to the traffic along CR 44. Treasure Island Road is unsignalized, and should be monitored as a potential signal location. If warranted, the signalization of this intersection could be expected to enhance the LOS to an acceptable level.

12.0 Recommendations

The alternatives analysis resulted in a combination of several improvement alternatives as the most appropriate to satisfy travel demands along the CR 44 Corridor. Alternative #6, widen along a partial new and partial existing alignment, is recommended as the preferred widening alternative. In addition, it is recommended that several other alternatives, or subsets of them be incorporated into the preferred improvement concept.

- Bicycle and pedestrian improvements were identified as critical enhancement to the CR 44 Corridor. The bicycle and pedestrian enhancements identified in Alternative #7 should be included along with the preferred alternative.

- The preferred widening alternative presents a long-term solution to travel deficiencies along the CR 44 Corridor. To address critical operational and safety issues, and extend the useful life of CR 44, it is recommended that the traffic operations improvements identified in Alternative #2 be included as part of the preferred alternative.

- Alternative #3 and the related transportation demand management components represent cost effective, practical approaches to addressing congestion along CR 44 while at the same time increasing the useful life of the existing geometry and increasing the quality of life. It is recommended that as appropriate population, employment and development thresholds are reached along the CR 44 Corridor, the appropriate TDM measure or measures be implemented in conjunction with preferred widening alternative.

The preferred alternative is presented in Appendix H.