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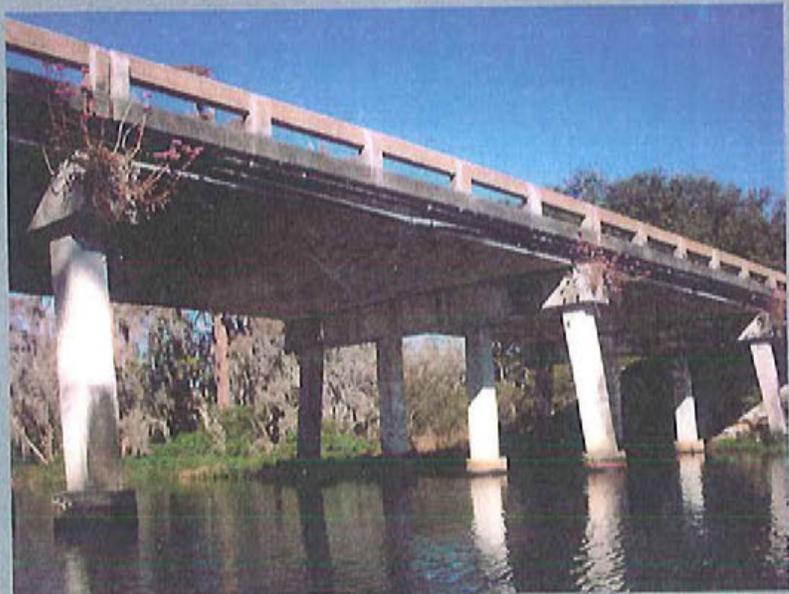
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Lakeshore Drive Bridge Improvements

Phase I
Preliminary Engineering Study
FINAL



HNTB

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- Appendix A: Roadway and Bridge Concept Plans
- Appendix B: Structural Deficiencies
- Appendix C: Drainage Maps

1. Summary

Lake County Public Works has conducted a Phase 1 Preliminary Engineering Study for the replacement of the Lakeshore Drive/C.R. 561A bridge in south Lake County. The project limits are from Osprey Pointe Boulevard to Hammock Ridge Road.

The objective of the Phase 1 Preliminary Engineering Study is to study, analyze and document the environmental and engineering analyses conducted to assist Lake County in reaching a decision on the type, location and conceptual design of the improvements to the Lakeshore Drive bridge. The improvements are necessary to accommodate the future traffic demand safely and efficiently and to address other safety concerns.

1.1. Commitments

The following commitments have been made by Lake County during the course of the study through the public involvement and project development process:

- Four-foot on road bicycle lanes and five-foot sidewalks will be provided along Lakeshore Drive.
- The roadway improvements and drainage system will be designed and constructed with measures taken to minimize impacts to existing utilities.
- Lake County is committed to developing drainage and typical section plans that promote the minimization of wetland impacts.
- Construction of the improvements will be performed in accordance with Florida Department of Transportation's standard construction practices, with emphasis on maintaining acceptable driving conditions through the construction zone.
- If, during construction activities, mitigation for contamination sites is found to be necessary, environmentally responsive actions will be taken in accordance with applicable Florida Department of Environmental Protection regulations.
- Consideration will be given to aesthetics during the design.

1.2. Recommendations

To be completed following the Lake County Board of County Commissioners Public Hearing.

2. Introduction

This Preliminary Engineering Report documents the Lake County Phase 1 Study for the replacement of the Lakeshore Drive in south Lake County. The limits of the project, as shown in **Figure A**, are from Osprey Pointe Boulevard to Hammock Ridge Road.

The existing roadway typical section consists of two, 11-foot lanes that are centered within a right of way that varies from 73 feet to 142 feet. No curb and gutter, bike lanes or sidewalks exist along the west side of the bridge. Curb and gutter, bike lanes and sidewalks do exist on the east side of the bridge. There is no defined existing drainage system along the west side of the bridge or on the bridge. The east side of the bridge consists of a closed drainage system in which stormwater is conveyed to a treatment pond. The existing bridge typical section consists of two, 12-foot lanes with no shoulders. Figures depicting these typical sections are shown in the existing conditions section of this report, chapter 4.

The purpose of this PER is to present the findings of the studies conducted for this project, to describe the results of the evaluation and to document the justification for the recommended improvements. This document describes the determinations made regarding typical roadway and bridge cross sections, existing traffic conditions and the comparative analysis of the improvement alternatives that would satisfy existing and future transportation demands.

Based upon the engineering and environmental resource data collected, a review of Lake County goals and the application of the current roadway design standards, potential alternatives were developed and evaluated based on impacts resulting from their alignment locations and configurations. Each alternative was assessed using evaluation criteria developed for that purpose. Following a comparison of the evaluations, the best potential location(s) and most appropriate design configurations were identified for the alternatives that warranted further review.

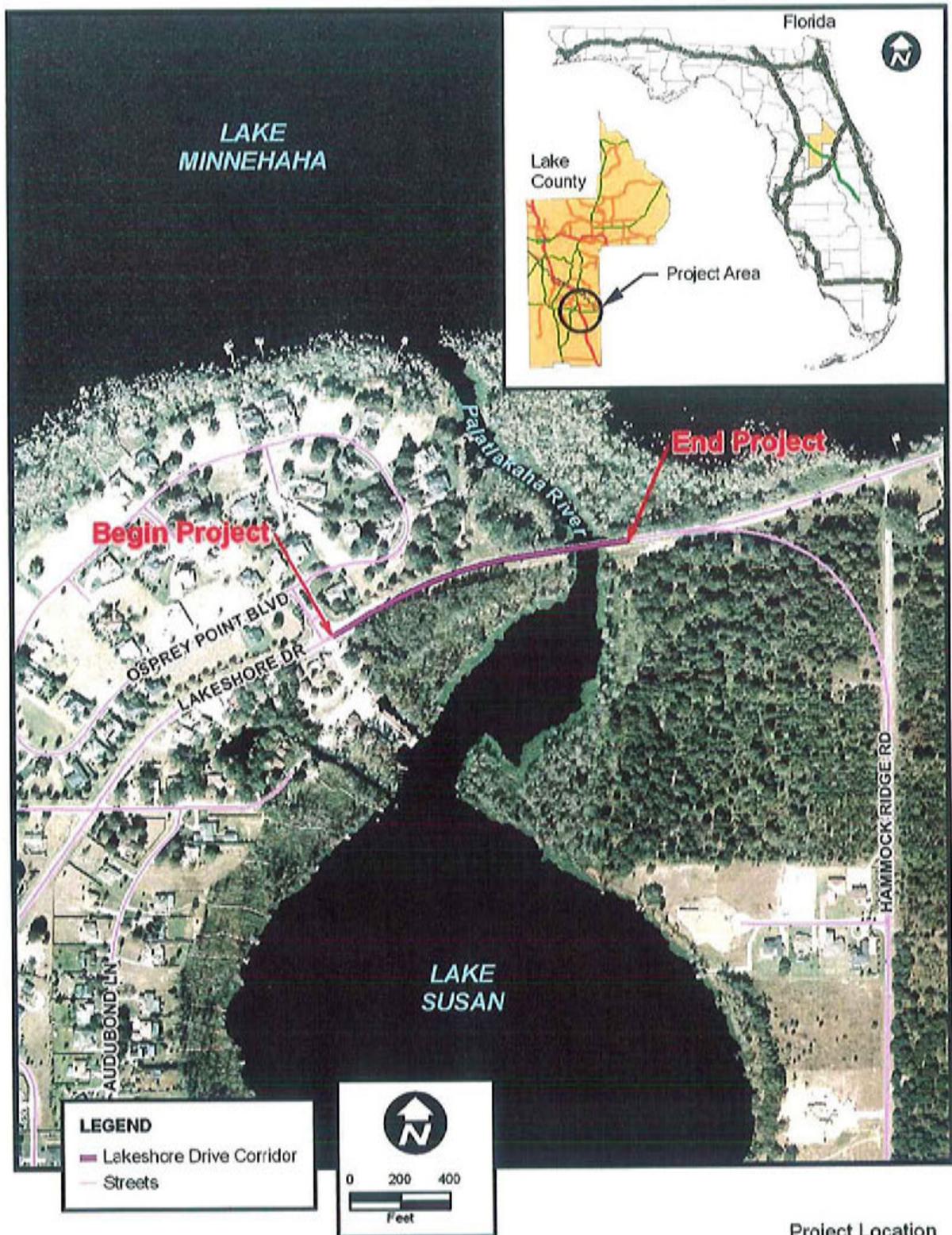
This report has been prepared to assist Lake County in identifying a recommended design concept alternative and will serve as the document of record for support of subsequent engineering decisions for the final design and construction stages that follow.

The conceptual roadway alignment and bridge plans, included in **Appendix A**, and the right-of-way identification maps are an integral part of this document. The plans reflect specific detail concerning each area of the project and supplement information contained within this report.

The proposed project involves the identification of improvements, including widening or replacement, to the Lakeshore Drive bridge. This bridge is situated within the judicial jurisdiction of unincorporated Lake County.

The proposed improvements will help provide safety features for the users of the roadway.

Figure A: Project Location Map



3. Need For Improvement

The need for the improvements to the Lakeshore Drive bridge is based on several factors. First is the need to increase the capacity of the roadway to accommodate present and future projected traffic volumes. Second is the need to improve safety over the heavily traveled bridge. Third is that the improvements are consistent with the goals, objectives and policies of the Lake County Comprehensive Policy Plan. Finally, improvements to the Lakeshore Drive Bridge will help meet the social/economic demand of the area.

This section of the report presents the findings relative to each of these areas and a review of the recommendations presented by the local comprehensive planning efforts.

3.1. Capacity

The Concurrency Management spreadsheet provided by Lake County was used to determine the existing LOS of the project corridor. This section of Lakeshore Drive currently operates at a LOS D. A detailed LOS analysis was performed and the projected LOS to year 2020 is LOS D.

3.2. Safety

The Lakeshore Drive corridor is largely urban in nature, with residential areas along both the west and east project limits. The two-lane bridge presents safety concerns as vehicles are traveling at high rates of speeds on a substandard bridge. The existing bridge includes no emergency shoulders for recovery efforts or for disabled vehicles. There are no pedestrian facilities provided across the bridge to accommodate pedestrians or bicyclists safely. This configuration has led to unsafe driving conditions for vehicles over the bridge and presents issues that may be resolved by the widening of the bridge and the roadway approaches. The sufficiency rating for the existing bridge was reviewed and found to be low because of the lack of shoulders, non-crash rated barriers and the substandard load rating.

Crash records along Lakeshore Drive bridge were reviewed for the previous 5 years, 2002 through 2007. Two collisions were recorded within the project limits, both occurring at the Osprey Pointe Boulevard intersection. Each of these crashes is described below.

- A vehicle was traveling southbound on Lakeshore Drive when just north of Osprey Pointe Boulevard it lost control and struck a tree on the north side of the roadway.
- A vehicle that was traveling northbound on Lakeshore Drive tried to make a left turn onto Osprey Pointe Boulevard, a vehicle traveling southbound on Lakeshore Drive struck the northbound turning vehicle.

3.3. Consistency with Transportation Plans

The improvements recommended for the Lakeshore Drive bridge are consistent with the goals, objectives and policies of the adopted 2025 Lake County Comprehensive Policy Plan.

3.4. Social and Economic Demands

The Lakeshore Drive bridge currently provides a link between C.R. 561 and U.S. 27. The portion of this corridor being studied is bordered by an established development northwest of the bridge while the remaining portions of the project are bordered by wetlands and lake front. This road serves as a north-south corridor between South Clermont and Clermont. As the area continues to grow, a safe passageway must be provided along Lakeshore Drive for vehicles, pedestrians and bicyclists. The quality of service and safety provided by the Lakeshore Drive bridge has a direct social and economic impact on the people who live and work in Lake County.

4. Existing Condition

4.1. Existing Roadway Conditions

The following subsections depict the conditions and characteristics of the existing project corridor.

4.1.1. Functional Classification

Functional classification identifies a street or highway according to the character of service it provides. In the latest update to the functional classification tables, Lakeshore Drive has been classified as a rural-collector roadway.

4.1.2. Typical Cross Section

The existing typical cross section, shown in **Figure B** is generally described by two, undivided, 11-foot lanes. There are no paved shoulders provided along the road and there is no formal drainage system.

The posted speed limit on the west side of the bridge is 45 mph while the posted speed limit on the east side of the bridge is 35 mph.

4.1.3. Pedestrian and Bicycle Facilities

There are no sidewalks or designated bicycle facilities west of the bridge. There is a sidewalk on the south side of the roadway and a 4-foot bicycle lane on each side of the roadway on the east side of the bridge near the intersection with Hammock Ridge Road.

4.1.4. Right-of-Way

The county owned right of way along this portion of Lakeshore Drive varies in width. At Osprey Pointe Boulevard the right of way is 73 feet wide and gradually widens to 107 feet wide a distance of 120 feet west of the bridge, where the right of way width jumps to 140 feet continuing at this width to the end of the bridge. At the end of the bridge the right of way width is 140 feet wide and proceeds to reduce in width in the eastbound direction where the final width is 100 feet wide at the intersection with Hammock Ridge Road. Detailed right-of-way maps will be prepared as part of this study.

4.1.5. Horizontal Alignment

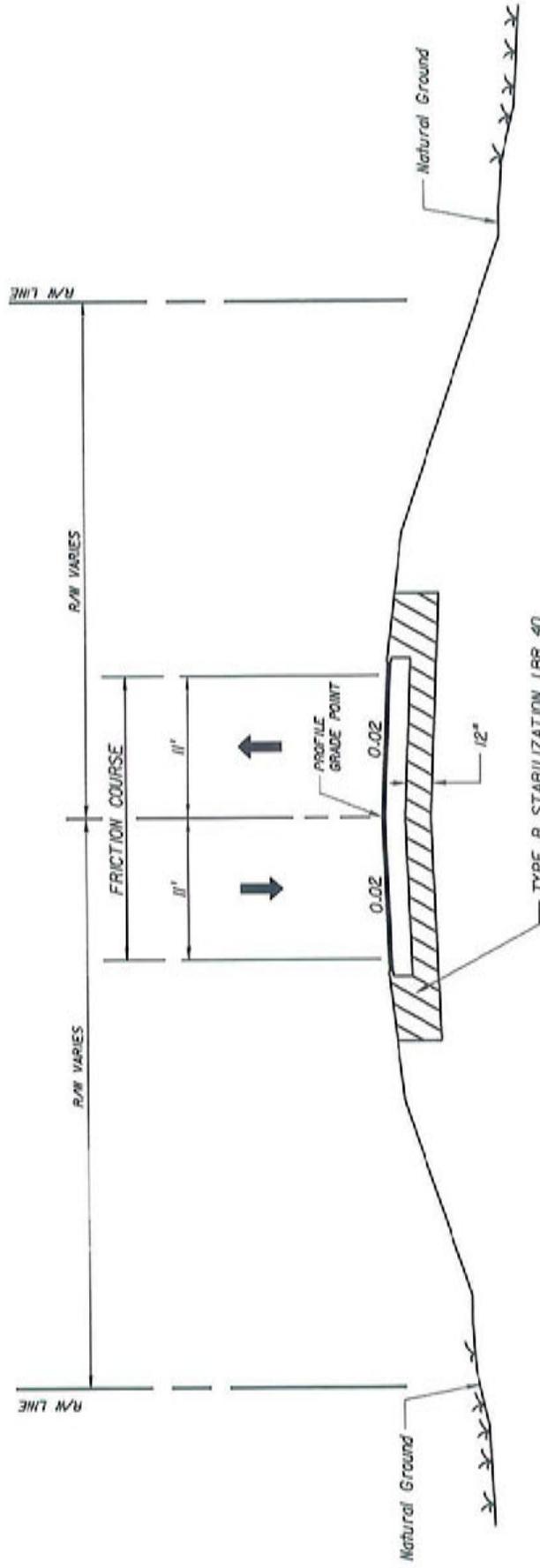
The existing roadway consists of two horizontal curves, within the limits of the project, separated by a tangent segment as described in **Table 1**.

Table 1: Existing Curve Data

Curve Number	Radius	Cross Slope	Posted Speed
1	1,273.57 feet	0.02 (reverse crown)	45 mph
2	750 feet	0.02 (normal crown)	35 mph

4.1.6. Vertical Alignment

The existing construction plans dated 1961 were obtained and used to re-create the existing profile. Where the project begins at Osprey Pointe Boulevard there is a sag curve, the entrance grade to this 500-foot-long sag curve is -3.2 percent and the exit grade is 3.0 percent. The bridge is centered about a crest curve with an entrance grade of 3.0 percent and an exit grade of -3.0 percent. Where the project ties into the existing Hammock Ridge Road there is another sag curve. The entrance grade to this 450-foot-long sag curve is -3.0 percent and the exit grade is 0.0 percent.



EXISTING ROADWAY TYPICAL SECTION

4.1.7. Drainage

The project is located within the Oklawaha River Basin under the jurisdiction of the St. John's Water Management District.

The project consists of two sub-basins. Basin 1 encompasses the project area located south of the bridge to the approximate middle or high-point of the bridge. Basin 2 extends from the high point of the bridge to the northern end of the project. Runoff from Basin 1 drains in a southeasterly direction, primarily via sheet flow, to the Palatka River where it is conveyed to Lake Minnehaha which is designated by the SJRWMD as an Outstanding Florida Water. Basin 1 has no existing stormwater management facilities. The majority of the existing pavement runoff from Basin 2 is conveyed via curb inlets to the existing dry retention pond located just to the south of the project. This pond was constructed as part of the South Clermont Connector Road Project and was designed to retain all captured stormwater utilizing Lake County and SJRWMD design criteria for a closed basin. Although, Basin 2 is not a closed basin, utilizing the closed basin design criteria eliminated the need to provide additional stormwater treatment for discharge to an OFW. The balance of the runoff from Basin 2 drains to the Palatka River and ultimately Lake Minnehaha.

Through coordination with the Florida DEP, it has been determined that the Palatka River is considered lands of the state, or sovereign submerged lands, and therefore will require an authorization easement for the area of the proposed bridge over the river.

4.1.8. Geotechnical Data

A geotechnical investigation will be conducted to evaluate viable foundation and wall types for this project. The findings will be documented in the *Preliminary Geotechnical Structures Report for the Lakeshore Drive Bridge Improvements*. The geotechnical investigation will include standard penetration test borings, power auger borings, hand auger borings, muck probes and corrosion testing. Upon selection of a preferred roadway and bridge alternative, geotechnical work will begin.

4.1.9. Crash Data

A crash analysis was conducted as part of this engineering study. Crash data was reviewed within the project limits for a five-year period from 2002 through 2007. The crash data was provided by Lake County and is summarized in Table 2. There were two reported collisions during this time period, each occurring at the intersection of Osprey Pointe Boulevard and Lakeshore Drive. The collisions resulted in minor injuries.

Table 2: Crash Data Summary

Crash	Number of Occurrences					
Lakeshore Drive at Osprey Pointe Boulevard						
Type	2002	2003	2004	2005	2006	2007
Left-Turn	0	0	1	0	0	0
Other	0	0	0	0	1	0
TOTAL	0	0	1	0	1	0

4.1.10. Intersections and Signalization

There are no signalized intersections within the project limits.

One unsignalized intersection, Lakeshore Drive at Osprey Pointe Boulevard, was reviewed as part of this project.

4.1.11. Lighting

There is no conventional street lighting system along Lakeshore Drive in the project area.

4.1.12. Utilities

There are several utilities through the project corridor. Overhead electric lines, water, gas, cable television and telephone lines have been identified.

The following utility companies will be contacted and asked to provide details of existing utilities types, sizes and general locations: Mr. Mike Dunn, Lake Utility Services, Inc.; Mrs. Tamara Richardson, City of Clermont; Mr. Larry Henderson, Bright House Networks; Mr. Alex Wosgein, Lake Apopka Natural Gas; Mr. Mike Shell, Embarq and Mrs. Michelle Johnson, Progress Energy.

4.1.13. Pavement Conditions

Lake County has a formal pavement management system for inspecting roadway pavement within the County, it is called PASERS. PASERS is used to rate the pavement condition on a scale of 1 to 10 with 1 being the worst and 10 being excellent. Upon visual inspection of the pavement, there were various longitudinal and transverse cracks along with areas of raveling, as a result of this analysis the pavement on the west side of the bridge received a rating between 4 and 5. The pavement on the east side of the bridge was replaced in 2007 due to the construction of Hammock Ridge Road.

4.2. Existing Bridge Conditions

The following subsections depict the conditions and characteristics of the existing Lakeshore Drive Bridge.

4.2.1. Existing Bridge Characteristics

Lakeshore Drive bridge, Bridge No. 114077 is on the tangent segment of roadway that crosses the Palatka River perpendicular to the channel. The bridge riding surface is crowned at the centerline and cross-sloped at 3/16 inches per foot. The existing 185-foot-long structure is comprised of five 37-foot spans. The first and last spans are constructed over the spill slopes and the interior three spans are over the channel. The prestressed concrete deck panel superstructure is founded on concrete pile bents with concrete caps. The overall structure depth, measured from the top of deck to the bottom of the deck panels, is approximately 1-foot -5-inch. The bridge deck accommodates two 12-foot lanes without shoulders. A raised 2-foot-wide sidewalk runs along the outside edges of the bridge and a guardrail is mounted to the outside fascia of the bridge deck. The total bridge width is 30-feet-3-inches. The lack of shoulders does not comply with the current standards and the existing bridge railing is not rated to resist the impact load of the current design vehicle. **Figure C** depicts graphically the existing typical section of the Lakeshore Drive bridge.

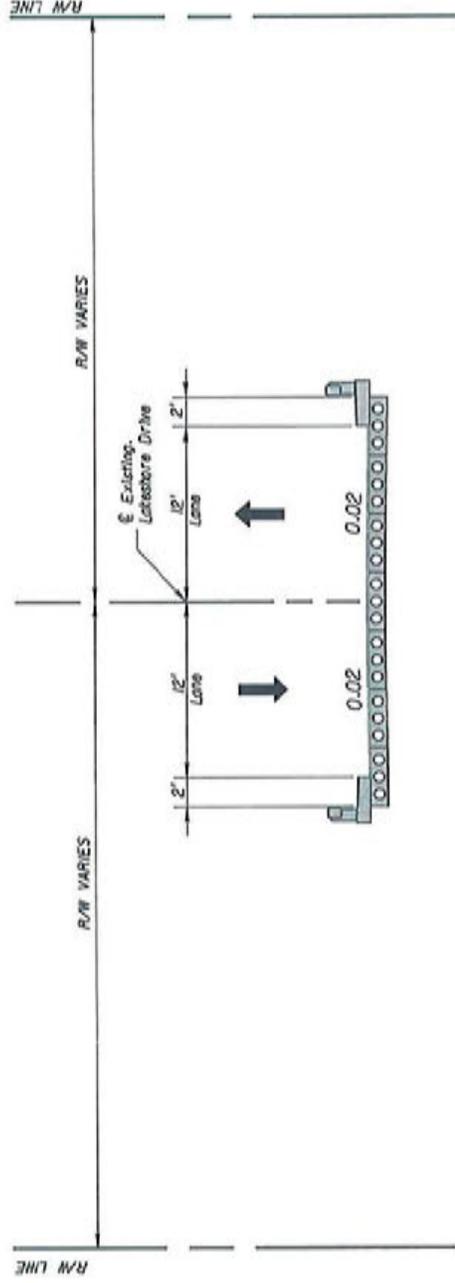
4.2.2. Bridge Inspection

The Bridge Inspection Report, dated October 13, 2005, indicates that the main load carrying elements of the bridge are in, at least, satisfactory condition. This assessment was confirmed via a field evaluation. **Appendix B** highlights some of the deficiencies noted in the report.

4.2.3. Load Rating

The Load Rating of a bridge is a measure of the structural capacity of the bridge to carry the Florida Legal Vehicles which provide both an Operating Rating and an Inventory Rating. The Operating Rating represents the absolute maximum permissible load to which a structure may be subjected. The Inventory Rating represents the load level which can safely utilize an existing structure for an indefinite period of time. Typically, only the HS20 Vehicle is load rated for inventory.

Table 3 lists the Operating Rating for all the Legal Trucks and both the Operating Rating and Inventory Rating for the HS20 vehicle as reflected in the latest Lakeshore Drive bridge Load Ratings dated April 12, 1999. No load restrictions are currently mandated for this bridge since all of the Operating Load Ratings exceed the permissible vehicle weights. However, the table shows an inventory load rating less than the vehicle weight for the HS20 vehicle. This indicates that the bridge is not structurally sufficient to safely carry the HS20 vehicle for an indefinite period of time.



EXISTING BRIDGE TYPICAL SECTION

Lakeshore Drive
Preliminary Engineering Report



Lakeshore Drive
Existing Bridge Typical Section

Figure
C

Table 3: Load Rating Summary

Vehicle Designation	Vehicle Weight (U.S. Tons)	Moment Rating Factor	Shear Rating Factor	Load Rating
SU2	17.0	2.611	N.A.	44.39
SU3	33.0	1.418	N.A.	46.79
SU4	35.0	1.317	N.A.	46.10
C3	28.0	2.442	N.A.	68.38
C4	36.7	1.725	N.A.	63.31
C5	36.6	1.697	N.A.	62.11
ST5	40.0	1.757	N.A.	70.28
HS20	36.0	1.615	N.A.	58.17
HS20 (Inventory)	36.0	0.970	N.A.	34.92

4.2.4. Sufficiency Rating

The bridge Sufficiency Rating is a numerical indicator of the adequacy of a bridge to remain in service. The rating combines structural adequacy, serviceability, functional obsolescence and essentiality for public use. Valid ratings range from 0 (most deficient) to 100 (most sufficient). The Sufficiency Rating for this structure, as listed in the Bridge Inspection Report dated October 13, 2005, is 70.6. This low sufficiency rating results from the insufficient load carrying capacity and the substandard shoulders and barriers.

4.2.5. Horizontal Alignment

The Lakeshore Drive bridge is located on a tangent section of roadway.

4.2.6. Vertical Alignment

The Lakeshore bridge is centered about a 500-foot-long vertical crest curve. The entrance grade is 3.0 percent and the exit grade is -3.0 percent.

4.2.7. Geotechnical Data

The findings of the geotechnical investigation will be documented in the *Preliminary Geotechnical Structures Report for the Lakeshore Drive Bridge Improvements*. The geotechnical investigation will include standard penetration test borings, power auger borings, hand auger borings, muck probes and corrosion testing and will be conducted upon selection of a preferred roadway and bridge alternative.

4.3. Environmental Characteristics

4.3.1. Land Use Data

The existing land use surrounding the Lakeshore Drive bridge consists primarily of undeveloped wetlands and lake frontage with one residential development, Osprey Pointe, northwest of the bridge.

As a result of the surrounding wetlands, Lake Minnehaha, Lake Susan and the Palatlahaha River, it is not expected that land use will change significantly in the future.

4.3.2. Cultural Features and Community Services

Cultural Features

No significant cultural features exist along the Lakeshore Drive project corridor.

Community Services

Community Services include locations such as schools, churches, community centers, hospitals, cemeteries, public parks and emergency services. The only community services located near the corridor is a fire station. Fire station number 109, is located approximately 1,600-feet west of Osprey Pointe Boulevard outside the study corridor at 11630 Lakeshore Drive.

4.3.3. Natural and Biological Features

A preliminary ecological assessment of the study area is currently under way. The findings will be documented in the *Preliminary Ecological Assessment Report for the Lakeshore Drive Bridge Improvements*. The referenced report will contain a complete discussion of the existing environmental characteristics and regulatory considerations.

4.3.4. Contamination

Visual inspection of the project site indicated no signs of contamination.

5. Design Criteria

Roadway

The roadway design criteria utilized is based on the FDOT *Plans Preparation Manual* in conjunction with the FDOT *Design Standards, May 2007*, and the *Florida Green Book*.

Table 4: Roadway Design Criteria

Design Element	Criteria	Source
Functional Classification	Urban Collector	
Design Year	2030	Lake County
Design Speed	45 MPH	PPM Chapter II
Design Vehicle	WB-50	PPM Chapter II
Horizontal Alignment		
Maximum Super elevation	0.05	PPM Table 2.8.3
Maximum Curvature	8° 15'	PPM Table 2.8.3
Maximum Curvature w/o Super elevation	2° 45' (3° 00' with RC)	PPM Table 2.9.2
Maximum Deflection w/o Horizontal Curve	1° 00' 00"	PPM Table 2.8.1a
Minimum Length of Horizontal Curve	675' Desirable, 400' Min.	PPM Table 2.8.2a
Vertical Alignment		
Maximum Grade	7% (Flat Terrain)	PPM Table 2.6.1
Minimum Grade	0.3%	PPM Table 2.6.4
Min. K Value for Crest Vertical Curves	98	PPM Table 2.8.5
Min. K Value for Sag Vertical Curves	79	PPM Table 2.8.6
Max. Change in Grade w/o Vertical Curve	0.70%	PPM Table 2.6.2
Min. Roadway Base Clearance above DHW	1'	PPM Table 2.6.3
Roadway Cross Section		
Lane Widths	12'	PPM Table 2.1.1
Shoulder Widths	5' (5' Paved)	PPM Table 2.3.2
Cross Slopes	2% (2 inner travel Lanes), 3% (outer travel lane)	PPM Fig. 2.1.1
	6% Shoulders	PPM Table 2.3.2
Median Width	22'	PPM Table 2.2.1
Clear Zone	24' From Travel Lanes	PPM Table 2.11.9
	14' From Aux Lanes	PPM Table 2.11.9
Minimum Border Width	33' From Outside Edge of Shoulder	PPM Table 2.5.1

Structures

The structural design is based on the *American Association of State Highway and Transportation Officials Load Resistance Factor Design Bridge Design Specifications Edition 4* with 2006 interims, FDOT *Structures Design Guidelines* current edition and FDOT *Structures Detailing Manual* current editions. In the event of a conflict, the FDOT *Structures Design Guidelines* takes precedence over AASHTO Specifications.

Drainage

The stormwater management and drainage design complies with the criteria found in the *Storm Water Management Design Standards of Lake County*, SJRWMD, Applicants Handbook and FDOT *Drainage Design Manual*.

6. Traffic

The information in this section is provided as a summary of the traffic conditions that exist at the location of the Lakeshore Drive bridge. Included is a detailed discussion of existing traffic conditions and characteristics, planned roadway improvements in the area, development of the projected traffic in the design years and level of service analyses for the design years.

6.1. Existing Conditions

The Lakeshore Drive corridor consists of one unsignalized intersection at the beginning of the project at Osprey Pointe Boulevard.

6.2. Multimodal Transportation System Considerations

The project is located within an area of largely urban and residential uses. There are no park and ride facilities within the area. Largely, travel through the area is by personal automobile or large cargo transportation vehicles.

Bus service is not provided within the corridor. There is an existing sidewalk on the south west side of the bridge. There are 4-foot bicycle lanes provided on the east side of the bridge near Hammock Ridge Road. Bicyclists have been observed within the study corridor.

6.3. Traffic Analysis Assumptions

6.3.1. Design Assumptions

Based on information provided by Lake County, the following periods were used to provide design traffic forecasts for the Lakeshore Drive bridge:

- Existing Year – 2007
- Opening Year – 2010
- Interim Year – 2020
- Design Year – 2030

The following documents were reviewed to identify any programmed or planned improvements that would impact traffic projections on Lakeshore Drive Bridge:

- 2007-2011 Lake County Transportation Construction Program
- 2006/2007-2010/2011 Lake County Transportation Improvement Program
- Lake-Sumter Metropolitan Planning Organization's 2025 Long Range Transportation Program
- 2004 Adopted Lake County Comprehensive Plan
- 2005 City of Clermont Comprehensive Plan

No roadway improvements were identified that would impact this project corridor.

6.4. Historic and Existing Traffic Volumes

Table 5 below summarizes the historic and existing Average Annual Daily Traffic for the count station (#38) located within the limits of the project that is recorded yearly by Lake County.

Table 5: Existing Traffic Volumes

Location	Annually Adjusted Daily Traffic (AADT)					5-year Annual Growth Rate
	2003	2004	2005	2006	2007	
.30 miles west of Lake Louisa Road	14,918	12,855	13,714	13,353	12,228	-4.85%

6.5. Traffic Volume Projections

The development of traffic projections requires the examination of historical traffic growth, the most current transportation models, proposed development in the vicinity of the corridor, a basic understanding of the traffic circulation patterns and roadway characteristics in the corridor.

6.5.1. Trend Analysis

Based on the historical traffic count information, provided by Lake County, trend analyses were performed to evaluate future traffic growth in the project corridor. This analysis was based on the count station within the project vicinity as identified previously.

The future growth trend was established by a least square linear regression of historic counts. The trend growth rate for each location is shown in **Table 6**. Based on this analysis, a resulting annual simple growth rate of approximately 0.85 percent per year was estimated using the projected trend between the years 2007 and 2030. As shown in **Table 6**, the trend analyses had an R^2 greater than 75 percent, which is the threshold used to consider a location acceptable for use in the overall growth rate calculation. Therefore, the trend growth rate was considered acceptable for use in the development of traffic projections.

Table 6: Historical Growth Rate Analysis

Location	2007 Trend ⁽¹⁾ Projected Volumes	2030 Trend Projected Volumes	Growth Rate 2006 Trend to 2030 Trend	R^2
Lakeshore Drive 0.30 miles west of Lake Louisa Road	13,800	17,200	0.85%	78.3%

(1) Trend projected 2007 volumes are used to calculate growth rate and may be different from existing 2007 AADT used in this study.

(2) For informational purposes only, Trend growth rates with a R^2 greater than 75% should be used for analysis.

6.6. Design Traffic Forecasts

The traffic forecasts, shown in **Table 7**, are based on a two-lane bridge. Since improvements to the corridor include the addition of shoulders, bicycle lanes and pedestrian features, with no capacity improvements, future traffic projections are anticipated to be the same for a No-Build or Build scenario.

Traffic projections were developed and analyzed for opening year 2010, mid-design year 2020 and for design year 2030. **Table 7** below identifies the AADT and PM Peak volumes projected for the Lakeshore Drive bridge for each of these years. Based upon the current Concurrency Management information provided by Lake County, this section of Lakeshore Drive currently operates at a LOS D and is projected to continue to operate at a LOS D up to and just beyond design year 2020.

Table 7: Traffic Projections

Year	2010	2020	2030
AADT	12,540	13,580	14,620
PM Peak	1,020	1,110	1,190

7. Corridor Analysis

The objective of the corridor analysis process is to select a viable corridor in which to provide technically and environmentally sound alignment alternatives that are cost effective and acceptable to the community. An aerial image, survey data and environmental inspection were used to develop corridors which provide the greatest benefit and avoid significant environmental or social impacts. Available right of way is also denoted through which a facility could be planned that would meet the needs identified during the study process.

As discussed in earlier sections of this report, the existing Lakeshore Drive corridor is primarily rural and residential in nature. Extensive environmental and residential impacts would result when considering any other corridors near the study area. Based on a review of all available information, the existing corridor was selected as the preferred corridor for the planned roadway improvements.

8. Alternatives Analysis

The sections following describe the various roadway, bridge and drainage improvement alternatives that have been considered during this study process.

8.1. No-Build Alternative

The No-Build Alternative involves maintaining the existing 2-lane bridge and associated roadway along Lakeshore Drive described previously in this report. The implications of this No-Build Alternative include acceptance of a deteriorating bridge which lacks shoulders, bicycle features, pedestrian features, and sufficient guardrail options.

There are advantages and disadvantages that are typical when considering a No-Build Alternative. The advantages include the following:

- No costs for roadway and bridge design plans preparation, right-of-way acquisition, roadway construction, bridge construction, drainage construction and utility relocations.
- No environmental impacts
- No inconvenience caused by roadway and bridge construction

The disadvantages include the following:

- Deficiencies on the bridge will not be improved
- Deficiencies in pedestrian and bicycle facilities will not be improved

8.2. Roadway Build Alternatives

One roadway typical cross section has been considered and analyzed during this project. The two lane, urban typical section, consists of two 12-foot lanes, one in each direction. Adjacent to the 12-foot lanes is a 4-foot wide bike lane. On the outside and adjacent to each bike lane is Type F curb and gutter. A 5-foot sidewalk is also provided on the north side of the roadway, this is separated from the back of the curb and gutter by a 3-foot wide sodded utility strip.

8.3. Drainage Build Alternatives

A thorough review of the existing topography, geotechnical data and the environmental resource permit for the adjacent Hammock Ridge Road was conducted. This information indicates that the project area is mostly comprised of sandy soils belonging to the hydrological groups A and B which will allow for the stormwater management method of infiltration. Two drainage design alternatives were investigated for Basin 1 and Basin 2, these include dry ponds and trench drains.

8.3.1. Ponds

Basin 1:

A linear dry pond was sized to manage the stormwater runoff from Basin 1. The pond was sized to accommodate the treatment of the stormwater through the method of dry retention while attenuation would be managed through detention of the peak runoff rates. The geometrics of the pond were configured and located such as to minimize or avoid impacts to the adjacent property and wetlands. Right-of-way impacts for the pond in Basin 1, shown in **Appendix C** were estimated to be approximately 0.68 acres.

Basin 2:

The existing retention pond that was constructed during the South Clermont Connector Road was investigated for expansion to accommodate the additional runoff from Basin 2. Results show that the pond can be expanded toward the roadway within the existing right of way. This will require increasing

the slope behind the sidewalk and replacing a segment of the interceptor ditch located around the pond berm with a closed system. **Appendix C** provides a depiction of the proposed expansion for the pond in Basin 2.

8.3.2. Trench Drains

Basin 1:

Since the pavement cross slope is super-elevated, sloped toward the south for almost the entire basin, the trench drain is located within the utility strip along the low side or south side of the roadway instead of both sides of the roadway to eliminate constructability issues associated with cross drain pipes. The estimated length and diameter of trench drain needed to treat Basin 1 is 805 linear feet of 36-inch pipe. Because the required treatment volume provided within the trench drain is greater than the required attenuation volume, attenuation requirements are achieved. There are no right of way or wetland impacts beyond that discussed in the roadway section of this report.

Basin 2:

The utilization of trench drain for the management of stormwater in Basin 2 was not evaluated as the expansion of the existing dry retention pond within the existing right of way is clearly the most cost effective alternative.

8.4. Bridge Build Alternatives

Two bridge alternatives were investigated for the replacement of the existing Lakeshore Drive bridge. Using a single cross slope for both alternatives is recommended to allow for a possible future widening. Each of these alternatives was presented at the Public Kick-off Meeting. The two alternatives considered are presented in **Appendix A**, one single-span alternative and one three-span alternative. Each of the alternatives is comprised of two 12-foot lanes, one in each direction, an 8-foot shoulder on each side, an 8-foot sidewalk on the north side and a crash rated traffic railing barrier on each side with pedestrian hand railing on top of the barrier on the north side of the bridge.

8.4.1. Single Span

This alternative is a 120-foot long single span bridge with AASHTO Type V girders. This alternative eliminates the need for intermediate bents and provides a clear, navigable span of approximately 120-foot over the waterway. The lack of intermediate bents helps reduce construction costs and the risk of utility conflicts. The construction duration of the bridge is expected to be shorter in this alternative as well.

8.4.2. Three Span

This alternative has three 65-foot long spans with AASHTO Type II girders. The length of the proposed bridge is approximately equal to the length of the existing bridge. Higher vertical clearances can be achieved with this alternative in comparison to the Single Span option. However, additional intermediate bents increase the cost of the structure and require additional geotechnical and foundation work.

8.5. Retaining Walls

Due to the maintenance of traffic arrangements, the proposed bridge needs to be constructed adjacent to the existing bridge. The current right of way cannot accommodate the required shift without the use of MSE walls. Therefore, MSE walls are recommended for this project. The quantity of MSE walls required is dependent on the alternative.

8.6. Evaluation Matrix

Each of the viable alternatives was evaluated based on costs, right-of-way impacts and environmental impacts. Each impact is described as follows:

- **Right-of-Way Impacts:** For the roadway and bridge the right-of-way impacts are evaluated. Right-of-way impacts are also evaluated for the drainage system.
- **Residential Impacts:** These impacts are determined by the number of residents that will require relocation.
- **Wetlands:** Wetland areas have been identified during a biological review of the corridor. Each area considered a wetland has been discussed in previous sections of this report. The value defined in the matrix is the number of acres directly impacted by the proposed improvements.
- **Wildlife and Habitat:** Wildlife and habitats occurring within the project corridor have been identified in previous sections of this report. This value denotes the level of impact that the each alternative has on the wildlife and habitat in the corridor.
- **Right-of-Way Costs:** This cost is associated with the roadway impacts and stormwater management.
- **Estimated Costs:** Construction costs have been estimated for each build alternative.
- **Total Cost:** Total cost is the addition of the estimated construction, contingency and right-of-way costs for each alternative.

Table 8 provides a comparison of the evaluation criteria for the bridge alternatives. The comparison of the basin alternatives are shown in Table 9.

Table 8: Roadway and Bridge Alternative Evaluation Matrix

Evaluation Criteria	Alternatives	
	1 Single Span	2 Three Span
Right-of-Way Impacts	0	0
Residential Impacts	0	0
Environmental Impacts		
Wetlands	0	0
Wildlife and Habitat	0	0
Estimated Costs	\$2,500,000	\$3,000,000
Right-of-Way Costs	\$0	\$0
Total Cost	\$2,500,000	\$3,000,000

Table 9: Drainage Alternative Evaluation Matrix

Evaluation Criteria	Alternatives			
	Basin 1		Basin 2	
	Trench Drain	Pond	Trench Drain	Pond
Right-of-Way Impacts	0	0.68 Acres	N/A	0
Residential Impacts	0	0	N/A	0
Trench Drain Length / Diameter	805 LF of 36"	0	N/A	0
Environmental Impacts				
Wetlands	0	0	0	0
Wildlife and Habitat	0	0	0	0
Estimated Costs	\$185,150	\$8,000	N/A	\$1,500
Right-of-Way Costs	0	\$750,000	N/A	0
Total Cost	\$185,150	\$758,000	N/A	\$1,500

8.7. Recommended Alternative

Based upon the results of the engineering and environmental analysis and input received from the public and local governmental bodies, the single span bridge which maintains the existing profile is the preferred bridge alternative. The recommended typical section for the roadway consists of two 12-foot lanes, one in each direction, a 4-foot bike lane on each side of the road, a 5-foot sidewalk on the north side of the road and type F curb and gutter. The recommended typical section for the bridge consists of two 12-foot lanes, one in each direction, a 8-foot shoulder on each side, and an 8-foot sidewalk on the north side of the bridge. For drainage basin 1 the trench drain is the preferred alternative and for drainage basin 2 the joint use pond is the preferred alternative. For the following reasons the aforementioned bridge and drainage alternative was chosen.

1. This bridge and drainage alternative had the least total cost
2. Required the least amount of additional right of way
3. Created the least impacts to the surrounding property owners
4. Provides the least amount of environmental impacts
5. Preferred by the majority of the public during the public involvement process
6. Construction duration is reduced

9. Preliminary Design Analysis

The following sections describe the results of the preliminary design analysis conducted for the preferred alternative discussed in Section 8.7. The concept plans for this alternative can be found in **Appendix A**.

9.1. Traffic Volume Forecasts

Table 10 provides the historic and existing count information for this project area from the 2007 Lake County Annual Traffic Count document. The historic growth rate has been calculated based on this information.

Table 10: Existing Traffic Volumes

Location	Annually Adjusted Daily Traffic (AADT)					5-year Annual Growth Rate
	2003	2004	2005	2006	2007	
.30 miles west of Lake Louisa Road	14,918	12,855	13,714	13,353	12,228	-4.85%

Based on the trends analysis presented in section 6 of this report, the projected AADT for 2030 is 14,620. Although overall operating conditions for the build scenario are acceptable for opening year 2010 and mid-design year 2020, the design year 2030 will yield a LOS E.

9.2. Typical Cross Sections

The recommended roadway alternative consists of a single typical section for the project corridor. The two-lane section includes two 12-foot-through lanes, one in each direction; 4-foot bike lanes on both sides of the roadway and a 5-foot sidewalk on the north side of the roadway. The recommended preferred typical section is graphically depicted in **Figure D**.

The recommended preferred bridge alternative consists of a 120-foot-long single span bridge with AASHTO Type V girders. The bridge typical section consists of two 12-foot lanes, one in each direction; a 8-foot shoulder on each side and an 8-foot sidewalk on the north side. The barriers on the bridge are crash rated traffic railing barriers with pedestrian hand railing on the top of the barrier on the north side of the bridge. The bridge has a constant cross slope of 2.0 percent sloping towards the south. The uniform cross slope will facilitate in widening the bridge to 4-lanes in the event the need arises in the future. The proposed bridge typical section is shown in **Figure E**.

9.3. Alignment and Right-of-Way Needs

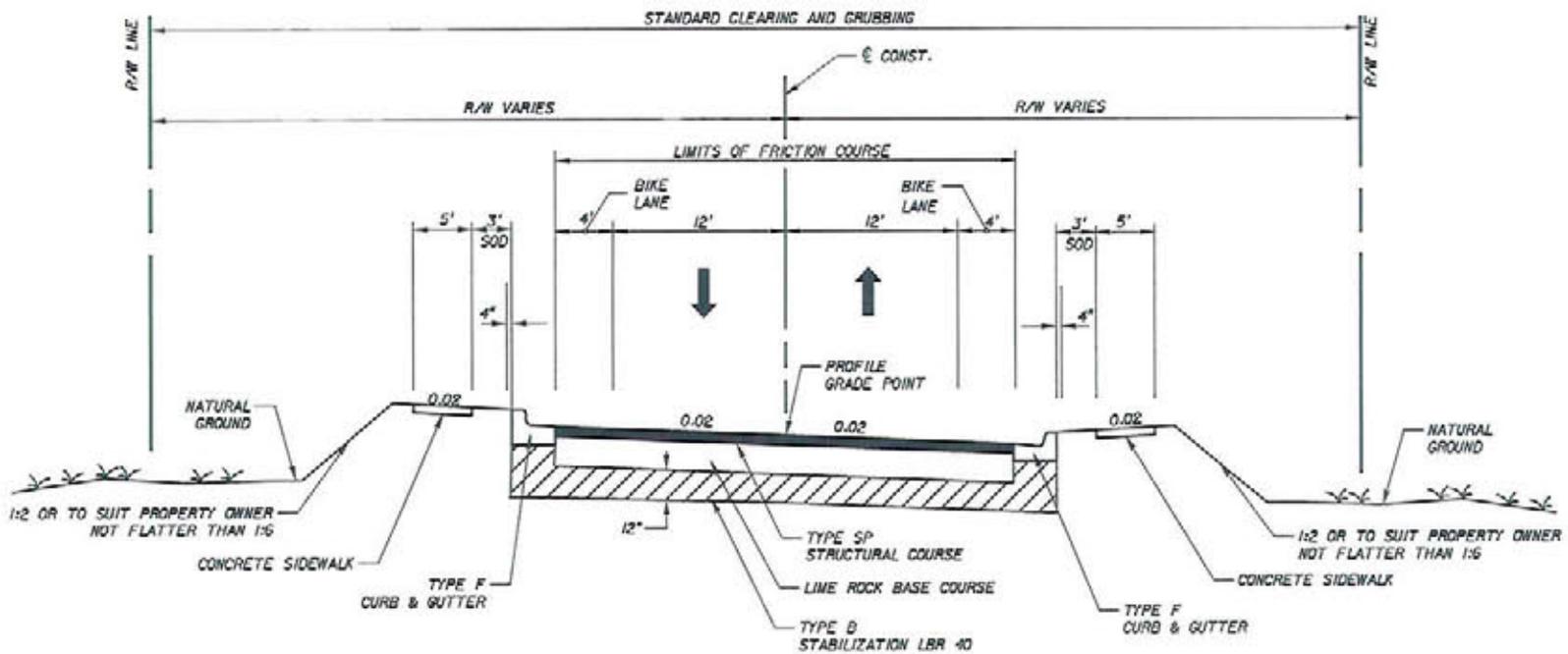
The existing right of way, currently owned by Lake County, is sufficient to accommodate the roadway improvements, the new bridge and the drainage system.

9.4. Bridge

Considering the construction costs, the single span alternative is the preferred alternative for the project. Elimination of the intermediate bents limits the construction work over water. Shorter construction duration and reduced foundation work and ease of navigation are additional advantages of the single span alternative.

9.5. Relocation

The proposed alignment will not require the relocation of any residences or businesses along the project corridor. There will be no displacements of institutional or community facilities.



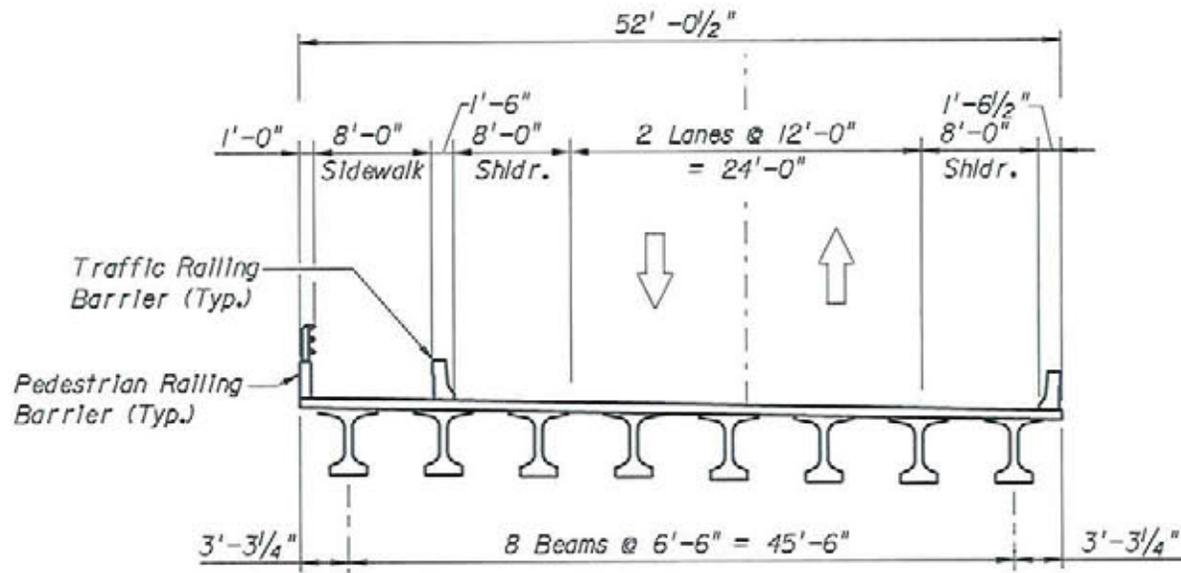
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TRAFFIC DATA

CURRENT YEAR ESTIMATE = 2007 AADT = 12,228
 OPENING YEAR ESTIMATE = 2010 AADT = 12,540
 DESIGN YEAR ESTIMATE = 2030 AADT = 14,620
 DESIGN SPEED = 45 MPH

NEW CONSTRUCTION

ASPHALTIC CONCRETE (FC-3) 1" MIN.
 ASPHALTIC CONCRETE (TYPE S-1) 2.5" MIN.
 LIMEROCK BASE COURSE (MIN. LBR 100) 10"



9.6. Project Costs

The total estimated project costs include construction cost estimates and engineering design cost estimates. Right-of-way acquisition is not required and therefore has no costs.

The estimated construction cost for the preferred alignment was developed using historical pricing information for past FDOT roadway construction projects. The estimated construction cost is \$2.5 million and includes minimal utility relocation costs.

The estimated engineering design cost for the preferred alignment is \$299,400 and is based on twelve percent of the estimated construction cost.

The estimated total project costs are summarized as follows:

Design	\$300,000
Right-of-Way	\$0
Construction	\$2,500,000
Total Estimated Project Cost	\$2,800,000

9.7. Recycling of Salvageable Materials

The opportunity to recycle any salvageable materials by the contractor is encouraged by Lake County. Such materials may include old asphaltic concrete pavement, base material, bridge concrete and drainage structures.

The existing pavement may be milled for recycling during the construction of the project. Any other salvageable materials will be identified during the design of the project. If these materials should be removed from the construction site, it is to be done as specified in the current *FDOT Standard Specifications for Road and Bridge Construction*. The opportunity to utilize existing pavement will also be identified during the design of the project.

9.8. User Benefits

The preferred alternative provides user benefits to the extent that it provides a shoulder in the event a vehicle breaks down and has to stop on the bridge as well as additional for recovery and avoidance maneuvers. The addition of bicycle lanes and pedestrian accommodations along the corridor and on the bridge provide a benefit to the users of this facility.

9.9. Pedestrian and Bicycle Facilities

A four-foot bicycle lane will be provided in both directions along the outside travel lane and a 5-foot sidewalk will be provided on the north side of the roadway and an 8-foot sidewalk will be provided on the north side of the bridge.

9.10. Safety

Safety is a major aspect in development of the project. Improved pavement conditions, adequate drainage systems, bridge sufficiency rating, sight distances, roadway geometry, clear recovery areas and pedestrian and bicycle features are all proposed to improve the safety of this roadway.

9.11. Economic and Community Development

The majority of the land along the project corridor is vacant, with the exception of the Osprey Pointe subdivision located just west of the Lakeshore Drive bridge. It is anticipated that the new proposed single span bridge with the bicycle and pedestrian enhancements will allow the residents to have access to both sides of the Palatka River providing for a more cohesive community. Also, boaters traveling the Palatka River to and from Lake Susan and Lake Minnehaha will be provided with an unobstructed boating channel and unobscured view of the surrounding river and wetlands.

9.12. Environmental Impacts

Detailed studies and evaluations were conducted to determine the potential for adverse impacts that may result from the proposed project. Baseline data, evaluation procedures and analysis of the results are contained in the project files and in the *Preliminary Ecological Assessment Report for the Lakeshore Drive Bridge*, prepared during this project.

The potential for environmental impacts is low within the existing right of way and proposed joint use pond site, the selection of a preferred alternative was not influenced by these factors.

9.13. Utility Impacts

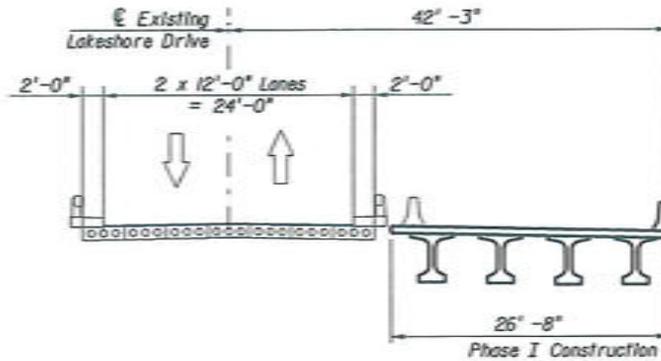
The final design of this project will be coordinated with the existing utility owners in such a way as to minimize adjustments and disruption of service. The majority of the utilities are situated within County owned right of way by maintenance permits and would be relocated at the owner's expense. Utility owners were identified by Sunshine One Call in May 2006. Utility owners will be provided notification of the project by letter and with an aerial photography showing the existing and proposed right-of-way lines, surveyed utility information and roadway conceptual plans for the preferred alternative. The utility companies that have been contacted are listed in Table 11.

Table 11: Utility Contact Information

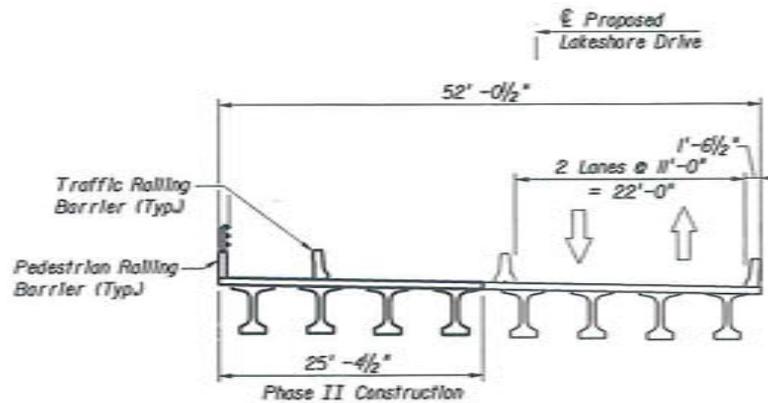
Utility	Facility Type
Mr. Mike Dunn Lake Utility Services, Inc. 200 Weathersfield Avenue Altamonte Springs, FL 34714	Water
Mrs. Tamara Richardson City of Clermont 3335 Hancock Road Clermont, FL 34711	Water
Mr. Larry Henderson Bright House Networks 211 St. Joe Plaza Palm Coast, FL 32164	Cable / Phone
Mr. Alex Wosgein Lake Apopka Natural Gas 1320 Winter Garden - Vineland Road Winter Garden, FL 34787	Gas
Mr. Mike Shell Embarq 33 North Main Street Winter Garden, FL 34787	Cable / Phone
Mrs. Michelle Johnson Progress Energy 3300 Exchange Plaza Lake Mary, FL 32746	Electric

9.14. Traffic Control Plan

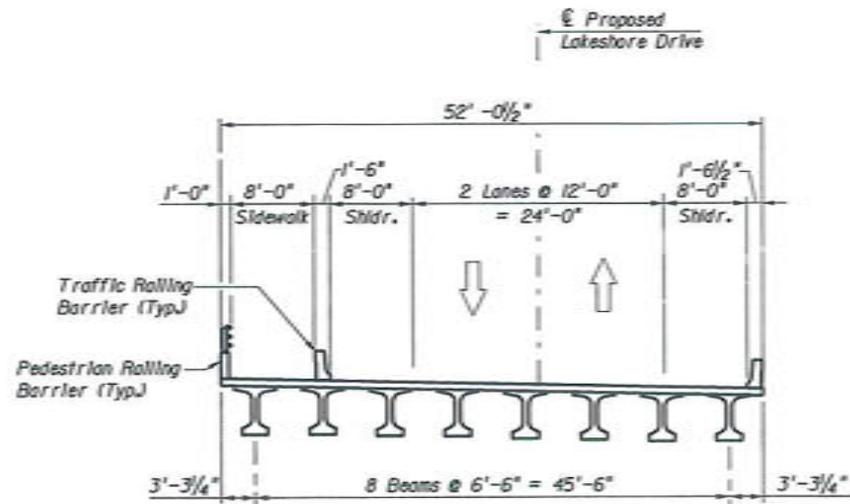
Traffic over the Lakeshore Drive bridge must be maintained at all times. Given the traffic volumes, and the lack of a suitable detour, it is not feasible to close the bridge during construction. The traffic control plan consists of three phases. In Phase I, the existing bridge will remain open to traffic while a portion of the new bridge is constructed just south of the existing bridge. The portion of bridge constructed in phase 1 will be wide enough to carry two lanes of traffic. In Phase II, the traffic is shifted to the new bridge and the existing bridge is demolished and the remainder of the new bridge is constructed. In Phase III the new bridge is striped appropriately and traffic is shifted to the final configuration. The bridge construction sequencing is shown in Figure F.



PHASE I



PHASE II



PROPOSED SECTION

9.15. Results of Public Involvement Program

A Public Meeting was held at the Clermont Jenkins Auditorium, near to the study corridor. The Public Meeting was held on November 8, 2007. Newsletters with meeting notification information were mailed on October 24, 2007, to appropriate elected and appointed public officials, to appropriate regional and reviewing agencies and to property owners of record. Pursuant to Florida Statute 334.211, notifications were mailed to property owners of record whose property is located within 300 feet of each side of the centerline of the existing Lakeshore Drive bridge corridor from Osprey Pointe Boulevard to Lake Ridge Circle in Lake County. Additionally, other interested persons were also notified. A public notice display ad was published in the Orlando Sentinel – Lake Section on October 31, 2007.

The Open House/Material Review period of the meeting began at 5:30 p.m. Members of the community began arriving at approximately 5:20 p.m. During this period, attendees could peruse the available boards and documentation as well as ask questions of any staff member in attendance. The formal portion of the presentation began at 6:00 p.m. The study team provided a brief description of each item available at the sign-in table and urged attendees to provide comments via the comment sheet. Utilizing a PowerPoint presentation, the team provided project related information regarding historical information, information collected during the data collection efforts, purpose and need, corridor specific issues and an explanation of the results expected from the process.

A total of 5 people were in attendance at the meeting. A majority of those in attendance resided along the corridor. The attendees were interactive and attentive during the presentation. Many questions were answered during the informal sessions and contacts were made for future individual meetings to discuss individual concerns. One comment was received regarding the shifting of the bridge further south and the concern that the transition from the roadway to the new bridge would be unsafe.

9.16. Drainage

The stormwater runoff west of the bridge will be treated in approximately 805-feet of 36-inch trench drain. The stormwater runoff east of the bridge will be treated in the existing pond that was recently constructed for the Hammock Ridge Road project.

Appendix A: Roadway and Bridge Concept Plans

Appendix B: Structural Deficiencies

Summary of Structural Deficiencies

SUMMARY OF STRUCTURAL DEFICIENCIES

(Excerpts from Bridge Inspection Report dated October 13, 2005)

Deck Surface

The Asphalt Overlay Exhibits transverse cracks over the expansion joints.



Longitudinal cracks in the Asphalt Overlay over the slab unit joints.



Superstructure

Spall with exposed rebar on the left edge of the underside of Slab unit 3-2



Summary of Structural Deficiencies

SUMMARY OF STRUCTURAL DEFICIENCIES

(Excerpts from Bridge Inspection Report dated October 13, 2005)

Joint Seals

Leaking expansions. Dirt and vegetation at the curb area.



Typical vegetation at the end of Bent



Slope Protection

Typical Vegetation at Bent 2.



Summary of Structural Deficiencies

SUMMARY OF STRUCTURAL DEFICIENCIES

(Excerpts from Bridge Inspection Report dated October 13, 2005)

Approach Roadway

Longitudinal cracking in the east approach roadway.

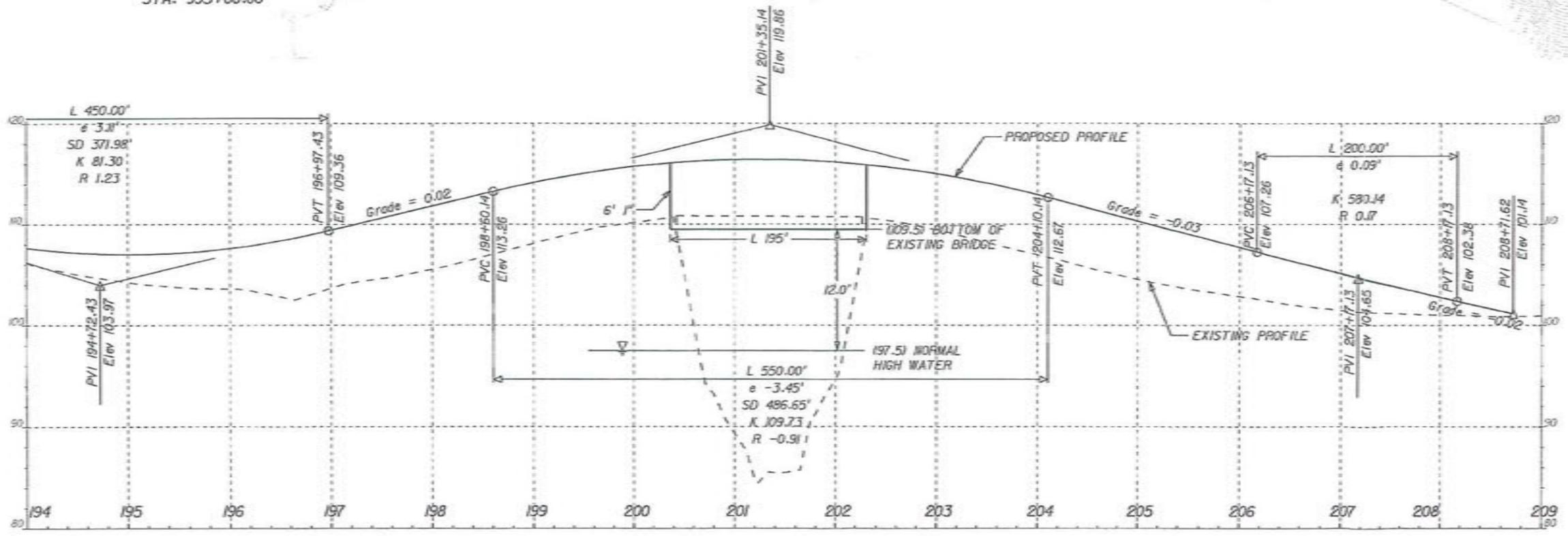
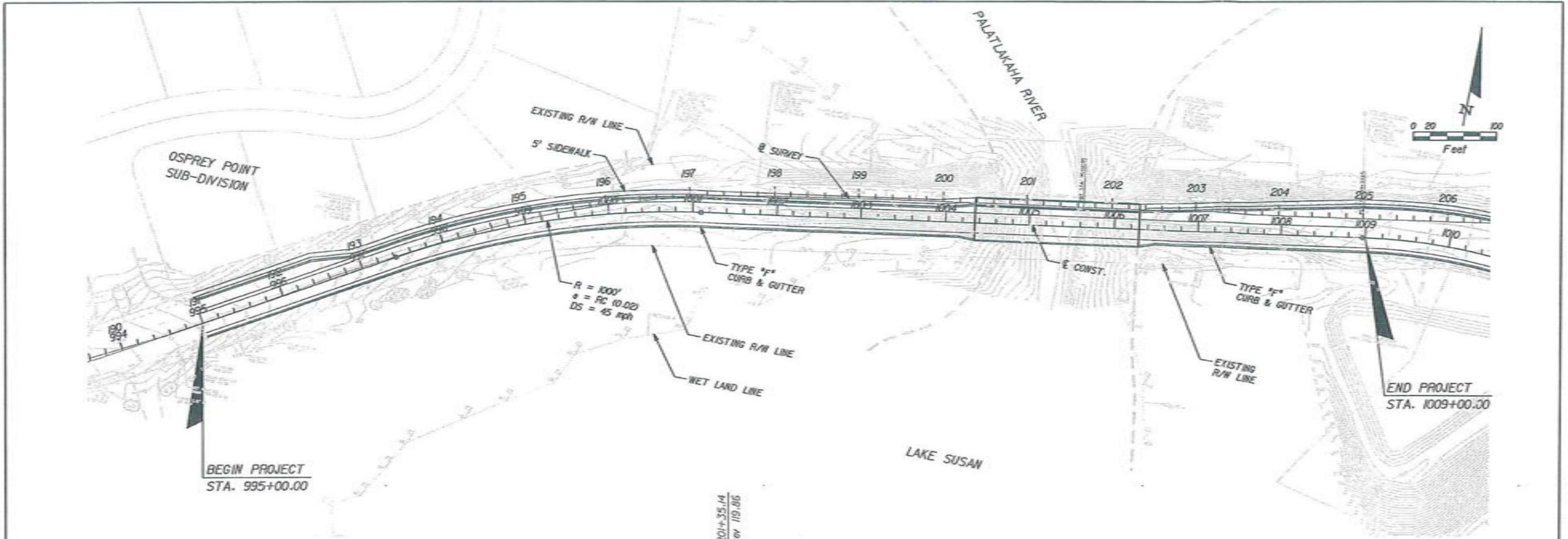


Slope Protection

Collapsed rip rap in the east slope



Appendix C: Drainage Maps



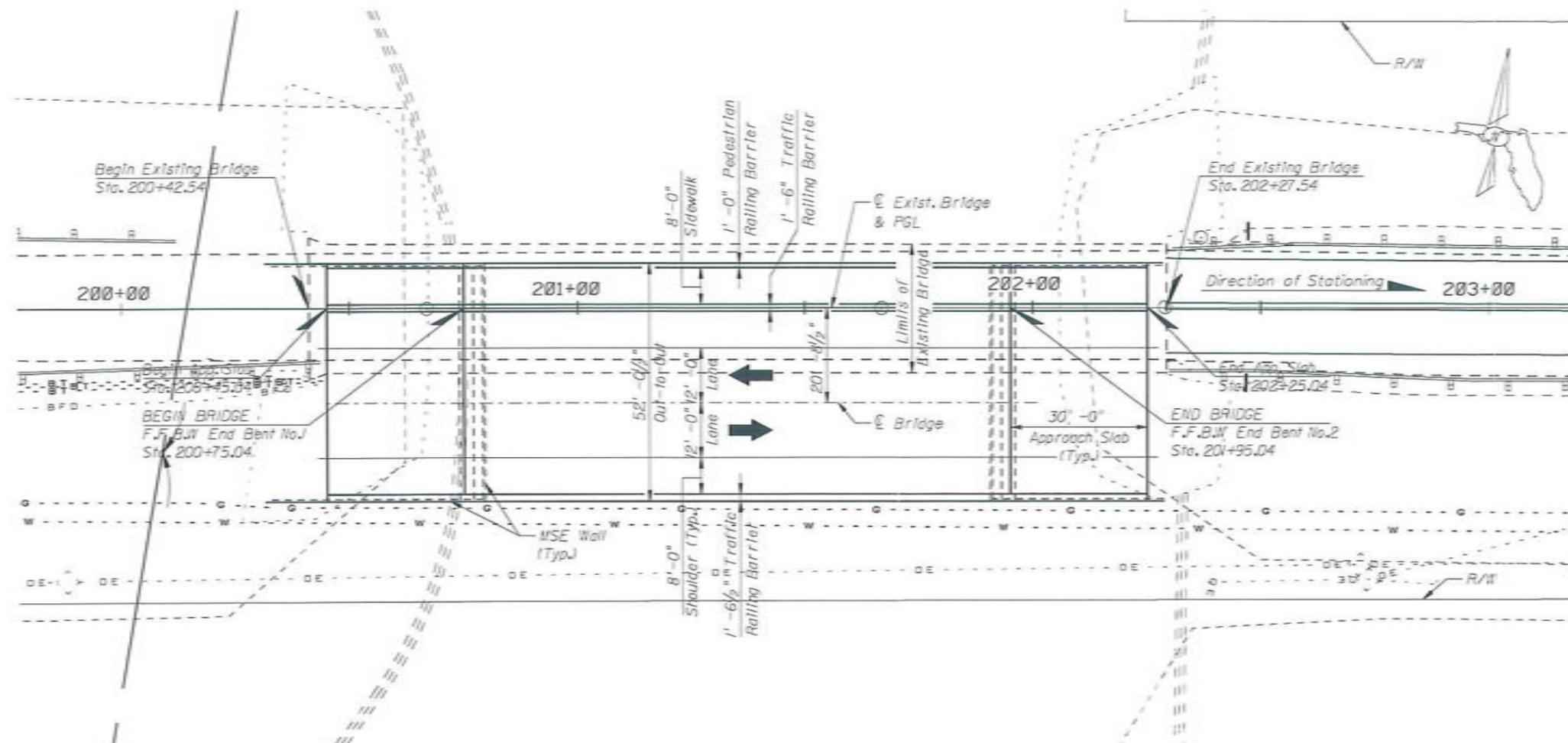
REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB
 HNTB CORPORATION
 300 PRIMA BLDG,
 SUITE 200
 LAKE WARY, FL 33746
 (407) 805-0355
 CERT. OF AUTH. NO. 6500
 ENGINEER OF RECORD: ROBERT W. DENNEY, P.E.
 FL. REGISTRATION NO. 58593

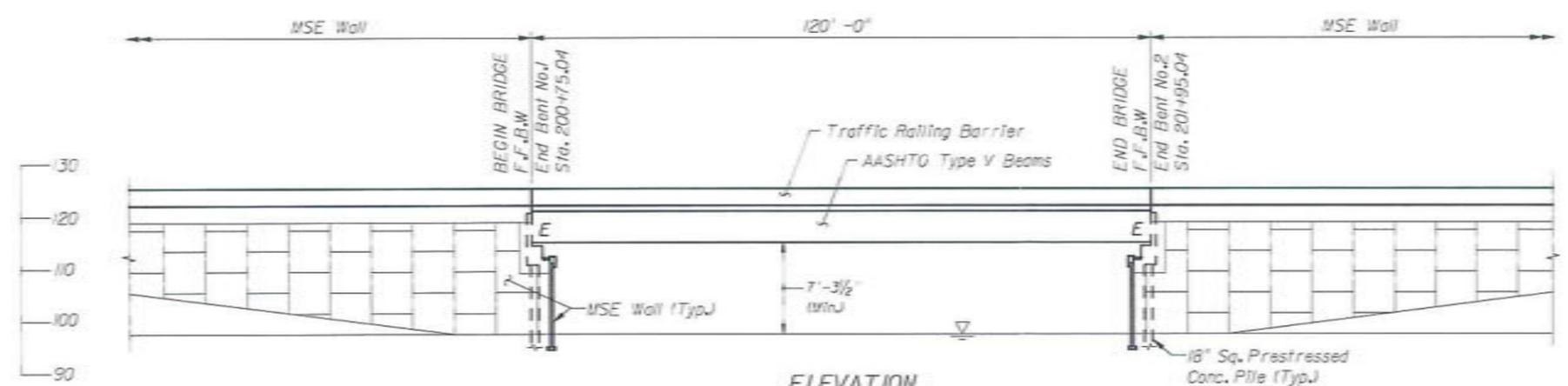
LAKE COUNTY
 FLORIDA

**LAKESHORE DRIVE
 PLAN AND PROFILE
 ALTERNATIVE 2**

SHEET NO.



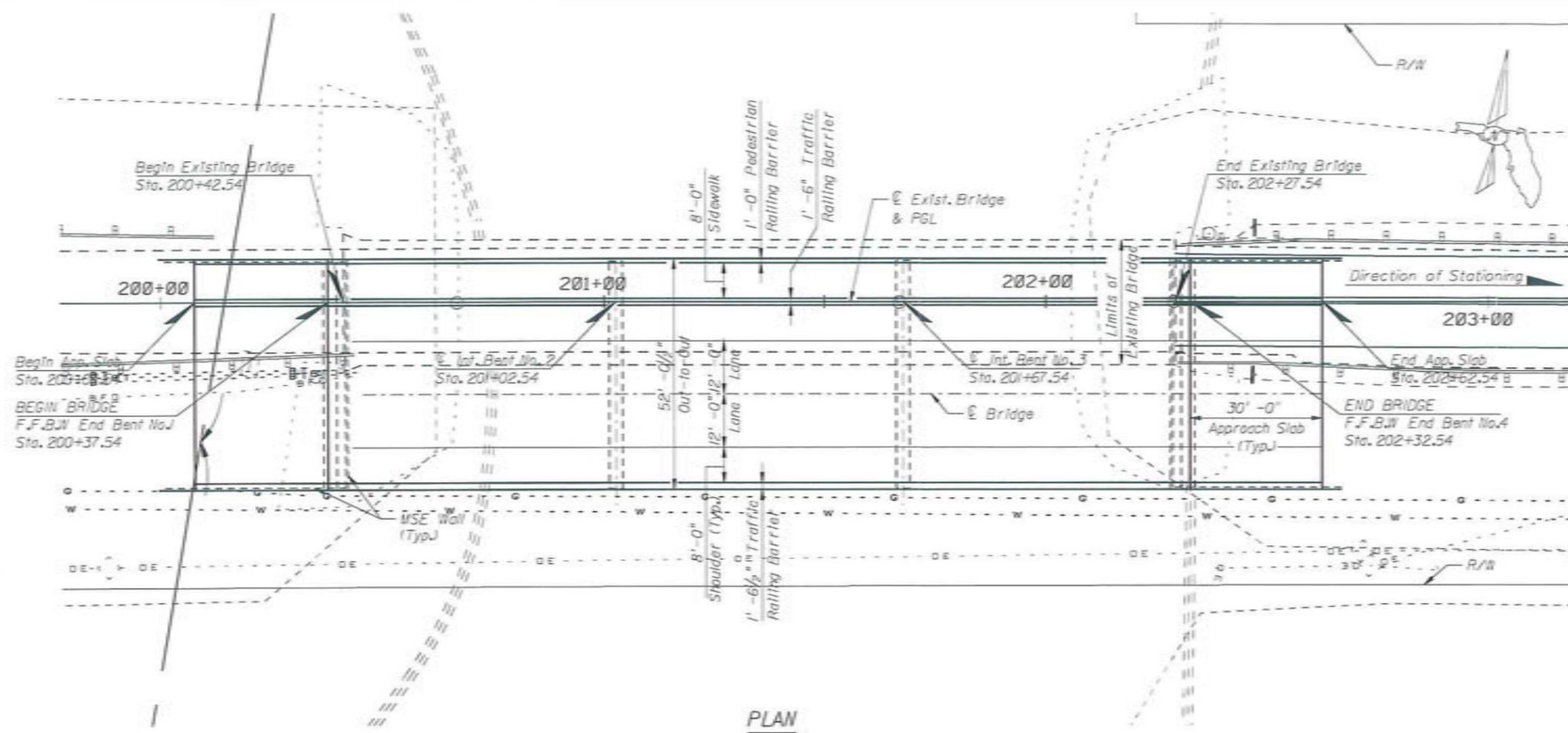
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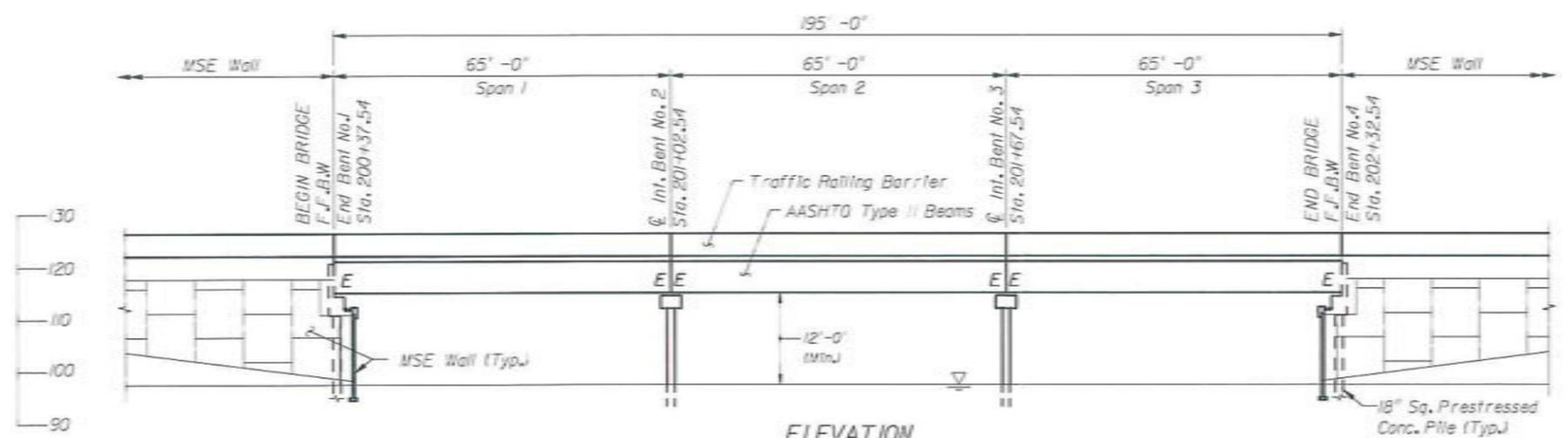
ELEVATION

- LEGEND:
- F.F.B.W. = Front Face of Backwall
 - E = Expansion Bearing
 - G = Gas Main
 - OE = Overhead Electric
 - BFO = Buried Fiber Optic

REVISIONS						DRAWN BY	CHECKED BY	DESIGNED BY	APPROVED BY	ENGINEER OF RECORD HNTB 300 PRIMA BLVD., SUITE 200 LAKE WARY, FL 32746 (407) 805-0355 CA NO. 6500	 LAKE COUNTY FLORIDA	LAKESHORE DRIVE GENERAL PLAN AND ELEVATION ALTERNATIVE 1	Figure
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PLAN



ELEVATION

- LEGEND:**
- F.F.B.W. = Front Face of Backwall
 - E = Expansion Bearing
 - G = Gas Main
 - OE = Overhead Electric
 - BFO = Burled Fiber Optic

REVISIONS						ENGINEER OF RECORD			LAKESHORE DRIVE GENERAL PLAN AND ELEVATION ALTERNATIVE 2	Figure
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 FL. REGISTRATION NO. 54872



**LAKESHORE DRIVE
DRAINAGE MAP**

SHEET NO.



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 SUITE 200
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ENGINEER OF RECORD: TIMOTHY X. VAVRA, P.E.
 FL. REGISTRATION NO. 54872



LAKESHORE DRIVE
DRAINAGE MAP

SHEET NO.