PRELIMINARY ENGINEERING REPORT

I-4 (S.R. 400) PD&E Study From C.R. 532 (Osceola-Polk County Line) To S.R. 528 (BeeLine Expressway) in Osceola & Orange Counties, Florida

Financial Project Numbers: 242526 & 242483
State Project Numbers: 92130-1425 & 75280-1479
Federal Aid Project Numbers: N/A & NH-4-2(169)65
Work Program Item Numbers: 5147330 & 5147254

Prepared for:

FLORIDA DEPARTMENT OF TRANSPORTATION

District Five
719 South Woodland Blvd.
Deland, Florida 32720

TRANS 4 MATION

THE EVOLUTION OF TRANSPORTATION IN CENTRAL FLORIDA

Prepared by:

HNTB

PRELIMINARY ENGINEERING REPORT

I-4 (S.R. 400) PD&E Study
From C.R. 532 (Osceola-Polk Line Road)
To S.R. 528 (BeeLine Expressway)
in Osceola and Orange Counties, Florida

State Project Nos: 92130-1425 & 75280-1479
Work Program Item Nos: 5147330 & 5147254
Federal Aid Project Nos.: N/A & NH-4-2(169)65
Financial Project Nos.: 242526 & 242483

Prepared for:
FLORIDA DEPARTMENT OF TRANSPORTATION
District Five
719 South Woodland Boulevard
DeLand, Florida 32720

Prepared by:
HNTB CORPORATION

JUNE 2000

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF EXHIBITS

LIST OF EXHIBITS Continued

LIST OF TABLES

LIST OF APPENDICES (Volume II)

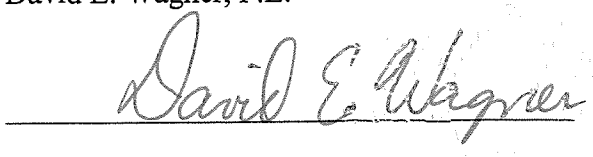
PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with HNTB Corporation, authorized to operate as an engineering business, certificate of authorization number 6500, by the State of Florida, Department of Professional Regulation, Board of Professional Engineers, and that I have reviewed or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for:

PROJECT:	I-4 (S.R. 400) Section 1 PD&E Study
STATE PROJECT NOS.:	92130-1425 & 75280-1479
WORK PROGRAM ITEM NOS.:	5147330 & 5147254
FINANCIAL PROJECT NOS.:	242526 & 242483
FEDERAL AID PROJECT NOS.:	N/A & NH-4-2(169)65
LOCATION:	From C.R. 532 at the Polk/Osceola County line to southwest of S.R. 528 (BeeLine Expressway), in Osceola and Orange Counties, Florida

This Preliminary Engineering Report includes a summary of data collection efforts and conceptual design analyses for the I-4 Section 1 Corridor PD&E Study. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering and planning as applied through professional judgment and experience.

NAME: David E. Wagner, P.E.

SIGNATURE: 

P.E. NUMBER: 49363

DATE: June 22, 2000

SECTION 1
SUMMARY

1.0 SUMMARY

1.1 Commitments

All project construction activities will be accomplished in accordance with the provisions in the Florida Department of Transportation (FDOT) *Standard Specifications for Road and Bridge Construction.* To minimize impacts to the human and natural environment, FDOT is committed to the following additional measures:

1. Wetlands - Mitigation of anticipated wetland impacts (28.4 hectares [71.0 acres]) will be provided under the provisions of S. 373.4137 F.S., which requires that mitigation of FDOT construction impacts be implemented by the appropriate water management district where the impacts occur. Coordination with the South Florida Water Management District (SFWMD) confirms that the WMD intends to provide the necessary mitigation to offset these impacts.

2. Contamination - Information regarding eleven potential petroleum contamination sites will be updated, including site evaluations and organic vapor analyzer (OVA) screening/monitoring if necessary, during the final design phase and prior to construction or right-of-way acquisition. Estimated areas of contamination will be marked on the design drawings and any necessary clean-up will take place during construction if deemed feasible. Special provisions for handling expected and unexpected contamination during construction will be included in the construction plans package.

3. Salvaging of materials (i.e., signs, traffic signals, roadway lighting, lime rock and asphalt) will be given consideration along all of the sections of roadways being displaced by construction activities.

4. Noise - Two potential noise barriers were determined to be reasonable and feasible based on the results of the STAMINA 2.1 barrier analysis. Due the revised Western Beltway interchange concept and the associated acquisition of the Paradise RV Park, a noise barrier will no longer be required at that location. See Post-Hearing Design Refinements under Section 1.2 Recommendations, for further information regarding the revised concept. For the Monterey Lake Apartments in Orange County near the BeeLine Expressway (S.R. 528), a potential noise barrier of 145 m (476 ft.) in length and 5.0 m (16 ft.) in height was shown to be reasonable and feasible.

   The FDOT is committed to the construction of noise barriers at the Monterey Lake Apartments, contingent upon the following conditions:

   - Detailed noise analyses during the final design phase supports the need for abatement;
   - Reasonable cost analyses indicate that the economic cost of the barrier(s) will not exceed the FDOT guidelines;

- Community input regarding the barrier(s), solicited by the FDOT District Five office during the final design phase, is positive;
- Safety and engineering aspects as related to the roadway user and the adjacent property owner(s) are acceptable; and
- Any other mitigating circumstances have been resolved.

If, during the final design phase of the project, any of the contingency conditions listed above cause abatement to no longer be considered reasonable or feasible for a given location or locations, such determination will be made prior to requesting approval for construction advertisement. In addition, during final design and prior to construction, those sites which may be affected through any final design alignment changes, including new development sites and those sites now considered borderline, will be revised insofar as a noise analysis.

5. Water Quality - Stormwater pond sizes have been developed for the purpose of estimating right-of-way requirements only. The actual physical size and configuration of all required water management facilities will be determined during the final design phase of the project. All stormwater facility design will be in accordance with the most stringent regulations of the various permitting agencies, including the South Florida Water Management District and Orange County.

6. Drainage Structures To Enhance Wildlife Connectivity - With respect to providing habitat and cover for wildlife, the existing I-4 crossing locations provide essential aquatic and terrestrial connectivity between portions of both Reedy and Davenport Creeks. The Davenport Creek system is currently crossed via a series of concrete box culverts. The largest of these crossings consists of a multiple-opening (4) box arrangement at the main stream channel. The culvert structures within the Davenport Creek system provide aquatic connectivity and allow terrestrial animal access only during low water stages. The project design must include drainage structures which preserve the existing hydrologic openings to meet drainage requirements. As part of the drainage final design, FDOT is committed to the evaluation and consideration of cross drain culvert configurations which also serve to enhance the opportunity for wildlife to utilize these structures as crossing locations.

7. Access Management – A break in access along Lake Avenue will be provided to the Embassy Suites Hotel, which is located in the southwest quadrant of the proposed I-4/Lake Avenue interchange, across from the proposed I-4 westbound exit ramp. The Department believes the design concept as shown is a reasonable compromise, balancing traffic operations and cost issues.

8. Special Features – Barrier separated special use/HOV lanes will be used throughout Section 1. A park and ride lot will be located adjacent to the I-4/Lake Avenue interchange.

9. Transportation Systems Management (TSM) – TSM measures have been considered extensively in the development of, and are an integral part of, this project. The TSM measures which are incorporated into this project include High Occupancy Vehicle (HOV) lanes, an additional median transit envelope for future transit facilities, Intelligent Transportation System (ITS) features, interchange improvements, and ramp-to-ramp auxiliary lanes. Further, the Central Florida Regional Transportation Authority is planning on providing light rail transit (LRT) service adjacent to the corridor to further enhance mobility and provide modal options for commuters and visitors.

10. Noise, Landscaping, and Retention Pond Issues at Lake Willis – The Department is committed to re-evaluating the need for noise abatement, landscaping treatments, and the location of retention ponds in the vicinity of Lake Willis during final design.

1.2 Recommendations

The FDOT recommends the improvements to the 22.0 km (13.7 mi.) section of I-4, from the Polk/Osceola County line to west of the BeeLine Expressway (S.R. 528). This recommendation is based on input from the community, coordination with local governments and other agencies, and engineering and environmental analyses conducted as part of the Project Development and Environmental (PD&E) Study. The proposed improvement is anticipated to provide additional mobility options, enhance traffic safety, and enhance general use lane operations.

The Recommended Preferred Alternative is shown on the Conceptual Design Plans and Profiles in the appendix and described in Sections 8 and 9 of this document. Subsequent to the Public Hearing, several design refinements and modifications have been made to the Preferred Alternative. These modifications have been incorporated in the Conceptual Design Plans provided in the appendix. As a result of the Public Hearing, environmental studies, and interagency coordination, the Preferred Alternative is recommended for Location/Design Concept Approval.

The recommended improvement provides for six general use lanes and two or four special use/high occupancy vehicle (HOV) lanes, ramp-to-ramp auxiliary lanes, collector-distributor (CD) roadways, grade-separated ramps, interchange modifications, and new interchanges.

Typical Sections

Two mainline typical sections have been identified for I-4 Section 1. These typical sections, shown as Exhibit 8-1, provide for six general use lanes and two or four special use/HOV lanes. These typical sections are described as follows:

Typical Section #1: This mainline typical section will provide six general use lanes and four special use/HOV lanes within a minimum of 129.2 m (424 ft.) of right-of-way with open drainage or a minimum of 88.0 m (290 ft.) with closed drainage. This typical section will be used from the Polk/Osceola County line to west of World Drive. The special use lanes along this segment continue the treatment proposed in District One which allows long distance through trips. This typical section is also used from east of Lake Avenue to the BeeLine Expressway (S.R. 528). Along that segment, the four HOV lanes are restricted to HOV3+ (vehicles with three or more occupants) in the design year.

Typical Section #2: This mainline typical section will provide six general use lanes and two HOV lanes within a minimum of 122.0 m (400 ft.) of right-of-way with open drainage or a minimum of 81.0 m (266 ft.) with closed drainage. This typical section will be used from west of World Drive to east of Lake Avenue.

Both typical sections provide a design speed of 110 km/hr (70 mph).

Interchanges

Grade separations and interchanges are planned at 13 locations, which are:

- C.R. 532 (interchange);
- Western Beltway (new interchange);
- C.R. 545 (overpass);
- World Drive (interchange);
- Road B (new HOV-only interchange, to/from the northeast along I-4);
- Southern Connector (S.R. 417) (interchange);
- U.S. 192 (S.R. 530) (interchange);
- Osceola Parkway (interchange currently under construction);
- S.R. 536 (interchange);
- S.R. 535 (interchange);
- Lake Avenue (new interchange)
- Central Florida Parkway (interchange); and
- BeeLine Expressway (interchange).

Further, HOV flyover ramps are planned at the World Drive CD road (eastbound HOV exit), S.R. 536 (eastbound HOV entrance and westbound HOV exit), Lake Avenue (eastbound HOV entrance and westbound HOV exit), and the BeeLine Expressway (all directions/movements).

Preliminary bridge concepts have been developed for each location, including bridge sections, plans, and elevations, as shown in Section 9.20. Additional structures to be provided along the project include cross drains necessary for the conveyance of significant offsite runoff under the proposed roadway (Section 9.19.1).

Drainage

Stormwater management will involve the collection of runoff in open swales or a closed drainage system and conveyance to nearby stormwater management facilities prior to discharge into the natural system. Preliminary pond sizes and locations will be reevaluated during the final design phase (Section 9.19.3).

As displayed during the Public Hearing, Ponds 70.1a ALT and 70.5 ALT are adjacent to Lake Willis. Several residents living adjacent to Lake Willis had concerns about water quality, water quantity, aesthetics, and noise resulting from the construction of the Preferred Alternative and the proposed ponds. They requested alternative locations be investigated to avoid potential impacts to the lake and to their neighborhood. Additionally, there was some concern about Pond 70.8, which is located at the intersection of Central Florida Parkway and Turkey Lake Road. This location is a prime commercial site. As a result, the drainage basin limits were reviewed. Two alternative ponds have been located on the west side of I-4 near the outfall ditch from Lake Willis to Big Sand Lake, and Pond 70.8 was moved to the south and reduced in size. It should be noted that these alternative ponds and the adjustments to Pond 70.8 are alternatives to the ponds shown in the Preferred Alternative preliminary plans.

Post-Hearing Design Refinements

Since the Public Hearing, the Federal Highway Administration (FHWA) has requested that the Western Beltway interchange concept be modified to be consistent with that developed in the Western Beltway PD&E Study. The modified interchange concept can accommodate the possibility of future HOV direct connect ramps to and from both directions along I-4. This modification was due, in part, to the progress and schedule of the Western Beltway PD&E Study. The ponds within the interchange have also been revised to reflect those depicted in the Western Beltway PD&E Study.

Features of the revised interchange concept include an 80 km/hr (50 mph) design speed for all ramps including the future HOV direct connect ramps, deeper infield ponds within the interchange, and dual lanes on both flyover structures to prevent the need for future widening. Other revisions include the reconstruction of the C.R. 545 overpass to the east of the existing alignment to avoid impacts to the TECO Gas Substation (a low risk contamination site) and the relocation of the eastbound to northbound ramp to avoid a potential sinkhole. The C.R. 545 bridge will be lengthened 30.0 m (100 ft.) to accommodate the future HOV ramps passing underneath.

The additional impacts associated with the revised Western Beltway interchange concept, as compared to the prior concept originally selected in this study, are summarized in Table 1-1. As shown, the modified interchange will result in roughly 6 additional acres of wetland impacts than the previous concept. A reduced border width has been used along the north side of I-4 east of C.R. 545 to minimize additional wetland impacts. The modified interchange now proposed requires additional ROW along I-4 and will acquire

Table 1-1
COMPARISON OF WESTERN
BELTWAY INTERCHANGE CONCEPTS

Criteria/Impact	Previous Concept	Revised Concept	Change with Revised Concept
Relocations			
Residential	0	8	8
Business	0	1	1
Environmental Impacts			
Archeological Sites	0	0	0
Contamination Sites (low risk)	1	0	-1
Historical Structures	0	0	0
Floodplains (acres)	3.63	4.57	0.94
Wetlands (acres)	6.48	12.08	5.6

the Paradise RV Park, which involves relocation of eight permanent residences and one business (the trailer park itself). However, the revised concept reduces the required ROW in the vicinity of the TECO Gas Station, in order to avoid impacts, as described above.

Since the Public Hearing, several other minor design refinements and modifications have been made to the Preferred Alternative. These refinements and modifications represent no substantive change to the construction cost, right-of-way requirements, or environmental impacts previously estimated for the Preferred Alternative. Some of these refinements were developed as a result of the findings in the Systems Access Modification Report (SAMR). These design changes are described below.

The eastbound HOV slip ramp east of World Drive has been relocated to the west, between the special use lane flyover exit ramp to the World Drive CD road and the World Drive overpass structures. In conjunction with this modification, the special use lanes have been extended eastward from the flyover ramp to this slip ramp. The designation of the slip ramp has changed as it will serve as the end of the special use lanes, as well as the HOV exit to U.S. 192, Osceola Parkway, and S.R. 536. The one-lane slip ramp will be a lane drop; however, a recovery lane of sufficient length has been provided along the HOV facility, which continues eastward. To enhance the merge between the slip ramp and the general use lanes, a 625.0 m (2,050 ft.) parallel acceleration lane has been provided.

These modifications enhance operations along the special use lane flyover exit ramp and the weave along the World Drive CD road, by removing the traffic which desires to continue east on I-4, but is not eligible for using the HOV lanes. The World Drive CD road would then primarily serve as the means of collecting and distributing I-4 traffic to/from World Drive and to/from the Southern Connector (S.R. 417). Also, minor modifications have been made to a few other ramps depicted in the Preferred Alternative. These primarily include the length of parallel acceleration lanes from entrance ramps.

SECTION 2
INTRODUCTION

2.0 INTRODUCTION

2.1 Purpose

This Preliminary Engineering Report (PER) has been prepared as part of the Florida Department of Transportation (FDOT) Project Development and Environmental (PD&E) Study for Interstate 4 (I-4) Section 1 located in Osceola and Orange Counties, Florida. The PD&E Study is being conducted to identify the most appropriate transportation improvements needed to accommodate existing and projected travel demand along I-4, consistent with area transportation plans and with minimal socio-economic and environmental impact. This PER documents existing conditions, needed improvements, and design considerations for improving this transportation facility.

The recently completed I-4 Multi-Modal Master Plan (MMMP) serves as the blueprint for improvements to I-4 throughout FDOT District Five. This PER further refines improvements recommended in the I-4 MMMP for Section 1. This PER will assist FDOT and the Federal Highway Administration (FHWA) in identifying a "preferred alternative" and will serve as the document of record in support of subsequent engineering decisions as the project advances through design and construction. Conceptual design plans are included in the appendices contained in Volume II and should be reviewed concurrently with this report.

2.2 Project Description

Interstate 4 is an east-west freeway which lies entirely within the state of Florida. It connects Orlando in Central Florida to Tampa on the west coast and to Daytona Beach on the east coast. It roughly parallels slower U.S. 92 across the state, and provides a bypass route around smaller cities such as Lakeland, Winter Haven, and Kissimmee. Exhibit 2-1 shows the location of the study area within the state of Florida.

Within the Orlando metropolitan area, I-4 connects to several major activity centers including resort areas, downtown Orlando, and other employment centers. Within the Section 1 study area, I-4 services the Disney and International Drive resort areas, the convention center, and other tourist and employment centers.

Improvements are planned for the entire length of I-4 in the State of Florida, with several projects currently under construction within Districts One and Seven. The southwestern terminus of I-4 is in Tampa, at its interchange with I-275. I-4 is a four-lane facility from I-275 to U.S. 192 (S.R. 530) in Osceola County, with the exception of a short six-lane segment between I-275 and 21st/22nd Street in Tampa. The six-lane widening of I-4 between I-275 and east of U.S. 41/50th Street in Tampa and operational improvements to the I-4/I-275 interchange are currently being designed. These projects are regarded as interim improvements with construction being several years away. The ultimate improvement to I-4 between I-275 and east of U.S. 41/50th Street consists of a four

EXHIBIT 2-1
LOCATION OF STUDY AREA

HNTB
Architects Engineers Planners

roadway system, with two roadways serving each direction and three basic lanes on each roadway. The interim project constructs the outer roadways, which in the ultimate condition represent a collector-distributor (CD) system.

The remainder of I-4 within District Seven, from U.S. 41/50th Street to the Hillsborough/Polk County line, is currently being widened to six lanes with safety improvements. The limits of the widening extend beyond the Hillsborough/Polk County line to Memorial Boulevard within District One, for a total of approximately 39 km (24 mi.). All segments of this project east of I-75 are scheduled for completion in year 1999. The segment from U.S. 41/50th Street to I-75 is scheduled for completion in year 2001. This project is being constructed in conjunction with the Polk County Parkway (West) interchange in District One.

The Master Plan and PD&E studies for the segments between U.S. 41/50th Street and the Hillsborough/Polk County line were conducted prior to the FDOT Interstate Highway Policy and have been designed with a typical median width of 26.8 m (88 ft.). This median width will accommodate either an additional lane in each direction with a 13.4 m (44 ft.) transit envelope or two additional lanes in each direction with 12.2 m (40 ft.) from edge of travel lane to edge of travel lane. These additional lanes were planned to be contiguous to the other lanes without any separation. The planning studies recommended five lanes in each direction between U.S. 41/50th Street and I-75 and four lanes in each direction from I-75 to the Hillsborough/Polk County lines as the ultimate improvements, which are inconsistent with the FDOT Interstate Highway Policy. Improvements beyond six lanes are planned to be many years away and the Policy will be revisited at that time to guide those improvements.

Design and right-of-way acquisition for widening I-4 to six lanes throughout the remainder of District One, between Memorial Boulevard and the Polk/Osceola County line, are currently in the 5 year work program. No construction funds for this section is in the 5 year work program. However, the 10 Year Interstate Work Plan shows that a couple of segments are planned for construction between years 2004 and 2008. The ultimate typical section proposed for I-4 within Polk County consists of six general use lanes and four special use lanes (6+4) with a 13.4 m (44 ft.) transit envelope in the median. The special use lanes are designated for use by high occupancy vehicles (HOV) and long distance single occupant vehicles (SOV). This typical will begin at the Hillsborough/Polk County line at the end of the Tampa urban service boundary and continue to the Polk/Osceola County line or the District One/District Five boundary. The Polk County Metropolitan Planning Organization (MPO) has adopted a 6+0 roadway typical section with enough median width to accommodate four future special use lanes with a transit envelope, as part of their 2020 Long Range Plan.

For District Five, the I-4 MMMP typical section of six general use lanes and two HOV lanes (6+2) was planned to begin at the Polk/Osceola County line, which required that the

transition from 6+4 to 6+2 occur at the county line. Coordination between Districts One and Five was conducted on the typical sections during Tier 3 of the I-4 MMMP and within this PD&E study.

The FDOT is proposing improvements to I-4 Section 1 which extends from southwest of C.R. 532 at the Polk/Osceola County line to southwest of the BeeLine Expressway (S.R. 528) in Orange County (Section 1), a distance of approximately 22.0 km (13.7 mi.). The existing typical section from the beginning of the project to just southwest of C.R. 545 consists of two mainline travel lanes in each direction, separated by a 30.5 m (100 ft.) median. From southwest of C.R. 545 to just northeast of U.S. 192, I-4 consists of two mainline travel lanes in each direction, separated by a 19.5 m (64 ft.) median, with the exception of one area where the median is bifurcated. The existing typical section from northeast of U.S. 192 to the end of the project consists of three mainline travel lanes in each direction divided by a 19.5 m (64 ft.) median. CD roadways have recently been constructed from northeast of Reedy Creek to the Southern Connector (S.R. 417), which includes the World Drive interchange. CD roadways also exist along westbound I-4 at the S.R. 536 interchange. Ramp-to-ramp auxiliary lanes exist in both directions from S.R. 536 to S.R. 535 and from the Rest Area to Central Florida Parkway. Exhibit 2-2 provides a detailed map of the project study area and includes the interchanging roadways and other important roadways within the corridor.

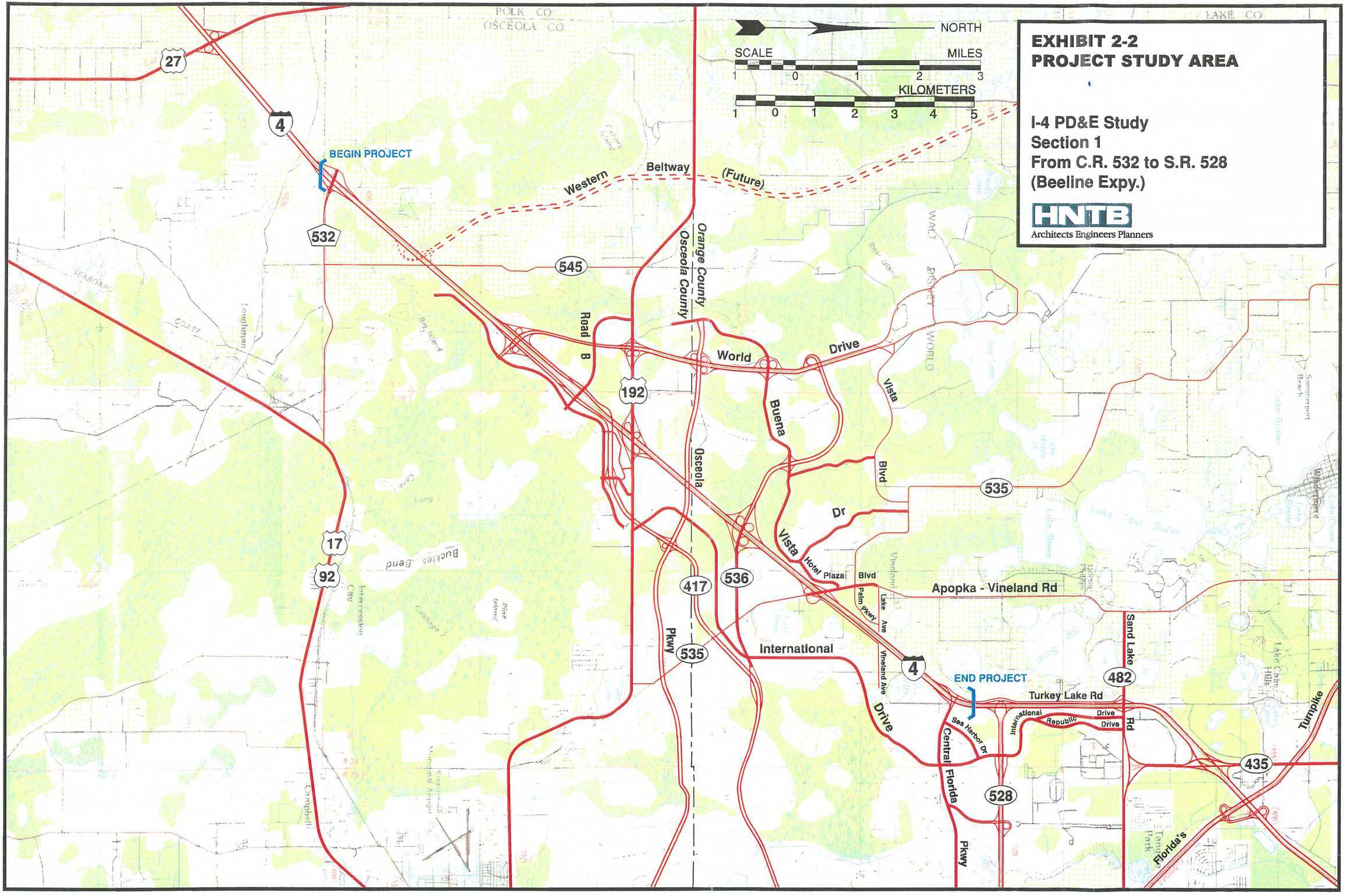
Included in the study area are the following existing overpasses and interchanges on I-4:

- C.R. 532 interchange,
- S.R. 545 overpass,
- World Drive interchange (recently completed),
- Southern Connector Extension (S.R. 417) interchange,
- U.S. 192 (S.R. 530) interchange,
- Osceola Parkway overpass,
- S.R. 536 interchange,
- S.R. 535 interchange, and
- Central Florida Parkway interchange.

Improvements to the C.R. 532 interchange were recently completed. This project added entrance and exit ramps to and from the northeast along I-4.

Also, there are several planned and programmed improvements within the study area which include:

- widening the I-4 mainline from four to six lanes from U.S. 27 in Polk County to U.S. 192 (S.R. 530) in Osceola County;
- construction of the Western Beltway interchange;
- improvements to the U.S. 192 (S.R. 530) interchange;


NORTH
SCALE
MILES
1 0 1 2 3
KILOMETERS
1 0 1 2 3 4 5
EXHIBIT 2-2
PROJECT STUDY AREA
I-4 PD&E Study
Section 1
From C.R. 532 to S.R. 528
(Beeline Expy.)
HNTB
Architects Engineers Planners
POLK CO
OSCEOLA CO
LAKE CO
BEGIN PROJECT
END PROJECT
Western Beltway (Future)
Orange County
Osceola County
Road B
World Drive
Buena Vista Dr
Vista Blvd
Hotel Plaza Blvd
Palm Pkwy
Lake Ave
Vineland Ave
Apopka - Vineland Rd
International Drive
Sand Lake Rd
Turkey Lake Rd
Republic Drive
Sea Harbor Dr
Central Florida Pkwy
Florida's Turnpike
Summerport Beach
27
4
532
545
192
535
536
417
17
92
435
528
482

- construction of the Osceola Parkway interchange; and
- new access at Lake Avenue, as identified in the I-4 MMMP, which is located between S.R. 535 and Central Florida Parkway.

With the exception of the proposed interchange at Lake Avenue, these improvements will be in-place prior to the implementation of the improvements recommended in this report. The Lake Avenue interchange concept proposed in the I-4 MMMP is a half interchange, with ramps to and from the northeast along I-4. An alternative full interchange concept is developed within this study which includes ramp movements to and from the southwest along I-4. This concept is explained in more detail in sections 8 and 9 of this report.

The I-4 MMMP recommended two typical sections for I-4 Section 1:

- Six general use lanes plus two high occupancy vehicle (HOV) lanes (buffer separated) (6+2) with a 13.4 m (44 ft.) rail envelope from the Polk/Osceola County line to northeast of Lake Avenue and
- Six general use lanes plus four HOV lanes (barrier separated) (6+4) with a 13.4 m (44 ft.) rail envelope from northeast of Lake Avenue to the BeeLine Expressway (S.R. 528.)

The special use lanes within the I-4 MMMP are restricted to high occupancy vehicles with a minimum of three occupants (HOV3+).

As stated previously, the ultimate typical section proposed by District One in Polk County consists of six general use lanes and four special use lanes (6+4) with a 13.4 m (44 ft.) median for future rail. Interregional single occupant vehicles (SOV) and HOV2+ will be allowed in the special use lanes. The transition between the District One and District Five typical sections was coordinated during the I-4 MMMP which planned the transition at the Polk/Osceola County line. However, based on further study and coordination with Districts One and Five, a more logical location for the transition would be near the World Drive interchange. The reasons for this change are described in section 6.5 of this report. The transition would be accomplished by direct flyover ramps from/to the special use lanes to/from the CD roadways within the World Drive and Southern Connector (S.R. 417) interchanges. This would allow vehicles to access the Southern Connector and Central Florida Greeneway (S.R. 417), which is planned as a long-term alternative for trips passing through the Orlando metropolitan area. The modified typical sections for I-4 Section 1 are:

- 6+4 from the Polk County line to southwest of World Drive,
- 6+2 from southwest of World Drive to northeast of Lake Avenue, and
- 6+4 from northeast of Lake Avenue to the BeeLine Expressway (S.R. 528).

In addition, a 13.4 m (44 ft.) rail envelope will be provided in the median throughout the study corridor. The special use and HOV lanes will be barrier separated from the general use lanes throughout Section 1. Access to these lanes will be provided through the use of

slip ramps, direct flyovers, and T ramps. The special use lanes southwest of World Drive will permit both interregional SOV and HOV2+, same as in District One. Northeast of World Drive, the special use lanes will be restricted to HOV 3+, and will be referred to as HOV lanes throughout this document. Where necessary, the general use lanes will be supplemented by CD roads and auxiliary lanes. Drainage improvements and stormwater management facilities will be constructed as part of the project.

As stated previously, the northern terminus of this project is located at the BeeLine Expressway interchange. This is a systems interchange which splits the traffic heading to Downtown Orlando and points north from traffic heading to the airport and the Space Coast. Due to this split, I-4 has a reduction in traffic. This reduction corresponds to a reduction in HOV demand, thereby reducing the number of lanes required to only one lane in each direction northeast of interchange. The BeeLine Expressway interchange is also the "gateway" into the Orlando urban area, initiating the transition from the more tourist corridor to the southwest to the more urbanized areas of Orlando to the northeast.

3.0 NEED FOR IMPROVEMENT

From the Walt Disney World/International Drive tourist area in west Osceola and southwest Orange Counties to Daytona Beach at the northeast end of the corridor, I-4 serves a variety of travel needs and offers unique opportunities for transportation solutions. The Orlando and Volusia County Metropolitan Planning Organizations (MPOs) have recognized that the I-4 corridor is one of the most important transportation corridors in the area. Continued mobility within the I-4 corridor is critical to the region's economic future.

The I-4 Section 1 corridor includes one of the world's largest concentrations of hotel rooms and major tourist attractions. Major expansion of these attractions are anticipated. This segment of the corridor exhibits high vehicle occupancy rates, largely controlled by the tourist industry's family orientation. I-4 also provides direct connection to several other major activity centers, including the Orlando Central Business District (CBD), which are outside of the I-4 Section 1 study area but directly influence the amount of traffic using I-4 within Section 1. These activity centers are expected to continue strong growth trends. Travel characteristics within Section 1 vary significantly from other sections, which create unique mobility challenges.

Several deficiencies exist within Section 1. These include congested travel conditions, substandard vertical curves, one substandard horizontal curve, several bridges which have surpassed their design life, inconsistent ramp terminal treatments, and inconsistent highway lighting. With the exception of the segment from S.R. 536 to S.R. 535, all I-4 mainline segments are currently operating at level of service (LOS) 'E' or 'F' during peak hours.

As substantial growth in population and employment through year 2020 is expected, growth in congestion along I-4 is expected to continue. Without any roadway improvements, the traffic demand within the I-4 Section 1 study area is expected to be more than 30 percent over capacity by year 2020. Improvements are recommended in various FDOT documents, MPO Urban Area Transportation Study, and Comprehensive Plans. These improvements will smooth general freeway operations by removing geometric bottlenecks, upgrading deficient design elements, improving safety features, and providing alternative transportation modes.

The factors that constitute the need for the proposed improvement include current and projected deficiencies, safety, consistency with local adopted transportation plans, and socio-economic demands. Each of these factors is discussed below.

3.1 Deficiencies

Within the Section 1 study area, I-4 is a four-lane freeway from C.R. 532 (at the Polk/Osceola County line) to U.S. 192 (S.R. 530). However, this segment of I-4 is

currently under design for widening to six lanes and is expected to be completed prior to construction of the improvements recommended within this report. Northeast of U.S. 192 (S.R. 530), I-4 is a six-lane freeway, with auxiliary lanes in some locations, extending to the north side of the Orlando metropolitan area.

Based on a review of existing traffic volumes and LOS, physical features, and physical conditions, I-4 Section 1 has several deficiencies:

- With the exception of one mainline segment, all segments currently operate under congested conditions (LOS 'E' or 'F') during peak periods, according to the existing year 1996 LOS analysis; I-4 currently exceeds capacity (LOS E) from west of C.R. 532 to the Southern Connector (S.R. 417) and from S.R. 535 to the BeeLine Expressway (S.R. 528); the widening of I-4 to six lanes from U.S. 27 to U.S. 192 (S.R. 530) will provide additional capacity to relieve this existing congestion; however, the no-build analysis, which assumes six lanes throughout Section 1, shows that by the year 2020 this segment will be at LOS F; consult the Design Traffic Technical Memorandum or section 6 of this report for more information;
- A 110 km/hr (70 mph) design speed was assumed throughout Section 1 in order to determine whether existing horizontal and vertical geometry satisfies current design criteria; horizontal curvature does not meet current design criteria near the Central Florida Parkway interchange due to inadequate stopping sight distance;
- There are 112 vertical curves within the study area that do not satisfy design criteria; most of the substandard curves are short with "K" values exceeding 110 km/hr (70 mph) design criteria; some of the curves are not required due to small changes in grade;
- Several ramp terminals do not meet current American Association of State Highway and Transportation Officials (AASHTO) criteria; also, there is a lack of consistency in the types of terminal treatments;
- Many bridge structures are nearing or surpassed their intended design life and do not meet current minimum vertical and horizontal clearances;
- Inconsistent lighting (i.e. mix of high mast, conventional, and no lighting) is provided throughout the section; the U.S. 192 (S.R. 530), S.R. 536, and BeeLine Expressway interchanges have high mast lighting; conventional lighting is provided from the southwest end of the World Drive collector-distributor (CD) roads to northeast of the Southern Connector, from southwest of S.R. 535 to northeast of S.R. 535, and from the southwest end of the rest areas to the Central Florida Parkway interchange; the C.R. 532 interchange and several segments do not have lighting; some of the segments without lighting are relatively short, especially between S.R. 536 and S.R. 535 and between S.R. 535 and the rest areas;
- Drainage does not meet current stormwater management regulations; additionally, there are many locations where there is not adequate base clearance over design high water; and

- Interchange spacing does not meet FDOT Access Management Standards between S.R. 536 and S.R. 535 and between Central Florida Parkway and the BeeLine Expressway (S.R. 528).

These deficiencies are described in further detail in section 4.0, Existing Conditions and in section 6.0, Traffic. As a result of the previously described conditions, the existing highway system in the project area is currently deficient for serving increasing travel demand.

According to *Florida's Level of Service Standards and Guidelines Manual for Planning*, 1995 Edition, (1995 LOS Manual) the minimum acceptable LOS is "D" for I-4 within Section 1. This substantiates the need for improvements. However, improvements must also be consistent with the FDOT Interstate Highway Policy, which requires that improvements beyond six basic lanes include multi-modal improvements. These growing deficiencies are identified within local and regional transportation plans.

3.2 Safety

A high crash location or segment is defined by the FDOT as a location where the safety ratio is greater than or equal to 1.0. Current crash data indicates safety ratios of less than 1.0 for all segments of I-4, U.S. 192 (S.R. 530), and S.R. 536 within the study area. None of these roadway segments are considered to be high crash locations. However, the safety ratios for S.R. 535 are approximately 1.7 in 1992, 1.8 in 1993, 1.7 in 1994, 0.8 in 1995, and 1.2 in 1996, which indicates that S.R. 535 in the vicinity of I-4 is a high crash location. It should be noted that the I-4/S.R. 535 interchange was under reconstruction between September 1993 and October 1995.

The most common crashes along S.R. 535 included rear end, angle and left turn crashes. The number of angle crashes were higher during construction than before or after. Following reconstruction of the interchange, the number of left turns crashes were significantly lower than before or during construction. Additionally, a high number of injuries have occurred along S.R. 535, more than on any segment of I-4 except from S.R. 535 to Central Florida Parkway. This segment of I-4 had approximately the same number of injuries in 1993 and 1994 as the segment of S.R. 535 under review, but is five times the length and carries more than double the traffic volume. Crash data is further discussed in Section 4.1.9 of the Preliminary Engineering Report and includes a more detailed review of S.R. 535. Additional improvements may be necessary on S.R. 535 near the I-4 interchange to address safety concerns. The proposed modifications along Section 1 of I-4 are expected to improve the safety ratios for the corridor.

3.3 Consistency with Transportation Plans

FDOT planning studies, the FDOT Transportation Improvement Program, MPO Urban Area Transportation Study, and Comprehensive Plans for Orange and Osceola Counties

have been reviewed to determine whether the proposed improvements within the I-4 PD&E Study are consistent with adopted plans. The text that follows describes the result of these reviews.

Orlando Urban Area Transportation Study (OUATS) Year 2020 Update

In response to the Intermodal Surface Transportation Efficiency Act (ISTEA), the Orlando Urban Area MPO updated the OUATS Long Range Transportation Plan to the year 2020. A two-tiered process was used which identified several alternatives with various highway and transit improvements and financial considerations. This study was approved on December 13, 1995 by the MPO with associated documentation completed in March 1996. Those improvements directly affecting the I-4 Section 1 corridor and interchanging roadways as well as major regional facilities include:

1. Improve I-4 from the Polk/Osceola County line to the Seminole/Volusia County line to six general use lanes plus two high occupancy vehicle (HOV) lanes;
2. Construct Western Beltway Part C, from Florida's Turnpike to U.S. 192 (S.R. 530) and from U.S. 192 (S.R. 530) to I-4, as a new four-lane toll expressway;
3. Extend S.R. 417 (Greeneway/Seminole County Expressway) from U.S. 17/92 to I-4, as a new four-lane toll expressway; this completes the eastern beltway around the Orlando metropolitan area;
4. Construct Fenton Street from Apopka-Vineland Road to I-4 as a new four-lane facility and Lake Avenue from Apopka-Vineland Road to International Drive Extension as a new four-lane facility;
5. Extend Westwood Boulevard from Lake Avenue to International Drive Extension as a new four-lane roadway;
6. Improve Osceola Parkway from World Drive to east of I-4 to six-lanes;
7. Improve U.S. 192 (S.R. 530) from Orange/Lake County line to World Drive to six lanes;
8. Widen Road "B" from I-4 to U.S. 192 (S.R. 530) east of I-4 to six lanes;
9. Widen C.R. 532 from I-4 to C.R. 545 and C.R. 545 from C.R. 532 to south of U.S. 192 (S.R. 530) to four lanes;
10. Expand Lynx bus system to 400 buses; and
11. Construct new Light Rail Transit (LRT) system from Sanford to Celebration.

I-4 Multi-Modal Master Plan (MMMP), Major Investment Study (MIS)

This study completed in May 1996 for the FDOT District Five was a MIS which addressed the improvements needed in the I-4 Corridor between Osceola County at the Polk County line eastward to the I-95 interchange in Volusia County. The product of the MIS was the identification of a "design concept and scope" for I-4 that defines mode of travel, technology, general location, and financing strategies for major highway and transit improvements.

The study developed a preferred I-4 investment strategy; the specific components of which include the following items relevant to the I-4 Section 1 PD&E Study:

"1. Six general use lanes separated from two special use lanes by buffer and/or barrier; because of the capacity limitation posed by a single special use lane in each direction, as well as enforcement problems created by a buffer separated concept, it is anticipated that the special use lanes will be limited to use by HOV, with no trucks or single occupant vehicles allowed;

2. Two special use lanes extending from Polk County to S.R. 472 in Volusia County;

3. Reserved right-of-way for rail envelope south (west) of the BeeLine Expressway and through Volusia County;

4. Light rail transit from Osceola County's Celebration development to Sanford."

Additional progress on items 3 and 4 above has been made since the I-4 MMMP and MIS were completed. The High Speed Rail (HSR) Study Team has conducted considerable preliminary evaluation and costing of alignment alternatives. In the south Orlando area, the alignment alternatives are all common at the Orlando International Airport. Alternatives from Orlando to Tampa are currently being considered that access I-4 west of S.R. 536. Alternatives were previously considered that entered the I-4 corridor between S.R. 536 and the BeeLine Expressway (S.R. 528). High right-of-way costs are a principal factor which led to these alternatives being deleted. Also, the Central Florida Light Rail Transit (LRT) study has established that their alignment would not be located in the I-4 median between S.R. 536 and the BeeLine Expressway.

FY 1997/98 - 2001/02 Orlando Urban Area Transportation Improvements Plan

On July 9, 1997, MetroPlan Orlando approved the latest Transportation Improvements Program (TIP) for Fiscal Years 1997/98 - 2001/02. Amendments to this document were approved on September 10, October 8, and November 12, 1997. This Program and associated amendments identify the following improvements near the Section 1 corridor:

1. S.R. 536 from I-4 to S.R. 535 - Six-lane widening scheduled for FY 1999/00;
2. I-4 from Osceola County line to west of the BeeLine Expressway - PD&E study in FY 1997/98 (covered in this report);
3. I-4 from S.R. 535 to John Young Parkway - Preliminary engineering for the addition of two HOV lanes and resurfacing in FY 1998/99 and 1999/2000;
4. Southwest Beltway from U.S. 192 (S.R. 530) to I-4 - Completed;
5. U.S. 192 (S.R. 530) from 150 m (500 ft.) west of Bonnet Creek to east of S.R. 535 - Six-lane widening in FY 1997/98;
6. U.S. 192 (S.R. 530) from 450 m (1500 ft.) east of I-4 to 150 m (500 ft.) west of Bonnet Creek - Six-lane widening in FY 1997/98 (completed);
7. I-4/Osceola Parkway interchange - Preliminary engineering (FY 1997/98 and 1998/99) and construction (FY 1998/99 through 2000/01);
8. I-4 from Polk County line to east of U.S. 192 (S.R. 530) - Preliminary engineering (FY 1997/98) and right-of-way acquisition (1999/2000 and 2000/01);

9. I-4 from 4.5 km (2.8 mi.) south of Polk County line to Orange County line - PD&E study (FY 1997/98);
10. I-4/World Drive interchange - Completed;
11. I-4/U.S. 192 interchange - Preliminary engineering (1998/99) and right-of-way acquisition (2000/01 through 2001/02);
12. Turkey Lake Road from Central Florida Parkway to Sand Lake Road - Construction of four-lane widening (FY 1997/98 through 1999/2000); and
13. S.R. 429/Western Beltway Part C from I-4 to McKinney Road - Final design scheduled for FY 2000/01 and 2001/02.

Reedy Creek Improvement District Comprehensive Plan - Traffic Circulation Element (as amended through Amendment 95-2)

I-4 and U.S. 192 (S.R. 530) provide principal access into the Reedy Creek Improvement District (RCID), and additional access is provided by Osceola Parkway, S.R. 536, and S.R./C.R. 535. The Walt Disney World attractions and resorts are located within RCID.

The Traffic Circulation Element includes the policy statements related to roadways directly connecting to I-4. Relevant policies include the following:

Policy 1.1 states that the peak season, peak hours LOS for principal arterials (both limited access and major) shall be LOS D for state facilities and LOS E for RCID major arterials that are neither constrained nor designated as tourist corridors.

Policy 1.2 states "A constrained facility designation shall be provided for C.R. 535 from Hotel Plaza Boulevard to I-4 and for Hotel Plaza Boulevard. For constrained facilities, a 15 percent degradation in average travel speeds or a 15 percent increase in traffic volume shall be permitted in addition to the standards in Policy 1.1.

Policy 1.8 prohibits at-grade intersections on U.S. 192 (S.R. 530) between World Drive and I-4.

Policy 4.3 states "Upon adoption of this plan, the RCID shall coordinate with FDOT, Osceola County, Orange County, and other appropriate governmental entities to pursue recommendations contained in the I-4 Corridor Study; the Osceola Parkway Study, the 4th and 5th Interchange Justification Studies, the Orange County and Osceola County Comprehensive Plans, and Metropolitan Orlando Urban Area Transportation Plan, and other planning studies."

Policy 5.2 provides that "Right-of-Way shall be reserved at the minimum width required to accommodate construction of the number of lanes shown on the transportation Network Maps (Figures 3-7 and 3-8)."

RCID Comprehensive Plan Roadway Capital Projects 1995 - 2000

Projects identified in the RCID Comprehensive Plan 1995 - 2000 Capital Projects, including recent amendments, directly related to I-4 are as follows:

1. World Drive Extension - Construction of new four-lane divided extension from U.S. 192 (S.R. 530) south to the proposed I-4 Interchange - completed;
2. World Drive Extension/I-4 Interchange - Construction of the World Drive Extension/I-4 Interchange - completed;
3. Southern Connector Section 1 - Construction of new four-lane road from I-4 to south of U.S. 192 (S.R. 530)/Southern Connector interchange - completed;
4. U.S. 192 (S.R. 530) (East RCID) - Widen from four to six lanes from 450 m (1,500 ft.) east of I-4 to 150 m (500 ft.) west of Bonnet Creek Bridge - completed;
5. U.S. 192 (S.R. 530) - Widen from four to six lanes from 150 m (500 ft.) west of Bonnet Creek Bridge to S.R. 535 (FY 1998);
6. Osceola Parkway - Construction of a four-lane divided road from 520 m (1,700 ft.) east of World Drive to 685 m (2,250 ft.) east of I-4 including construction of 245 m (800 ft.) bridge over I-4 (FY 1995) - completed;
7. Osceola Parkway/I-4 interchange - Design (FY 1997) and construction (FY 98-2000) of a new interchange between U.S. 192 (S.R. 530) and S.R. 536;
8. S.R. 536 - Widen four to six lanes from I-4 to S.R. 535 (FY 96-2000);
9. I-4 - Preliminary engineering study from S.R. 535 to 33rd Street (FY 96/97);
10. I-4 - Preliminary engineering study from Osceola County line to 33rd Street (FY 1996); and
11. I-4 - Preliminary engineering study from 4.5 km (2.8 mi.) southwest of Polk County line to Orange County (FY 1996).

Orange County/RCID Agreement for I-4/Osceola Parkway Interchange

Orange County and the Reedy Creek Improvement District executed an agreement responsibility for right-of-way acquisitions, design, the cost of the construction and sale, security and servicing of the bonds for financing the I-4/Osceola Parkway interchange. The agreement was approved by the Orange County Board of County Commissioners on June 25, 1996. The term of the agreement expires when 1) either the County exercises its option of prepayment, or 2) the date on which the County's obligation to make semi-annual payments terminates, or January 1, 2030, except that the County's obligation shall service until the obligation is fully satisfied with no payment obligation beyond January 1, 2035.

The agreement is for the conversion of the Osceola Parkway overpass over I-4 to a full interchange at Osceola Parkway and I-4. The agreement stipulates that the project must be open to traffic by December 31, 2008.

Orange County Five Year Road Program FY 1997-2001

Projects listed in the Orange County 5 year roadway projects list within the I-4 study area include:

1. Construction is scheduled for widening Turkey Lake Road to four-lane divided, from Central Florida Parkway to Sand Lake Road, between October 1997 and May 1999; the project includes 1.5 m (5 ft.) sidewalks on the west side of the roadway; and

2. International Drive Extension, from S.R. 535 to the Central Florida Greeneway, is currently on-hold.

While not formally listed in the 5 year road program, Turkey Lake Road is currently being extended from Central Florida Parkway southward to Lake Avenue and is expected to be completed in early 1999. This is a developer-funded project and consists of a four-lane divided facility on new alignment, with sidewalks on both sides of the roadway and 4.2 m (14 ft.) outside travel lanes. The roadway will have a wide median, which will accommodate widening to six lanes in the future.

Osceola County Capital Improvement Projects - 5 Year Program

Only one improvement project is listed in the Osceola County 5 year program which is near the I-4 corridor. In fiscal year 1998-99, a PD&E study and final design are being prepared for widening C.R. 545 (Lake Wilson Road) from C.R. 532 to south of U.S. 192 (S.R. 530).

Orlando-Orange County Expressway Authority (OOCEA) Five-Year Work Plan, FY 1998 - FY 2002

The only project affecting the I-4 Section 1 corridor is the Western Beltway project. The portion of the Western Beltway Part C project near I-4, which includes the interchange at I-4, is planned to be designed in fiscal years 2000/2001 and 2001/2002. Advanced right-of-way acquisition is scheduled for fiscal year 1997/1998. The Western Beltway is the only project listed in the 2015 Master Plan in the study area.

It should be noted that alternatives for this interchange are being evaluated in section 8 of this report. Section 9 of this report describes the preferred interchange concept which is to be constructed by OOCEA as part of the project described above.

Florida Department of Transportation 5-Year Transportation Plan, Fiscal Year: 97/98 Through 01/02

Major projects near or within the I-4 study area include:

1. Preliminary engineering (FY 97/98) and right-of-way acquisition (99/00 and 00/01) for widening I-4 from the Polk County line to northeast of U.S. 192 (S.R. 530);
2. Right-of-way acquisition for the Western Beltway from U.S. 192 (S.R. 530) to I-4 (FY 97/98);
3. Preliminary engineering and right-of-way acquisition for the widening of U.S. 192 (S.R. 530) from the Lake/Orange County line to the Orange/Osceola County line (FY 97/98);
4. Preliminary engineering and right-of-way acquisition for the widening of U.S. 192 (S.R. 530) from the Orange/Osceola County line to 300 m (1000 ft.) east of Reedy Creek (FY 97/98);
5. Widening of U.S. 192 (S.R. 530) from 300 m (1000 ft.) east of Reedy Creek to 150 m (500 ft.) west of Bonnet Creek, not including the I-4 interchange area (FY 97/98); this project is complete;

6. Preliminary engineering (FY 98/99) and right-of-way acquisition (00/01 and 01/02) for improvements to the I-4/U.S. 192 (S.R. 530) interchange;
7. Preliminary engineering, right-of-way acquisition, and construction for widening U.S. 192 (S.R. 530) from 150 m (500 ft.) west of Bonnet Creek to east of S.R. 535 (FY 97/98);
8. Preliminary engineering for a new interchange at I-4 and Osceola Parkway (FY 97/98); and
9. Preliminary engineering (FY 97/98) and construction (FY 99/00) for the widening of S.R. 536, from S.R. 535 to I-4, to six lanes.

Additionally, two PD & E studies are identified in the work program for I-4 in FY 97/98; one is from 2.8 miles southwest of the Polk County line to the Orange County line (W.P.I. 5147330) and the second from the Osceola County line to southwest of the BeeLine Expressway (W.P.I. 5147254). Those studies are covered herein.

Orange County 1990-2010 Comprehensive Policy Plan Traffic Circulation Element

This document provides a list of 1991 to 1996 roadway improvements. Those projects near the I-4 study area include:

1. Preliminary engineering for U.S. 192 (S.R. 530) from Lake County to Osceola County;
2. Right-of-way acquisition and construction for S.R. 535 from S.R. 536 to I-4;
3. Final design for four-laning Turkey Lake Road from Central Florida Parkway to Sand Lake Road;
4. Construction of the Southern Connector, from the Eastern Beltway (now called the Central Florida Greeneway) to I-4 (project complete).

This document also gives a list of year 2010 anticipated road improvements. Those projects near the I-4 study area include the Southern Connector (Disney Extension) from International Drive to U.S. 192 (S.R. 530) and International Drive from the BeeLine Expressway to Westwood Boulevard. Orange County is currently preparing an Evaluation and Appraisal Report for DCA, which provides an update to the Traffic Circulation Element. It is expected to be completed in June of 1998. Due to the expected completion date, information from that report will not appear in this report.

Osceola County Comprehensive Plan Traffic Circulation Element

This document, adopted in 1991, provided recommended improvements through the year 2010. An update to this document has been postponed due to funding constraints. The following improvements near the I-4 study area were recommended in that document between years 1995 and 2000:

1. Add third eastbound through lane on U.S. 192 (S.R. 530) from I-4 to Parkway Boulevard and
2. Construct Southern Connector from the Orange County line to I-4 as a new four-lane freeway (completed).

To achieve an acceptable LOS, the following improvements were recommended between years 2000 and 2005:

1. Construct Western Beltway from the Orange County line to I-4 as a new four-lane freeway;
2. Widen I-4 to six lanes from C.R. 532 to Western Beltway; and
3. Widen U.S. 192 (S.R. 530) to six lanes from Western Beltway to World Drive.

The following improvements were recommended between years 2005 and 2010:

1. Widen C.R. 532 to four lanes from I-4 to northeast of C.R. 545 and
2. Improve I-4/U.S. 192 (S.R. 530) interchange.

Conclusions

A review of the various transportation studies by jurisdictions near the study area for the I-4 Section 1 PD&E study clearly demonstrates that the project corridor has been officially included within the MPO Urban Area Long Range Transportation Plan. The development of the PD&E study for the project, utilizing the same corridor as contained in the Urban Area Transportation Plan, was funded within the FDOT 5 year Transportation Plan for FY 97/98 to 01/02. Policy 4.3 of the RCID Comprehensive Plan Traffic Circulation Element mentions that, after the adoption of the plan, RCID will coordinate with various agencies to pursue recommendations in the I-4 Corridor Study, the Orange County and Osceola County Comprehensive Plans, and MPO Urban Area Transportation Study, and other planning studies.

The current Traffic Circulation Element within Osceola County's Comprehensive Plan and Orange County's Comprehensive Plan do not reference the improvements of the I-4 MMMP and MIS, due to the date of these documents. However, both agencies are in the process of updating their Traffic Circulation Elements. Osceola County's Traffic Circulation Element does mention the widening of I-4 to six lanes from C.R. 532 to the Western Beltway, which is recommended between years 2000 and 2005.

Since the construction of the recommended improvements within this PER is not expected to commence within the next 5 years, these improvements are not referenced in the Orlando Urban Area TIP, the RCID Comprehensive Plan Capital Projects, and the 5 year road programs of both Orange and Osceola Counties.

3.4 Social / Economic Demand

The Orange County, Osceola County and RCID Comprehensive Plans indicate that the I-4 corridor will experience tremendous growth in the future. The Osceola County

Comprehensive Plan states that development will continue to be focused on the northwest part of the county because of its proximity to the Orlando attractions and metropolitan area.

The Orange County Comprehensive Plan projects that future growth along I-4 southwest of the BeeLine Expressway will focus on activity centers. More development is planned for the International Drive and Disney activity center areas, a primary destination for tourists. Since this segment of I-4 is designated as Activity Center on the Future Land Use Map, the County has identified this area as appropriate for intense development with a mixture of uses.

While the expansion of I-4 may facilitate further growth, the project will not create development patterns different than those already existing or planned for the community. In addition to supporting planned growth for permanent residents, improvements to I-4 will ensure continued access for tourists, which are a primary component of Central Florida's economic base.

Within the Section 1 study area, additional commercial, office, residential, and industrial development has been approved. These primarily include approximately 5.2 million square feet of commercial development and 5.4 million square feet of office development. More than 28,000 additional hotel rooms and approximately 9,000 additional resort residential/time share units have been approved. Also, more than 17,000 additional permanent residential dwelling units have also been approved. Some of this additional development is currently under construction.

4.0 EXISTING CONDITIONS

4.1 Existing Roadway Characteristics

The existing roadway network in the study area consists of arterials, collectors, and the interstate facility. The I-4 Multi-Modal Master Plan (MMMP) Construction Staging Plan identified that the earliest Section 1 would be constructed is in the year 2010 to 2015 timeframe. Therefore, the projects previously discussed in section 3.3 are assumed constructed. The network contains seven north-south routes and seven east-west routes which are:

- I-4 (S.R. 400) (east-west)
- C.R. 532 (east-west)
- Western Beltway (north-south) (planned)
- C.R. 545 (north-south)
- World Drive (north-south)
- Southern Connector Extension, S.R. 417 (north-south)
- U.S. 192 (S.R. 530) (east-west)
- Osceola Parkway (east-west)
- S.R. 536 (east-west)
- International Drive (north-south)
- C.R./S.R. 535 (north-south)
- Central Florida Parkway (east-west)
- Turkey Lake Road (north-south)
- S.R. 528 (BeeLine Expressway) (east-west)

These facilities are shown in Exhibit 4-1.

Interstate 4 runs east/northeast from Tampa to Daytona Beach and runs in a northeasterly course through the study area. With the exception of International Drive, Turkey Lake Road, and I-4 itself, all roadways listed above traverse I-4 and most interchange with I-4. A summary of existing roadway characteristics is provided in Table 4-1.

Another PD & E study has been recently completed which studied the widening of I-4 to six lanes between U.S. 27 in Polk County and U.S. 192 (S.R. 530) in Osceola County. Some segments will be widened in the median and the other segments will be widened to the outside of the existing lanes.

The I-4/C.R. 532 interchange has recently been reconstructed as a full diamond interchange with additional access provided to and from the northeast along I-4. That

EXHIBIT 4-1
EXISTING ROADWAY NETWORK

I-4 PD&E Study
Section 1
From C.R. 532 to S.R. 528
(Beeline Expy.)

HNTB
Architects Engineers Planners

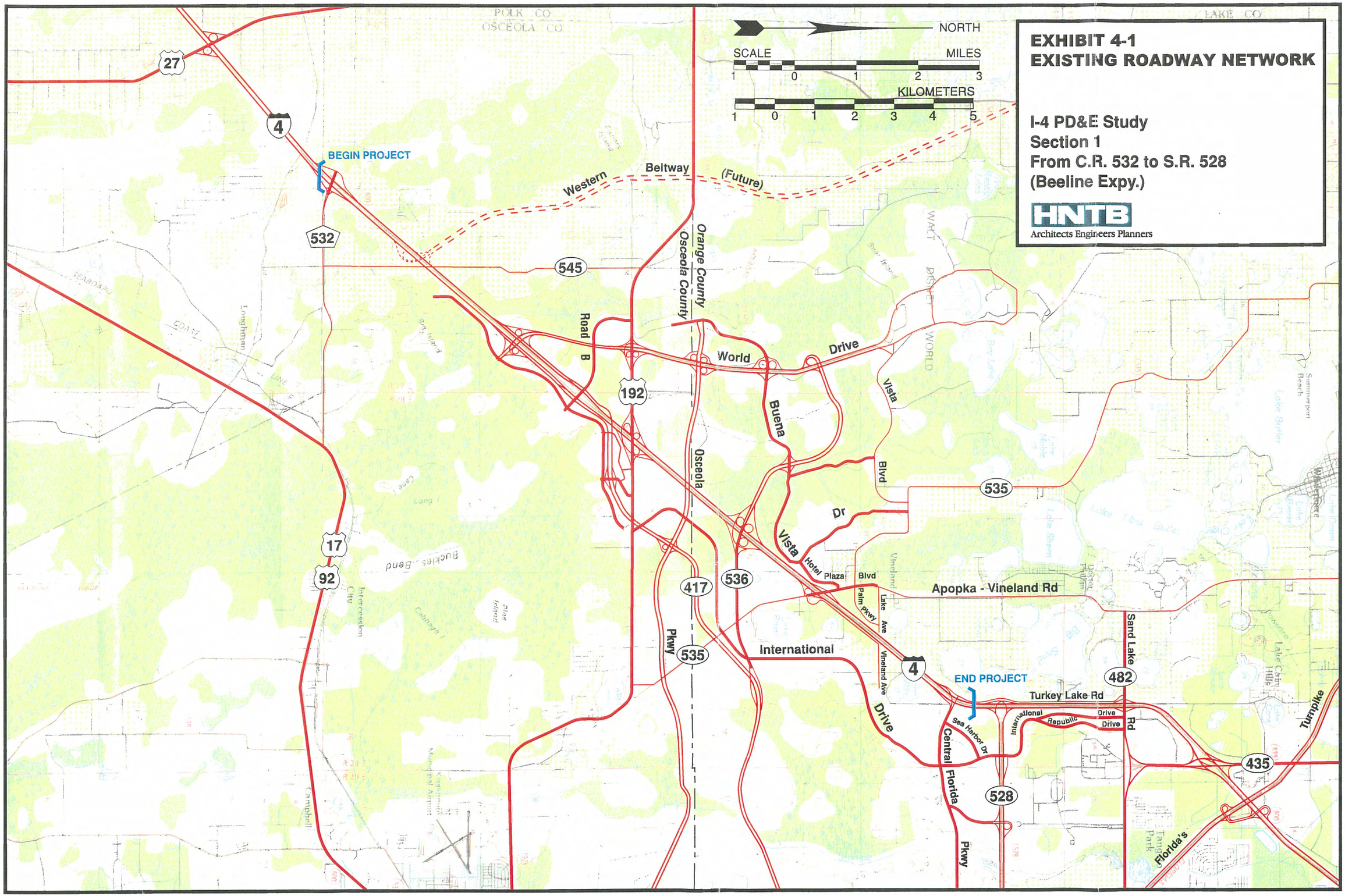


Table 4-1
EXISTING CONDITIONS

Road / Interchange	Functional Classification	Number of Through Lanes and Roadway Type	Typical R/W width (m)	Design / Posted Speed*	I-4 Annual Average Daily Traffic	I-4 Level of Service	General Vertical Alignment	General Horizontal Alignment	Current Criteria Met?	** Deficiencies
OSCEOLA COUNTY										
C.R. 532 - Interchange	Rural Major Collector	4-Lane Divided (Rural)	49.99	70/55			I-4 over		No	1, 2
I-4, C.R. 532 to C.R. 545	Rural Principal Arterial	4-Lane Divided (Rural)	91.44	110/65	79,200	F	Flat	Northeasterly	No	2
C.R. 545 S / C.R. 545 N	Rural Major/Urban Coll.	2 Lane Undivided (Rural)					C.R. 545 over		No	1, 2
I-4, C.R. 545 to World Drive	Urban Principal Arterial	4-Lane Divided (Rural)	91.44	110/65	79,200	F	Flat	Northeasterly	No	2
World Drive - Interchange	Urban Principal Arterial	4-Lane Divided (Rural)	60.96				World Drive over		No	2
I-4, World Dr. to S. Connector	Urban Principal Arterial	4-Lane Divided (Rural)	91.44	110/65	79,200	F	Flat	Northeasterly	No	2
Southern Connector - Interchange	Urban Principal Arterial	4-Lane Divided (Rural)	91.44	110/50			Southern Connector over		No	2
I-4, S. Connector to U.S. 192	Urban Principal Arterial	4-Lane Divided (Rural)	91.44	110/65	69,600	E	Flat	Northeasterly	No	2
U.S. 192 (S.R. 530) - Interchange	Urban Principal Arterial	6-Lane Divided	91.44/60.96	/55W,45E			U.S. 192 over		No	1, 2
I-4, U.S. 192 to Osceola Pkwy.	Urban Principal Arterial	6-Lane Divided (Rural)	91.44	110/65	100,800	E	Flat	Northeasterly	No	2
Osceola Parkway	Urban Principal Arterial	4-Lane Divided (Urban)	76.20	70/45			Osceola Parkway over		No	2
I-4, Osceola Pkwy. to S.R. 536	Urban Principal Arterial	6-Lane Divided (Rural)	91.44	110/65	100,800	E	Flat	Northeasterly	No	2
ORANGE COUNTY										
S.R. 536 - Interchange	Urban Minor Arterial	4-Lane Divided	76.2	100/55			S.R. 536 over		No	2
I-4, S.R. 536 to S.R. 535	Urban Principal Arterial	8-Lane Divided (Rural)	91.44	110/65	120,400	D	Flat	Northeasterly	No	2
S.R. 535 - Interchange	Urban Principal Arterial	6-Lane Divided (Urban)	varies	/40			I-4 over		No	2, 3
C.R. 535 (North of I-4)	Urban Minor Arterial	6-Lane Divided (Urban)		/40						2
I-4, S.R. 535 to Central FL Pkwy.	Urban Principal Arterial	6/8-Lane Divided (Rural)	91.44	110/65	150,400	F	Flat	Northeasterly	No	2
Central FL Pkwy - Interchange	Urban Minor Arterial	4-Lane Divided (Rural)	varies	60/45			I-4 over		No	1, 2
I-4, East of Central FL Pkwy.	Urban Principal Arterial	6-Lane Divided (Rural)	91.44	110/55	130,400	F	Flat	Northeasterly	No	2

* DESIGN/POSTED SPEEDS

Design Speed in km/hr

Posted Speed in mph

** DEFICIENCIES

**1. Insufficient Vertical Clearance

**2. Insufficient Vertical Curvature

**3. Safety Ratio > 1.0

project improved C.R. 532 to a four-lane divided facility within the immediate interchange area. On the northwest side of I-4, C.R. 532 connects to Goodman Road, an unpaved road.

The southern terminus of the proposed Western Beltway will be at the interchange with I-4, near the C.R. 545 overpass. This project, planned by the Orlando-Orange County Expressway Authority (OOCEA), is scheduled for final design in FY 00/01 through 01/02. No interchange exists or is planned at C.R. 545, a two-lane roadway.

Walt Disney Imagineering with FDOT participation recently completed the southern extension of World Drive and its interchange with I-4. World Drive is a limited access four-lane divided roadway within Walt Disney World properties. The Southern Connector Extension (S.R. 417) is a four-lane divided limited access toll facility which connects to the Central Florida Greeneway (also S.R. 417), a toll beltway around the south and east portions of the Orlando metropolitan area. Eventually, the Central Florida Greeneway will be extended from its present terminus in Sanford to I-4 completing an eastern beltway around Orlando. The Southern Connector Extension provides access to and from the southwest along I-4. Another project recently completed added collector-distributor (CD) roads along I-4 from southwest of the World Drive interchange to the Southern Connector Extension (S.R. 417) interchange.

U.S. 192 (S.R. 530) has recently been widened to six-lane divided near its interchange with I-4. A new interchange is under study for Osceola Parkway at I-4. The interchange will be designed and constructed in three stages. Stage 1 is expected to be completed prior to this I-4 project and consists of auxiliary lanes between U.S. 192 (S.R. 530) and Osceola Parkway, the interchange itself, and braided ramps between this interchange and the S.R. 536 ramps. The second stage involves the reconstruction of the U.S. 192 (S.R. 530) interchange with I-4. CD roads will be added from southwest of U.S. 192 (S.R. 530) to Osceola Parkway, which will separate movements to and from the southwest along I-4 to U.S. 192 and Osceola Parkway and movements to and from the northeast along I-4 from U.S. 192. The second stage will also be completed before the improvements recommended in this report are implemented. Stage 3 will implement the I-4 MMMP improvements which are consistent with the improvements recommended herein.

S.R. 536 is a four-lane divided roadway which provides direct access to Walt Disney World. East of I-4, this roadway provides a direct connection to the Central Florida Greeneway (S.R. 417) and S.R. 535. International Drive presently has its southern terminus at S.R. 536 and runs in a northerly direction beyond the northern project limit. This roadway provides direct access to land uses within the study area and is roughly parallel to I-4. International Drive is planned for extension from S.R. 535 to U.S. 192, but is currently on-hold. S.R. 535, a six-lane divided roadway, begins at the I-4 westbound ramps and runs southwest of the interchange to U.S. 192 (S.R. 530). North of the I-4 westbound ramps, this roadway is called C.R. 535.

There are two existing rest areas within the study area, located between the S.R. 535 and Central Florida Parkway interchange; each serves one direction of I-4. Two new rest areas, each serving one direction of I-4, were recently constructed in eastern Polk County. The new rest areas will replace the rest areas between S.R. 535 and Central Florida Parkway and another pair of rest areas located west of the new site in Polk County. The closing of the rest areas in Polk County is primarily due the close proximity of the acceleration/deceleration lanes along I-4 and the ramps at an adjacent interchange, which creates operational problems. When I-4 is widened in that area, those ramps are planned to be shifted nearer to the rest area, which along with higher volumes will further aggravate congestion. The new pair of rest areas are located in a more rural location, where interchanges are further apart. The rest areas that are being closed are now adjacent to several interchanges which have service facilities.

Central Florida Parkway is a four-lane facility under I-4, but widens to a six-lane facility to the east of I-4 which provides access to Sea World and intersects International Drive further east. Turkey Lake Road is a two-lane roadway which runs along the northwest side of I-4 from Central Florida Parkway to the north beyond the limit of this project. Turkey Lake Road is planned for extension to Lake Avenue as part of the Ruby Lake Ranch Development of Regional Impact (DRI).

4.1.1 Functional Classification

Table 4-2 provides a summary of the functional classification of the roadways within the study area. These classifications were determined by FDOT and Orange and Osceola Counties. I-4 within the study area serves tourist and business travel between Tampa, Orlando, and Daytona Beach as well as local commuter traffic and goods movement. I-4 is classified by the Florida Department of Transportation as a Rural Principal Arterial from C.R. 532 to C.R. 545 and an Urban Principal Arterial from C.R. 545 to the north end of Orlando metropolitan area. The Western Beltway is also classified as a Rural Principal Arterial. A Rural Principal Arterial, as defined by the American Association of State Highway and Transportation Officials (AASHTO) publication A Policy on Geometric Design of Highways and Streets - 1994, provides corridor movement with trip length and density suitable for substantial statewide or interstate travel and serves trips between urban areas with populations of at least 25,000.

This class of highway includes most heavily traveled routes that might warrant multilane improvements. This class is stratified into two design types: freeways (which include interstate highways) and other principal arterials. I-4 and the Western Beltway would fall into the freeway (interstate) category, since it has full control of access.

A Policy on Geometric Design of Highways and Streets - 1994 describes an Urban Principal Arterial as a roadway which serves the major centers of activity of urbanized areas, the highest traffic volume corridors, and the longest trip desires. It carries most of the trips entering and leaving the urban area, as well as most of the through movements

Table 4-2
FUNCTIONAL CLASSIFICATION OF ROADWAYS WITHIN THE STUDY AREA

Roadway	Lanes	Functional Classification	Design Type
I-4 (S.R. 400): C.R. 532 to C.R. 545	Four *	Rural Principal Arterial	Interstate
Western Beltway	Four	Rural Principal Arterial	Freeway
I-4 (S.R. 400): C.R. 545 to beyond north limit of study area	Four* / Six	Urban Principal Arterial	Interstate
Southern Connector (S.R. 417)	Four	Urban Principal Arterial	Freeway
BeeLine Expressway (S.R. 528)	Four	Urban Principal Arterial	Freeway
World Drive **	Four	Urban Principal Arterial	Other Principal Arterial
U.S. 192 (S.R. 530)	Six		
Osceola Parkway	Four		
S.R. 535 ***	Six		
S.R. 536	Four	Urban Minor Arterial	(Not Applicable)
C.R. 535 ***	Four		
International Drive	Four		
Central Florida Parkway	Six		
C.R. 532	Two	Rural Major Collector	(Not Applicable)
C.R. 545, South of I-4	Two		
C.R. 545, North of I-4	Two	Urban Collector	(Not Applicable)
Turkey Lake Road	Two		

* Future Six Lane.

** World Drive is an Urban Principal Arterial from I-4 to U.S. 192 (S.R. 530) and a Urban Minor Arterial from U.S. 192 to S.R. 536.

*** S.R. 535 runs from the I-4 westbound ramps (north) to U.S. 192 (south). C.R. 535 begins at the I-4 westbound ramps and continues to the north.

bypassing the central city. This class of roadway carries significant intra-area travel and provides continuity for all rural arterials that intercept the urban boundary. This class is further stratified into interstates, other freeways, and other principal arterials.

Besides I-4, other Urban Principal Arterials within the study area include World Drive (between I-4 and U.S. 192), Southern Connector Extension (S.R. 417), U.S. 192 (S.R. 530), Osceola Parkway, S.R. 535 (not C.R. 535), and the BeeLine Expressway (S.R. 528). S.R. 535 begins at the I-4 westbound ramps and runs southwest to U.S. 192 (S.R. 530). I-4 is further categorized as "interstate"; the Southern Connector Extension (S.R. 417) and the BeeLine Expressway (S.R. 528) are categorized as "other freeway". The other roadways are considered to be "other principal arterials".

World Drive north of U.S. 192 (S.R. 530), S.R. 536, C.R. 535 (north of the I-4 westbound ramps), International Drive, and Central Florida Parkway within the study area are classified as Urban Minor Arterials. According to AASHTO, an Urban Minor Arterial interconnects with and augments the urban principal arterial system, distributes travel to smaller geographical areas, and includes all arterials not classified as principal.

C.R. 532 and C.R. 545 south of I-4 are classified as Rural Major Collectors; C.R. 545 north of I-4 and Turkey Lake Road are classified as Urban Collectors. A Rural Major Collector, as defined by the AASHTO publication, serves county seats, larger towns, and other large traffic generators not on arterial routes and links these places with nearby larger towns or cities, or with routes of higher classifications. The Urban Collector street system, according to AASHTO, provides both land access service and traffic circulation within residential neighborhoods and commercial and industrial areas. This system collects traffic from local streets and directs it to the arterial system.

4.1.2 Typical Sections

I-4 throughout the limits of this project was originally constructed in the early 1960s with two 3.6 m (12 ft.) lanes, 2.4 m (8 ft.) inside unpaved shoulders, and 2.4 m (8 ft.) outside paved shoulders, in each direction, within typically 91.44 m (300 ft.) of right-of-way. From the Polk/Osceola County line to southwest of C.R. 545, the median width is 30.5 m (100 ft.). From southwest of C.R. 545 to the BeeLine Expressway, the median width is 19.5 m (64 ft). In the late 1970s, I-4 was widened to three lanes in each direction from U.S. 192 (S.R. 530) to northeast of the BeeLine Expressway. This project widened I-4 to the outside and did not require additional right-of-way nor change the original median width. This project also widened the inside and outside shoulders to 3.6 m (12 ft.) with 3.0 m (10 ft.) of paved surface.

Exhibit 4-2 shows the various typical sections along I-4 from the Polk/Osceola County line to southwest of the BeeLine Expressway (S.R. 528), which have the following limits:

- Typical Section 1: C.R. 532 (Polk/Osceola County line) to west of C.R. 545;
- Typical Section 2: West of C.R. 545 to west of World Drive and east of Southern Connector (S.R. 417) to east of U.S. 192 (S.R. 530);
- Typical Section 3: I-4/World Drive interchange CD roads (west of World Drive to Southern Connector, S.R. 417);
- Typical Section 4: West of World Drive to east of Southern Connector (S.R. 417);
- Typical Section 5: East of U.S. 192 (S.R. 530) to east of S.R. 536 and west of Central Florida Parkway to the BeeLine Expressway (S.R. 528);
- Typical Section 6: I-4/S.R. 536 interchange (westbound) CD road; and
- Typical Section 7: East of S.R. 536 to west of S.R. 535 and the rest area to west of Central Florida Parkway.

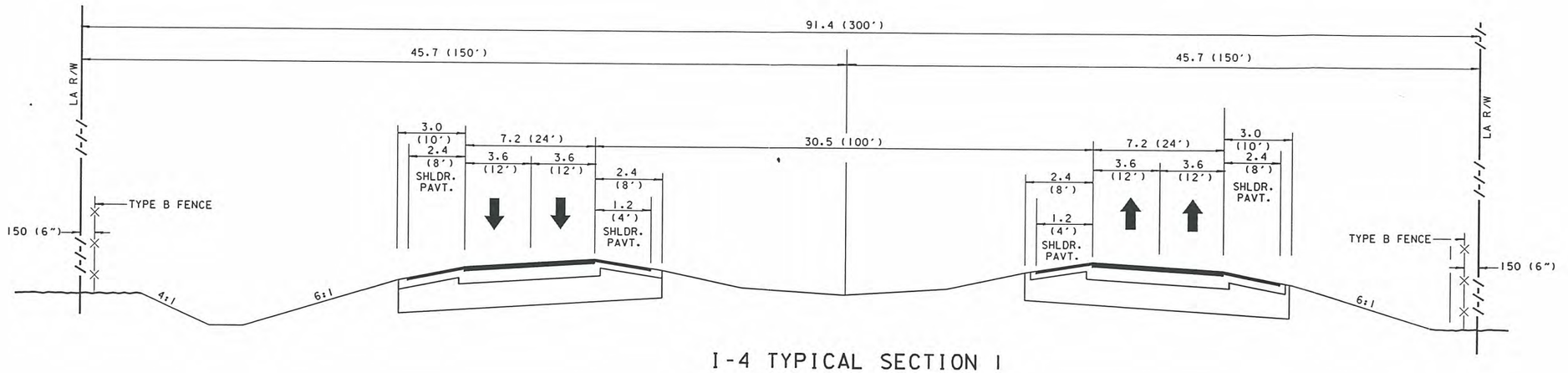
Exhibit 4-2, Typical Sections 1 and 2, show only four lanes for the section of this project from C.R. 532 to southwest of the World Drive interchange. The future widening to six lanes will generally be done to the inside where the median is 30.5 (100 ft.) wide and to the outside where the median is 19.5 m (64 ft.) wide. Typical Section 3 shows the I-4/World Drive CD roads; Typical Section 4 shows the auxiliary lanes adjacent to the World Drive interchange. Typical Sections 5, 6, and 7 cover the existing six-lane portions of I-4 within Section 1. Typical Section 5 covers the six-lane sections without auxiliary lanes, Typical Section 6 covers the westbound CD system at the S.R. 536 interchange, and Typical Section 7 shows the six-lane segments of I-4 with auxiliary lanes.

There are currently eight interchanges and two other roadways which cross I-4 within the project area. Table 4-1 gives a general vertical alignment of I-4 and the crossing roadways. I-4 crosses over C.R. 532, S.R. 535, and Central Florida Parkway. All other roadways pass over I-4. The Southern Connector Extension (S.R. 417) and the BeeLine Expressway (S.R. 528) terminate at I-4, having flyover ramps that cross over I-4.

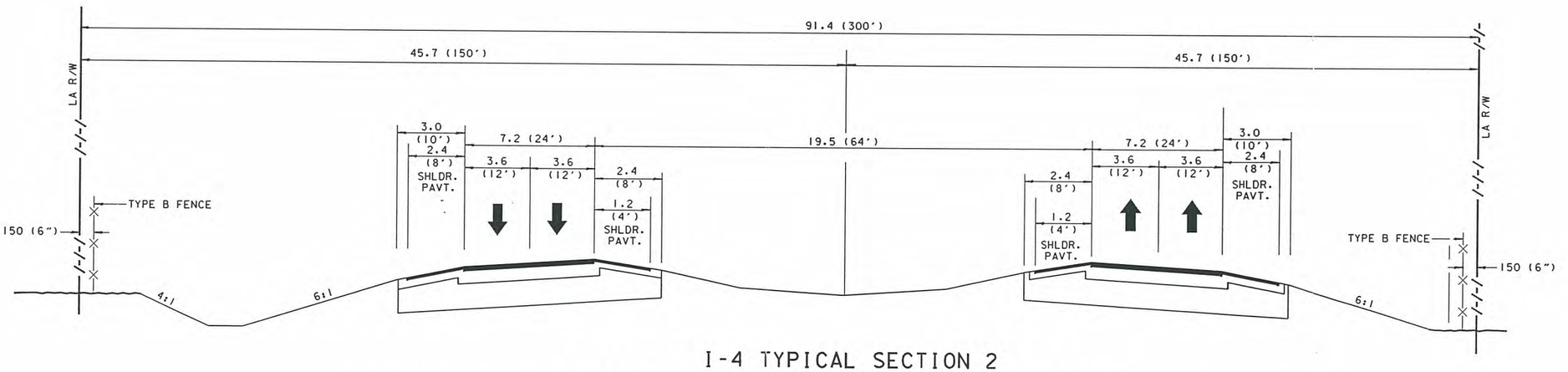
4.1.3 Pedestrian and Bicycle Facilities

Pedestrian features typically include sidewalks, pedestrian signals, marked crosswalks, school zone markings, and pedestrian overpasses. Pedestrians and bicyclists are currently prohibited from using I-4, and this prohibition is expected to continue in the future. There are no bike routes or paths outside of any roadway right-of-way within the study area nor are there any school zone signs or markings or pedestrian overpasses.

C.R. 532, World Drive, U.S. 192 (S.R. 530) and S.R. 536 in the vicinity of I-4 do not provide sidewalks, marked crosswalks, or pedestrian signals. East of I-4, U.S. 192 (S.R. 530) and S.R. 536 feature wide outside paved shoulders, which can accommodate



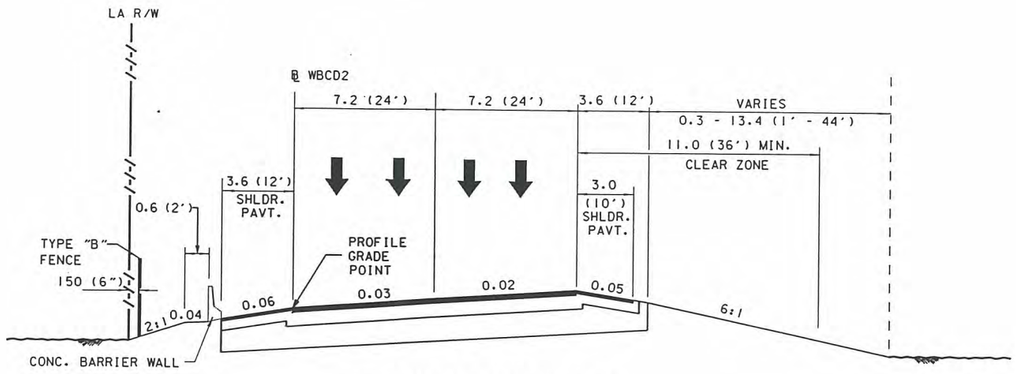
I-4 TYPICAL SECTION 1
C.R. 532 TO WEST OF C.R. 545



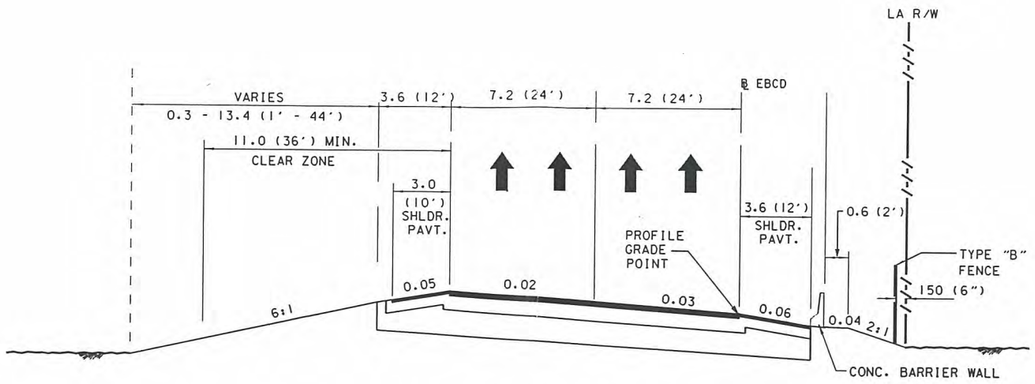
I-4 TYPICAL SECTION 2
WEST OF C.R. 545 TO WEST OF WORLD DRIVE
AND EAST OF SOUTHERN CONNECTOR (S.R. 417) TO EAST OF U.S. 192 (S.R. 530)

I-4 SECTION 1
PD&E STUDY

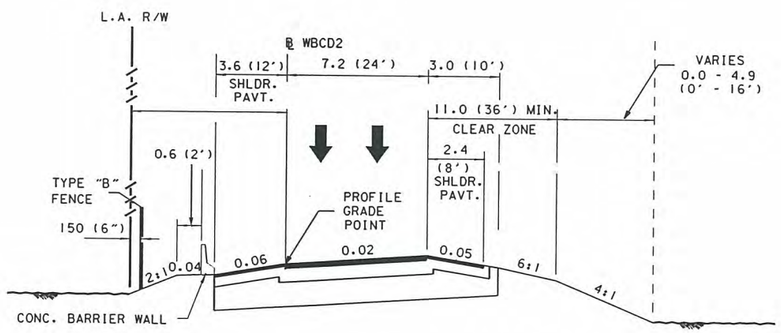
EXISTING TYPICAL SECTIONS
EXHIBIT 4-2 **HNTB**



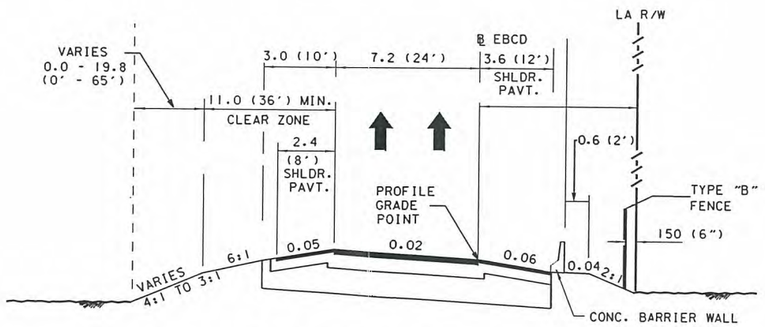
WESTBOUND (4 LANES)



EASTBOUND (4 LANES)



WESTBOUND (2 LANES)



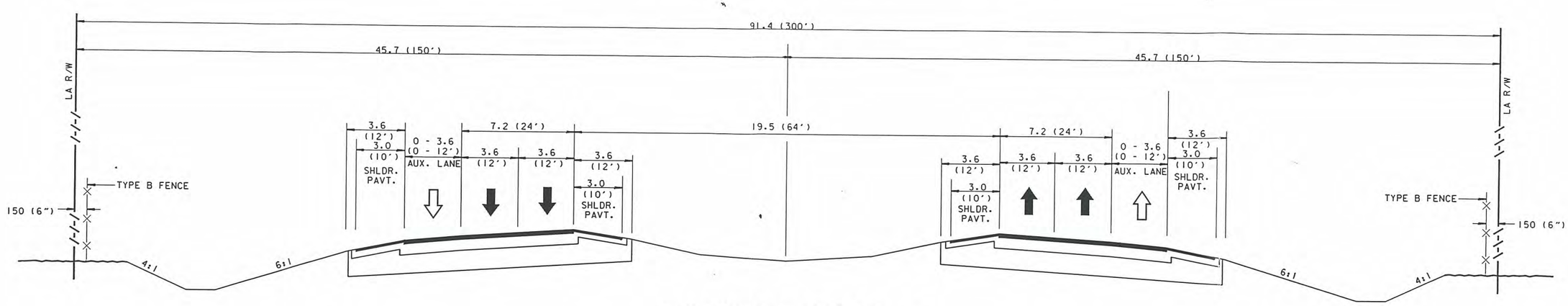
EASTBOUND (2 LANES)

I-4 TYPICAL SECTION 3

I-4 / WORLD DRIVE INTERCHANGE COLLECTOR-DISTRIBUTOR ROADS

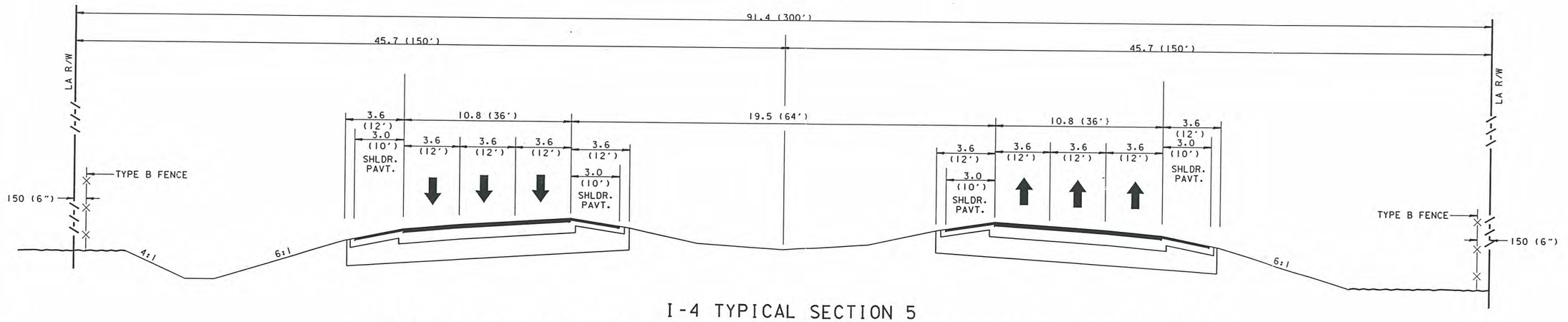
(WEST OF WORLD DRIVE TO SOUTHERN CONNECTOR, S.R. 417)

I-4 SECTION 1
PD&E STUDY
EXISTING TYPICAL SECTIONS
EXHIBIT 4-2 HNTB



I-4 TYPICAL SECTION 4

WEST OF WORLD DRIVE TO EAST OF SOUTHERN CONNECTOR (S.R. 417)

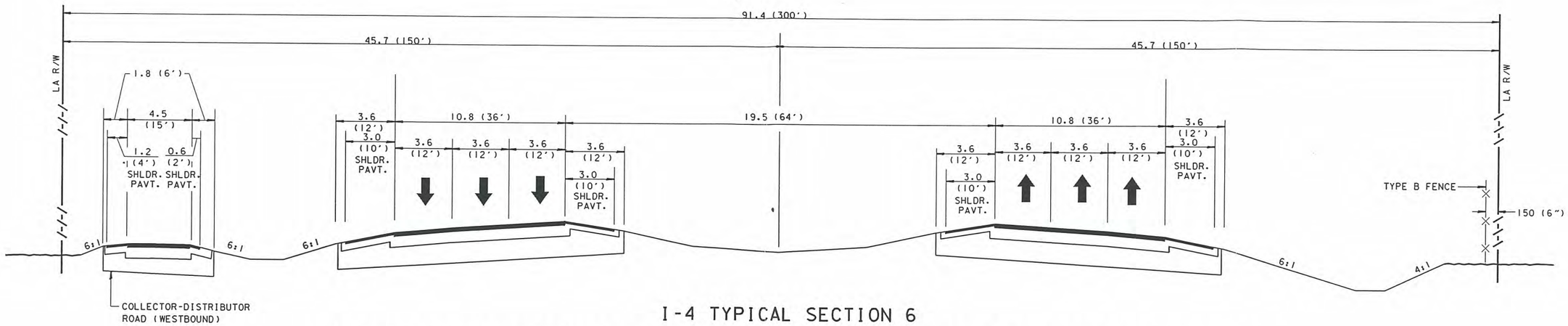


I-4 TYPICAL SECTION 5

EAST OF U.S. 192 (S.R. 530) TO EAST OF S.R. 536 (EPCOT CENTER DRIVE)
AND WEST OF CENTRAL FLORIDA PARKWAY TO BEELINE EXPRESSWAY (S.R. 528)

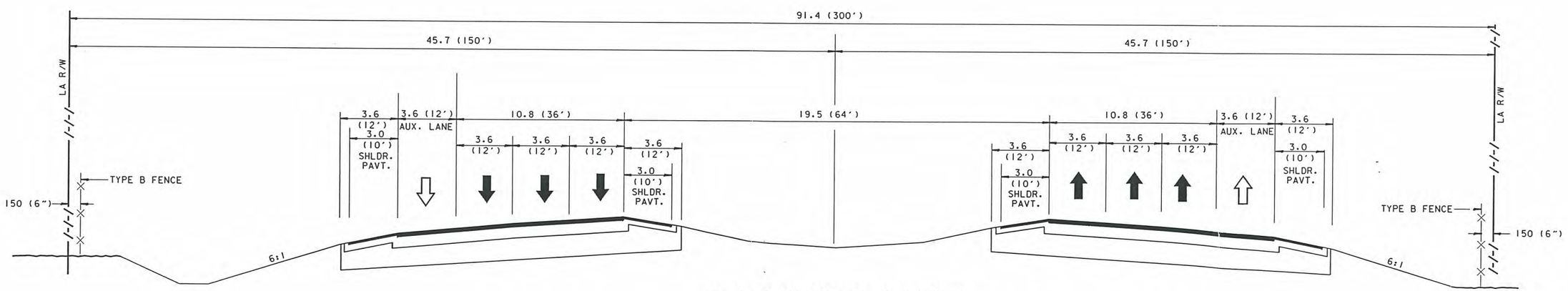
06-FEB-1998 17:41
e:\2434\dgn\gw\typ8.xlsdgn
\\orlwk001\trans\2434\pe\hkr\rpt.pen

I-4 SECTION 1 PD&E STUDY
EXISTING TYPICAL SECTIONS EXHIBIT 4-2 HNTB



I-4 TYPICAL SECTION 6

I-4 / S.R. 536 (EPCOT CENTER DRIVE) INTERCHANGE COLLECTOR-DISTRIBUTOR ROAD



I-4 TYPICAL SECTION 7

EAST OF S.R. 536 (EPCOT CENTER DRIVE) TO WEST OF S.R. 535

AND REST AREA TO WEST OF CENTRAL FLORIDA PARKWAY

06-FEB-1998 (T)\
e:\2443.4\dgn\typxs.dgn\
\\orlw001\rars\2443-4\perkins\rpt.cen

I-4 SECTION 1
PD&E STUDY

EXISTING TYPICAL SECTIONS
EXHIBIT 4-2 HNTB

pedestrians, bicycles, and disabled vehicles. U.S. 192 (S.R. 530) has narrow outside paved shoulders west of I-4 and in the interchange area; however, they are not of necessary width for a bike lane and they do not tie into the paved shoulder east of I-4. The wide outside paved shoulders on S.R. 536 extend through the I-4 interchange, but are discontinued on the west side of I-4. The outside paved shoulders on U.S. 192 (S.R. 530) and S.R. 536 are not "designated" bicycle lanes as they do not have pavement marking and signing associated with "designated" bike lanes.

S.R. 535 does not have paved shoulders or bike lanes; however, sidewalks run continuously along the east side of the roadway. Also, sidewalks exist north and south of I-4 on the west side of S.R. 535 outside the interchange and ramp area. Pedestrian signals and marked crosswalks are provided across one or more approaches at intersections along S.R. 535/C.R. 535.

Central Florida Parkway does not provide bike lanes or paved shoulders near I-4. Central Florida Parkway at Westwood Boulevard, the first signalized intersection east of I-4, has pedestrian signals and marked crosswalks on all but the west approach. However, there are no sidewalks at this intersection. East of this intersection, there is a sidewalk on the north side of Central Florida Parkway. There is also a sidewalk on the south side of Central Florida Parkway. Turkey Lake Road does not have sidewalks. Therefore, there are no continuous sidewalk facilities near this interchange.

Pedestrians and bicyclists are prohibited from using the both the Southern Connector Extension (S.R. 417) and the BeeLine Expressway (S.R. 528). Due to the limited access nature of these facilities, there is no indication that pedestrian and bicycle facilities will be provided.

4.1.4 Right-of-Way

The right-of-way for I-4 is typically 91.44 m (300 ft.) wide (45.72 m or 150 ft. from centerline), except areas adjacent to interchanges where additional right-of-way exists. Additional right-of-way also exists adjacent to the I-4/World Drive CD roads and for retention ponds within interchange areas. As previously mentioned, a PD & E study was recently completed which covers the widening of I-4 between U.S. 27, southwest of the Polk/Osceola County line, and U.S. 192 (S.R. 530). That project will be constructed before improvements recommended within this study are implemented and maintains the original 91.44 m (300 ft.) of right-of-way. The widening project will acquire additional right-of-way for stormwater retention ponds.

4.1.5 Horizontal Alignment

The existing horizontal alignment of I-4 from the Polk/Osceola County line to the BeeLine Expressway (S.R. 528), a distance of 22.0 km (13.7 mi.), is essentially straight,

running in a northeasterly direction. Three curves exist, as summarized in Table 4-3, at the following locations:

- Southwest of C.R. 532,
- At the Osceola Parkway overpass, and
- At the Central Florida Parkway interchange.

Table 4-3
EXISTING HORIZONTAL ALIGNMENT

Curve Number	Delta Angle	Deflection	Length	Radius	e
1	10°-20'-20"	Left	630.260 m	3,492.759 m	0.016
2	1°-26'-45"	Left	661.036 m	26,195.692 m	0.02
3	38°-30'-45"	Left	586.961 m	873.232 m	0.052

Although curve 1 is entirely within Polk County, the point of tangency (PT) is located approximately 63.5 m (208 ft.) southwest of the Polk/Osceola County line. Based on current FDOT standards, curve 1 should be in reverse crown with a superelevation of 0.02. As shown in Table 4-3, this curve has a flatter superelevation of 0.016 (3/16 in. per ft.). Curve 2 satisfies current design criteria for a 110 km/hr (70 mph) design speed. The speed limit in the vicinity of curves 1 and 2 is 65 mph.

Curve 3 does not meet current design criteria for a 110 km/hr (70 mph) design speed. The superelevation rate, e, and radius for this curve is equivalent to a 95 km/hr (60 mph) design speed. The posted speed at curve 3 is 55 mph, although it is located just northeast of the change in posted speed from 65 to 55 mph. Also, curve 3 does not meet stopping sight distance criteria for 110 km/hr (70 mph). This is both a horizontal and vertical curvature problem. When the roadway is reconstructed in the area of curve 3, the superelevation rate should be increased to 0.07 and the vertical profile should be flattened to meet current design criteria.

4.1.6 Vertical Alignment

Within the study area I-4 underpasses C.R. 545, World Drive, Southern Connector Extension (S.R. 417), U.S. 192 (S.R. 530), Osceola Parkway, and S.R. 536. I-4 overpasses C.R. 532, S.R. 535, and Central Florida Parkway.

There are 112 vertical curves along I-4, including both the eastbound and westbound roadways, within the study area. Most of these curves were designed to meet criteria in use in the late 1950's, and therefore do not meet all of today's criteria. The data on these vertical curves is presented in Table 4-4. As shown in Table 4-4, there are 45 crest and 67 sag vertical curves within the project limits.

AASHTO and FDOT design criteria were reviewed to determine the minimum K values and lengths of crest and sag vertical curves for a 110 km/hr (70 mph) design speed. These values are summarized in section 5 of this report. Curve 9, a crest vertical curve, is the only curve that meets current design criteria. There are 84 curves that have large "K" values which exceed the requirements for 110 km/hr (70 mph) design speed, but the curves are either too short or not required for the small change in grade. There are four curves with "K" values that do not satisfy current criteria, but are sufficient in length. Also, there are 23 curves that do not satisfy the minimum length or "K" value criteria.

4.1.7 Drainage

The I-4 PD&E Section 1 study area begins at the Polk/Osceola County line and extends in a northeasterly direction through Osceola and Orange Counties terminating at S.R. 528 in Orange County. From a drainage and stormwater management standpoint, this entire area is under the jurisdiction of the South Florida Water Management District (SFWMD). The proposed project area lies within four major drainage basins, as shown in Exhibit 4-3. The four primary basins are the Davenport Creek Basin, the Reedy Creek Basin, the Cypress Creek Basin and the Shingle Creek Basin. Typically, runoff volumes from each basin travel transverse in a southeasterly direction and are conveyed through the I-4 corridor. Below are descriptions of the prevailing drainage characteristics of each basin.

Davenport Creek Basin

The drainage area for this basin extends from north of U.S. 192 south to the I-4 corridor. Lakes Mac, Oliver, Gifford and Austin (in that order) cascade to one another towards the Mudd / Grass Lake area. Lake Oliver and Mudd Lake receive inflows from Hancock Lake and Crooked Lake, respectively, in southeast Lake County through a series of interconnected depressions with natural overflows. Storm water collected in the Mudd / Grass Lake area discharge under a paved roadway through six - 1200 mm (48 in.) reinforced concrete pipes to a depression immediately north of U.S. 192. It then flows under that roadway through triple 0.90 m x 3.05 m (3 ft. x 10 ft.) concrete box culverts towards Lake Davenport in Polk and Osceola Counties.

The Lake Davenport area receives runoff from areas in northeast Polk County and additional inflows from Lake Chapin and Apache, located immediately north of U.S. 192. The drainage basins of Lake Chapin and Apache have experienced some residential development, with more planned for the future. Storm water discharges from these lakes, along with some drainage from U.S. 192 and flows southeasterly toward the swamp

Table 4-4
I-4 EXISTING VERTICAL CURVE DATA

Curve Number	Roadway	From Station	To Station	Algebraic Difference, %	Length (meters)	K Value	Type of Curve	Cross Road	Bridge Clearance	Current Criteria Deficiences
1-2	EB/WB	PVC 655+02.3	PVT 656+24.2	0.22	121.9	553.4	SAG			SHORT
3-4	EB/WB	PVC 656+89.2	PVRC 658+24.4	2.78	135.2	28.1	SAG			SHORT K value < 100 km/hr criteria.
5-6*	EB/WB	PVRC 658+24.4	PVRC 4+42.0	6.00	457.2	76.1	CREST	*C.R. 532 UNDER/FLEX	*V=4.41 m OVER C.R. 532	SHORT K value < 100 km/hr criteria.
7	WB	PVRC 4+42.0	PVT 6+85.8	2.85	243.8	85.6	SAG			SHORT
8	WB	PVC 10+05.9	PVRC 11+88.7	1.29	182.9	141.5	SAG			SHORT
9	WB	PVRC 11+88.7	PVT 14+93.5	0.86	304.8	355.5	CREST			Meets current criteria.
10	WB	PVC 15+39.3	PVT 16+91.7	2.37	152.4	64.3	SAG			SHORT
11	WB	PVC 21+18.4	PVT 22+70.8	3.09	152.4	49.3	SAG			SHORT K value < 100 km/hr criteria.
12	WB	PVC 23+39.4	PVT 28+11.8	5.13	472.4	92.1	CREST			K value falls between 100-110km/hr criteria.
13	WB	PVC 28+65.2	PVT 30+17.6	2.19	152.4	69.7	SAG			SHORT
14	WB	PVC 31+39.5	PVT 32+91.9	0.93	152.4	164.2	CREST			SHORT
15	EB	PVRC 4+42.0	PVT 6+09.6	2.63	167.6	63.7	SAG			SHORT
16	EB	PVC 10+51.6	PVT 12+04.0	0.83	152.4	184.0	SAG			SHORT
17	EB	PVC 12+49.7	PVT 14+02.1	1.46	152.4	104.3	CREST			SHORT K value falls between 100-110km/hr criteria.
18	EB	PVC 14+78.3	PVT 16+30.7	0.58	152.4	262.1	SAG			SHORT
19	EB	PVC 21+33.6	PVRC 22+86.0	3.42	152.4	44.6	SAG			SHORT K value < 100 km/hr criteria.
20	EB	PVRC 22+86.0	PVRC 26+51.8	4.41	365.8	82.9	CREST			K value < 100 km/hr criteria.
21	EB	PVRC 26+51.8	PVT 28+04.2	2.04	152.4	74.8	SAG			SHORT
22	EB	PVC 31+85.2	PVT 33+37.6	0.08	152.4	1881.5	SAG			SHORT
23-24	EB/WB	PVC 34+02.4	PVT 36+99.6	2.59	297.2	114.9	CREST	*C.R. 545 OVER/FLEX	*V=4.95 m OVER I-4	SHORT K value falls between 100-110km/hr criteria.
25-26	EB/WB	PVC 37+70.2	PVT 38+92.1	1.68	121.9	72.4	SAG			SHORT
27-28	EB/WB	PVC 40+76.7	PVT 42+29.2	1.23	152.4	124.2	SAG			SHORT

Equality STA.-- 658+40 back = STA 0+00.0 ahead @ Polk/Osceola County line
Current criteria-- 1995 Metric:
Sag minimum K value: For 100km/hr, Kmin = 50; for 110km/hr, Kmin = 52
Crest minimum K value: For 100km/hr, Kmin = 90; for 110km/hr, Kmin = 125
Bridge Clearance = 5.0 flexible pavement, 5.05 rigid pavement
* over/under I-4

Table 4-4 (Cont'd)
I-4 EXISTING VERTICAL CURVE DATA

Curve Number	Roadway	From Station	To Station	Algebraic Difference, %	Length (meters)	K Value	Type of Curve	Cross Road	Bridge Clearance	Current Criteria Deficiences
29-30	EB/WB	PVC 42+44.4	PVRC 45+64.4	3.50	320.0	91.5	CREST			K value falls between 100-110km/hr criteria.
31-32	EB/WB	PVRC 45+64.4	PVT 47+01.6	2.47	137.2	55.6	SAG			SHORT
33-34	EB/WB	PVC 54+83.4	PVRC 56+05.3	0.80	121.9	152.4	SAG			SHORT
35-36	EB/WB	PVRC 56+05.3	PVRC 57+27.3	1.60	121.9	76.2	CREST			SHORT K value < 100 km/hr criteria.
37-38	EB/WB	PVRC 57+27.3	PVT 58+49.2	0.80	121.9	152.4	SAG			SHORT
39-40	EB/WB	PVC 62+02.8	PVT 63+55.2	0.39	152.4	391.9	SAG			SHORT
41-42	EB/WB	PVC 64+77.1	PVT 66+29.5	0.55	152.4	278.7	CREST			SHORT
43-44	EB/WB	PVC 70+56.2	PVT 72+08.6	0.16	152.4	964.6	SAG			SHORT
45-46	EB/WB	PVC 73+30.5	PVT 74+82.9	0.23	152.4	677.3	SAG			SHORT
47-48	EB/WB	PVC 79+40.1	PVT 80+92.5	0.23	152.4	677.3	CREST			SHORT
49-50	EB/WB	PVC 93+42.2	PVT 94+94.6	0.33	152.4	457.3	SAG			SHORT
51-52	EB/WB	PVC 97+99.4	PVT 99+51.8	0.10	152.4	1489.8	CREST			SHORT
53-54	EB/WB	PVC 101+34.7	PVRC 104+09.0	0.59	274.3	466.6	CREST			SHORT
55-56	EB/WB	PVRC 104+09.0	PVT 105+61.4	0.36	152.4	426.9	SAG	*U.S. 192 OVER/FLEX	*V=4.85 m OVER I-4	SHORT
57-58	EB/WB	PVC 108+51.0	PVT 110+03.4	0.37	152.4	407.5	SAG			SHORT
59-60	EB/WB	PVC 111+10.1	PVT 112+62.5	0.43	152.4	351.2	CREST			SHORT
61-62	EB/WB	PVC 119+63.5	PVT 121+15.9	1.57	152.4	96.8	CREST			SHORT
63-64	EB/WB	PVC 126+64.6	PVT 128+17.0	0.22	152.4	701.0	SAG			SHORT
65-66	EB/WB	PVC 131+52.3	PVT 133+04.7	0.11	152.4	1433.7	SAG			SHORT
67-68	EB/WB	PVC 136+40.0	PVT 137+92.4	0.11	152.4	1433.7	CREST			SHORT
69-70	EB/WB	PVC 139+44.8	PVT 140+97.2	0.12	152.4	1252.3	SAG			SHORT
71-72	EB/WB	PVC 146+45.8	PVT 147+98.2	0.78	152.4	194.2	SAG			SHORT
73-74	EB/WB	PVC 151+64.0	PVT 153+16.4	1.21	152.4	126.2	CREST			SHORT

Equality STA.-- 658+40 back = STA 0+00.0 ahead @ Polk/Osceola County line
Current criteria-- 1995 Metric:
Sag minimum K value: For 100km/hr, Kmin = 50; for 110km/hr, Kmin = 52
Crest minimum K value: For 100km/hr, Kmin = 90; for 110km/hr, Kmin = 125
Bridge Clearance = 5.0 flexible pavement, 5.05 rigid pavement
* over/under I-4

Table 4-4 (Cont'd)
I-4 EXISTING VERTICAL CURVE DATA

Curve Number	Roadway	From Station	To Station	Algebraic Difference, %	Length (meters)	K Value	Type of Curve	Cross Road	Bridge Clearance	Current Criteria Deficiences
75-76	EB/WB	PVC 154+38.3	PVT 155+90.7	0.30	152.4	506.3	SAG			SHORT
77-78	EB/WB	PVC 157+27.9	PVT 158+80.3	0.58	152.4	263.0	CREST			SHORT
79-80	EB/WB	PVC 163+37.5	PVT 164+59.4	0.29	121.9	414.8	SAG			SHORT
81-82	EB/WB	PVC 166+65.1	PVRC 167+87.1	2.16	121.9	56.6	SAG			SHORT
83-84	EB/WB	PVRC 167+87.1	PVT 171+98.5	5.44	411.5	75.6	CREST	S.R. 535 UNDER	V=5.20 m OVER S.R. 535	SHORT K value < 100 km/hr criteria.
85-86	EB/WB	PVC 172+44.3	PVT 173+81.4	3.00	137.2	45.7	SAG			SHORT K value < 100 km/hr criteria.
87-88	EB/WB	PVC 176+48.1	PVT 177+70.1	0.98	121.9	123.9	SAG			SHORT
89-90	EB/WB	PVC 179+91.0	PVT 181+13.0	0.93	121.9	130.5	CREST			SHORT
91-92	EB/WB	PVC 186+99.7	PVT 188+21.6	0.81	121.9	150.0	SAG			SHORT
93-94	EB/WB	PVC 192+78.8	PVT 194+00.8	0.96	121.9	126.7	CREST			SHORT
95-96	EB/WB	PVC 197+05.6	PVT 198+27.5	1.26	121.9	96.4	CREST			SHORT K value falls between 100-110km/hr criteria.
97-98	EB/WB	PVC 202+23.7	PVT 203+45.6	1.36	121.9	89.3	SAG			SHORT
99	WB	PVC 212+44.8	PVRC 213+66.7	2.56	121.9	47.6	SAG			SHORT K value < 100 km/hr criteria.
100	WB	PVRC 213+66.7	PVRC 217+32.5	4.37	365.8	83.8	CREST	*Central FL Pkwy. UNDER	*V=4.87 m, OVER Central FL Pkwy.	SHORT K value < 100 km/hr criteria.
101	WB	PVRC 217+32.5	PVT 218+54.4	1.85	121.9	65.8	SAG			SHORT
102	EB	PVC 212+44.8	PVRC 213+66.7	2.37	121.9	51.4	SAG			SHORT K value falls between 100-110km/hr criteria.
103	EB	PVRC 213+66.7	PVRC 217+32.5	3.98	365.8	91.8	CREST	*Central FL Pkwy. UNDER	*V=5.13 m, OVER Central FL Pkwy.	SHORT K value falls between 100-110km/hr criteria.
104	EB	PVRC 217+32.5	PVT 218+54.4	1.66	121.9	73.3	SAG			SHORT
105-106	EB/WB	PVC 229+36.5	PVT 230+58.4	0.09	121.9	1406.2	SAG			SHORT
107-108	EB/WB	PVC 236+52.8	PVT 237+74.7	0.31	121.9	394.6	CREST			SHORT
109-110	EB/WB	PVC 245+36.7	PVT 246+58.6	0.94	121.9	130.1	SAG			SHORT
111-112	EB/WB	PVC 250+54.9	PVT 251+76.8	1.17	121.9	104.1	CREST			SHORT K value falls between 100-110km/hr criteria.

Equality STA.-- 658+40 back = STA 0+00.0 ahead @ Polk/Osceola County line
Current criteria-- 1995 Metric:
Sag minimum K value: For 100km/hr, Kmin = 50; for 110km/hr, Kmin = 52
Crest minimum K value: For 100km/hr, Kmin = 90; for 110km/hr, Kmin = 125
Bridge Clearance = 5.0 flexible pavement, 5.05 rigid pavement
* over/under I-4

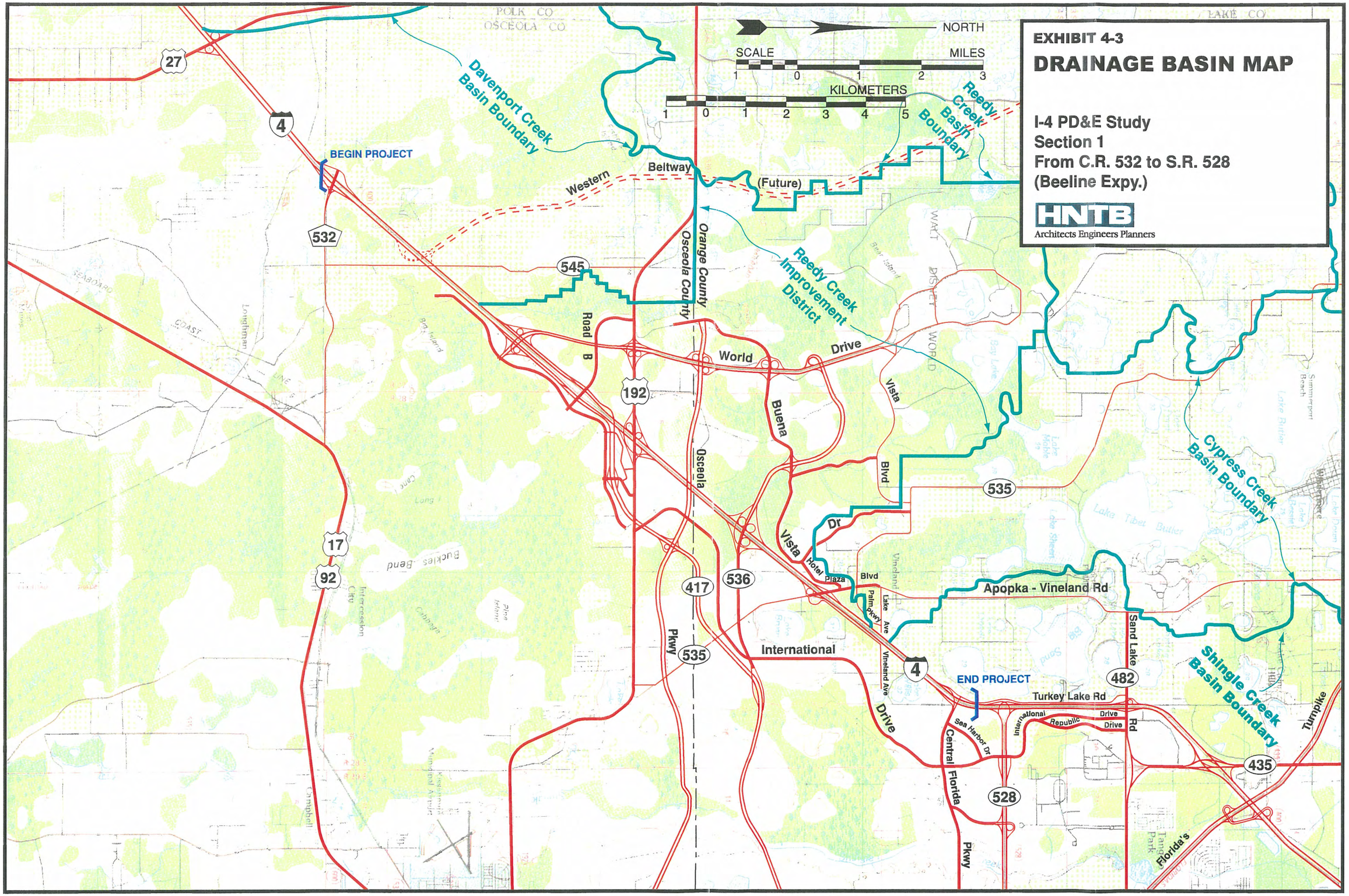


EXHIBIT 4-3
DRAINAGE BASIN MAP
I-4 PD&E Study
Section 1
From C.R. 532 to S.R. 528
(Beeline Expy.)
HNTB
Architects Engineers Planners
NORTH
SCALE
MILES
1 0 1 2 3
KILOMETERS
1 0 1 2 3 4 5
POLK CO
OSCEOLA CO
LAKE CO
Davenport Creek Basin Boundary
BEGIN PROJECT
Western Beltway (Future)
Reedy Creek Basin Boundary
Reedy Creek Improvement District
Orange County
Osceola County
Road B
World Drive
Buena Vista Blvd
Vista Dr
Hotel Plaza Blvd
Palm Pkwy
Lake Ave
Vineland Ave
Apopka - Vineland Rd
Sand Lake Rd
Cypress Creek Basin Boundary
Shingle Creek Basin Boundary
Turnpike
Osceola Pkwy
International Drive
Central Florida Pkwy
Sea Harbor Dr
Republic Drive
Turkey Lake Rd
END PROJECT
Florida's
27
4
532
545
192
17
92
417
536
535
482
435
528
Seaboard Coast Line
Buckles Bend
Interoceon City
Campbell
Mungbol Avenue
Lake Tibet Butler
Lake Mabel
Lake Rose
Lake Down
Summerport Beach
Tanger Park

adjacent to Lake Davenport. Inflows to this swamp then flow south to a 1150 mm by 820 mm (49 in. by 33 in.) corrugated metal pipe arch under an unpaved road and continues to the Davenport Creek Swamp.

Within this basin, there is little existing developed land adjacent to the I-4 corridor. The majority of the storm water runoff from the basin is ultimately conveyed through the I-4 corridor via three separate concrete box culverts. The existing structures include double 2.75 m x 2.10 m (9 ft. x 7 ft.) concrete box culverts, four - 3.65 m x 2.45 m (12 ft. x 8 ft.) concrete box culverts and double 2.10 m x 1.20 m (7 ft. x 4 ft.) concrete box culverts. In addition to these structures, double 1200 mm (48 in.) and a 600 mm (36 in.) pipe convey runoff volumes from Davenport Creek through the I-4 corridor.

Reedy Creek Basin

The Reedy Creek Basin lies within Orange and Osceola counties. Approximately 101 square kilometers (39 square miles) of the entire 160.6 square kilometer (62 square mile) Reedy Creek drainage basin are located in southwest Orange County. The drainage basin draining south to the I-4 corridor is bounded by the Florida Turnpike to the north and northeast, Apopka-Vineland Road and Dr. Phillips Boulevard to the east, and U.S. 27 to the west. The portion of the Reedy Creek Basin located within Orange County includes 33 major lakes that are part of this vast drainage network that ultimately outfalls to the Reedy Creek swamp located southeast of the I-4 corridor. Storm water runoff volumes are accumulated and conveyed through the I-4 corridor via the Reedy Creek Improvement District (RCID). The RCID consists of an extensive network of canals, bridge crossings, culverts and weir structures designed to accumulate and convey runoff volumes from tributary areas of the Reedy Creek Basin as well as runoff volumes from the resort areas within the Reedy Creek Basin.

The eastern half of the RCID drains to Bonnet Creek, which is a major tributary of Reedy Creek. Bonnet Creek collects and transports runoff volumes contributed from large portions of the Walt Disney World resort areas, the Lake Buena Vista resort areas, as well as from several adjacent golf courses. Bonnet Creek also accepts runoff volumes from South Lake and the Cypress Creek Basin. Ultimately Bonnet Creek discharges to Reedy Creek in Osceola County.

Runoff volumes from the western portion of the RCID drain to Reedy Creek. Similar to runoff volumes conveyed to Bonnet Creek, the sources for most of the runoff volumes are offsite discharges from Walt Disney resort areas, golf courses (local to the RCID), as well as discharges from Lake Reams, Whittenhorse Creek, Boggy Creek and the Reedy Lake area. Also, similar to the eastern portion of this basin, most runoff within the basin is conveyed via a network of canals that ultimately discharge to the Reedy Creek Swamp.

The majority of the storm water runoff from the basin is ultimately conveyed through the I-4 corridor via two bridge crossings and three separate concrete box culverts. There is a 67 m (220 ft.) long bridge over a 53 m (174 ft.) wide channel at Reedy Creek, and a 46.3 m (152 ft.) long bridge over a 30.5 m (100 ft.) wide channel at Bonnet Creek. The

remaining existing structures include double 1200 mm (48 in.) reinforced concrete pipes, double 2.10 m x 2.10 m (7 ft. x 7 ft.) concrete box culverts and double 2.10 m x 1.20 m (7 ft. x 4 ft.) concrete box culverts.

Cypress Creek Basin

The Cypress Creek Basin is located due north and immediately adjacent to the Reedy Creek Basin. This basin encompasses approximately 86.8 square kilometers (33.5 square miles) of land in Orange County, Florida. The Cypress Creek Basin is bounded by Apopka-Vineland Road and Dr. Phillips Boulevard on the east, the Florida Turnpike on the north, C.R. 535 on the west, and I-4 on the south. This basin has numerous lakes within its limits. However, the primary hydrologic feature within the Cypress Creek Basin is the Butler Chain of Lakes, which has been designated an Outstanding Florida Water by the Florida Department of Environmental Protection's recommendation to the Environmental Regulation Commission. In addition to the Butler Chain, the other lakes within this basin considered major hydrologic features are Lakes Whitney, Crescent, Rhea, Burden, Bessie, Ruby, Mabel and South Lake. Six of these eight lakes discharge to the Butler Chain expect for Mabel Lake and South Lake.

Of the four basins referenced, the Cypress Creek and Shingle Creek Basins are the most urbanized. This area has received significant development in the last 20 years in both residential and commercial growth. Most of the runoff from these developed areas receives water quality treatment in storm water retention ponds prior to entering the system of lakes within the basin limits.

Runoff volumes from the Cypress Creek Basin outflow from the system of lakes near the southern edge of Lake Sheen to the Cypress Creek Swamp. Flow through the swamp meanders south towards double 1500 mm (60 in.) culverts under C.R. 535 and then a trolley crossing of the Grand Cypress golf course. Two large concrete box culverts pass water under this trolley towards an Amil gate at the boundary of the RCID. Flow through the RCID from its property line generally proceeds to the southwest towards Bonnet Creek and eventually to the Reedy Creek Swamp. Flows from the swamp are transported through the I-4 corridor by a 1200 mm (48 in.) pipe and a 750 mm (30 in.) pipe.

Shingle Creek Basin

The Shingle Creek Basin lies in Orange and Osceola Counties. The portion of the Shingle Creek Basin within Orange County is approximately 209 square kilometers (80.7 square miles) in size. The topographic relief is mild with a combination of nearly level to rolling plains and relatively mature karst surfaces with intermittent ponds, swamps and marshes. Most of the area is connected by sluggish streams or by wide shallow sloughs. The watershed within Orange County is bordered by the Osceola County line to the south, and generally by S.R. 441 on the east, S.R. 50 to the north, and Apopka-Vineland Road to the west. Shingle Creek ultimately outfalls into Lake Tohopekaliga in Osceola County.

The Big Sand Lake area west of Interstate 4 is characterized as a cascading lake system comprised of five large lakes. Spring Lake is the headwaters of the system. Spring Lake

flows south under Sand Lake Road into Little Sand Lake. Little Sand Lake, Lake Crowell and Lake Willis all discharge into Big Sand Lake from the north, west and south, respectively. Big Sand Lake discharges east into the Valencia Water Control District via an open channel; culverts under Turkey Lake Road and Interstate 4; and a storm sewer along Central Florida Parkway to the Valencia Water Control District canals. Elevations in the Big Sand Lake Basin range from a high of 47.2 m NGVD (155 ft., NGVD) northwest of Spring Lake to a low of 27.4 m, NGVD (90 ft., NGVD) east of Big Sand Lake.

4.1.8 Geotechnical Data

The anticipated geotechnical conditions were evaluated based on a review of readily available published data, including United States Geological Survey (USGS) Quadrangle maps, United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey maps, and other sources. Based on this review, potential muck soil (organic content $\geq$ 5 percent) areas were identified and investigated with a limited number of soil borings and manual muck probes.

The project alignment lies within areas of uplands and lowlands. In the upland areas, the near-surface soil would generally be classified as "Select" by the FDOT Standard Index No. 505. It is possible that deeper cuts may encounter soils classified as Plastic (P) or High Plastic (H) and such soil would need to be removed in accordance with the requirement of FDOT Standard Index No. 500. Although the depth to groundwater in the upland areas should not be a major factor in alternatives evaluation, it is possible that deep cuts may penetrate the surficial groundwater table. Roadway grades should provide adequate separation between the pavement base and the water table. If this is not possible, then written approval and concurrence shall be obtained from the District Pavement Design Engineer, the District Drainage Engineer and the District Materials Engineer prior to initiating the design of any required roadway underdrain system.

The project alignment also traverses numerous lowland areas associated with creeks, lakes and wetland features. A preliminary field investigation including soil borings and manual muck probes was performed to provide information regarding the extent of organic soil (muck or peat) deposits in these areas. Areas where these organic soils have been identified should be avoided where possible for geotechnical as well as wetlands jurisdictional reasons to minimize impacts for construction and permitting. Relatively thin organic deposits can generally be economically removed and backfilled with select material. Deeper deposits (typically in excess of about 3 m) may require special internally reinforced embankment design, staged construction and/or surcharging to reduce the magnitude of post-construction settlements. Also, former or existing lakes may contain very deep deposits of weak or loose soils that may require extremely long piles to reach firm bearing strata for structure foundation support. These features are typically relic sinkholes that have been filled with soft muck and/or loose sand deposits.

Several local projects where bridges were built through relic sinkhole lakes resulted in pile lengths in excess of about 70 m (230 ft.).

Groundwater conditions through the majority of the uplands along the project alignment are expected to be relatively deep (greater than 2 m) and their conditions are favorable for dry retention facilities. Near wetlands or lakes, groundwater may be shallow and wet detention facilities are often more feasible.

The southwest and northeast portion of the project lie in known areas of high recharge to the Floridan Aquifer, and the remaining central portion traverses areas of known no recharge and low to moderate recharge. The geotechnical engineering profession is unable to accurately predict where and when a sinkhole may occur and investigations to evaluate sinkhole risk usually entail drilling deep SPT borings to look for advanced indicators of sinkhole activity such as voids, cavities, or loose, ravelled soil zones. Such exploration is not traditionally done for roadway design but is more critical for structures such as bridges. For reasons described above, it would be desirable to avoid topographic features which may be relic sinkholes, not necessarily to mitigate future sinkhole risk, but to minimize impacts due to soft or weak soils within the relic sinkhole.

Based on a review of the USGS map entitled "Potentiometric Surface of the Upper Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida," September 1996, the potentiometric elevation of the Floridan Aquifer ranges from about +15 to +31 meters (+50 to +100 ft.) NGVD from the beginning of the project alignment at C.R. 532 to the terminus at S.R. 528. According to USGS Quadrangle maps, ground surface and lake surface elevations are typically higher than corresponding potentiometric head elevations of the Floridan Aquifer; therefore, artesian groundwater conditions are not expected at or near the ground surface. However, deep excavations may encounter artesian conditions.

4.1.9 Crash Data

Crash data for years 1993 through 1996 was obtained from FDOT for I-4 and for most state roads that cross I-4 within the study area. Insufficient or no data exists for World Drive Extension near its interchange with I-4, since this roadway opened to traffic in April 1998. Very limited data exists for the Southern Connector Extension (S.R. 417) interchange, since it opened to traffic recently. Therefore, these two facilities were not analyzed. Since little crash data was available from local agencies, county roadways which cross or interchange with I-4 were not analyzed. The crash data for the state roadways is summarized in Table 4-5. For those roadways that interchange with I-4, the study area was extended 800 m (½ mi.) beyond the ramp terminal intersections or to the first signalized intersection.

Table 4-5 shows the annual vehicle-miles-traveled (VMT) and the total number of crashes for each roadway segment studied. The average daily traffic (ADT) volumes

Table 4-5
SAFETY ANALYSIS

ROAD	SEGMENT	YEAR	Annual VMT (millions)	TOTAL CRASHES	CRASH TYPE								CRASH CATEGORY			NUMBER OF FATALITIES	NUMBER OF INJURIES	SAFETY RATIO
					Rear End	Head On	Angle	Left Turn	Side-Swipe	Bridge Pier or Abut.	Fixed Object	Other	Fatality	Injury	Property Damage Only			
I-4	Polk/Osceola County Line to C.R. 545 (S.R. 530) 10.6 km (6.6 mi)	93	43.6	4	0	0	0	0	1	0	1	2	0	3	1	0	5	0.251
		94	44.8	13	7	0	0	0	2	0	1	3	0	11	2	0	25	0.789
		95	46.4	13	6	0	1	0	1	1	1	3	0	11	2	0	24	0.710
		96	46.4	18	7	0	3	0	0	0	1	7	0	17	1	0	33	0.922
I-4	C.R. 545 to U.S. 192 (S.R. 530) 10.6 km (6.6 mi)	93	83.6	22	9	0	0	0	0	0	4	9	1	16	5	1	54	0.207
		94	86.0	27	7	2	0	0	6	0	3	9	2	16	9	2	30	0.280
		95	89.1	28	10	0	1	0	3	0	3	11	0	19	9	0	39	0.244
		96	89.1	19	3	0	1	0	2	0	6	7	2	11	6	3	24	0.166
I-4	U.S. 192 (S.R. 530) to S.R. 536 3.9 km (2.4 mi)	93	58.8	10	4	1	0	0	1	0	2	2	1	5	4	1	13	0.111
		94	66.2	23	12	1	1	0	2	1	1	5	1	14	8	1	34	0.259
		95	80.3	16	4	0	2	0	2	0	4	4	2	10	4	4	24	0.134
		96	80.3	22	8	0	1	0	4	1	6	2	0	15	7	0	24	0.185
I-4	S.R. 536 to S.R. 535 2.5 km (1.5 mi)	93	50.0	20	10	0	2	0	1	0	5	2	0	16	4	0	31	0.255
		94	53.4	13	5	0	1	0	2	0	2	3	0	11	2	0	20	0.176
		95	51.1	18	6	0	2	0	1	0	4	5	0	12	6	0	25	0.222
		96	51.1	26	9	1	4	0	5	0	2	5	2	16	8	2	34	0.322
I-4	S.R. 535 to Central Florida Parkway 4.6 km (2.9 mi)	93	112.6	53	27	1	2	0	8	0	4	11	0	37	16	0	86	0.334
		94	134.1	64	43	0	6	0	7	0	1	7	1	48	15	1	90	0.388
		95	141.5	47	21	0	7	0	9	0	3	7	1	32	14	1	54	0.238
		96	141.5	59	21	3	7	0	9	0	9	10	0	36	23	0	58	0.300
I-4	Central Florida Pkwy. to 400 m (1/4 mi.) south of BeeLine Expressway (EB off/ WB on) ramps 0.38 km (0.24 mi)	93	9.2	4	2	0	0	0	1	0	1	0	0	4	0	0	7	0.200
		94	11.0	3	2	0	0	0	0	0	0	1	0	3	0	0	4	0.145
		95	11.6	3	1	0	0	0	0	0	0	2	0	3	0	0	5	0.124
		96	11.6	2	0	0	0	0	2	0	0	0	0	1	1	0	1	0.083

Table 4-5 (Continued)
SAFETY ANALYSIS

ROAD	SEGMENT	YEAR	Annual VMT (millions)	TOTAL CRASHES	CRASH TYPE								CRASH CATEGORY			NUMBER OF FATALITIES	NUMBER OF INJURIES	SAFETY RATIO
					Rear End	Head On	Angle	Left Turn	Side-Swipe	Bridge Pier or Abut.	Fixed Object	Other	Fatality	Injury	Property Damage Only			
U.S. 192 (S.R. 530)	West of I-4 to East of I-4 2.7 km (1.7 mi)	93	39.7	6	4	0	1	0	0	0	1	0	0	5	1	0	11	0.055
		94	36.6	7	2	0	0	0	0	0	3	2	0	3	4	0	5	0.071
		95	33.2	9	5	0	1	0	2	0	1	0	0	5	4	0	11	0.088
		96	33.2	22	9	0	0	0	4	0	6	3	0	17	5	0	31	0.225
S.R. 536	West of I-4 to East of I-4 2.5 km (1.6 mi)	93	36.0	12	3	0	2	3	2	0	1	1	1	7	4	1	18	0.120
		94	31.2	11	4	0	1	2	0	0	2	2	0	7	4	0	23	0.128
		95	30.3	9	3	0	1	0	0	0	1	4	0	7	2	0	11	0.095
		96	30.3	8	3	0	1	1	0	0	1	2	0	5	3	0	14	0.089
S.R. 535	Northwest of I-4 to Southeast of I-4 0.9 km (0.6 mi)	93	7.0	62	28	1	16	14	2	0	0	1	0	43	19	0	94	1.804
		94	7.0	59	27	0	10	18	2	0	0	2	0	48	11	0	83	1.723
		95	7.1	31	10	0	8	7	3	0	3	0	0	27	4	0	30	0.784
		96	7.1	47	20	0	8	8	5	0	0	6	1	30	16	2	67	1.216

given in the FDOT crash data computer printouts were used to determine the VMT for each roadway. The number of crashes are broken down into eight types: rear end, head on, angle, left turn, sideswipe, bridge pier or abutment, fixed object (other than bridge pier or abutment), and all others. Table 4-5 also shows the number of crashes broken into three categories:

- the number of crashes involving at least one fatality;
- the number of crashes where there was at least one injury but no fatalities; and
- and the number of crashes that involved property damage only.

The actual number of fatalities, the number of persons injured, and the safety ratio are also provided in Table 4-5 for each roadway segment. As stated in section 3.2, a high crash location or segment is defined by FDOT as a location with a safety ratio greater than or equal to 1.0. The safety ratio for a given location or segment is determined by dividing the actual crash rate by the critical crash rate. The critical crash rates are based on statewide average crash rates for facilities with similar characteristics, adjusted for a 95 percent confidence interval for rural facilities. The statewide average crash rates are updated annually and are developed for divided and undivided rural and urban facilities based on the number of lanes or roadway classification (interstate or turnpike). For roadway segments, the actual and critical crash rates are in units of the number of accidents per million vehicle miles. The statewide average crash rates for each roadway class and category were obtained for years 1993, 1994, 1995, and 1996, allowing safety ratios to be calculated based on the average crash rate for the same year.

As shown in Table 4-5, the safety ratios for I-4 from C.R. 532 to C.R. 545 show an increasing trend from 1993 to 1996. For 1996, the safety ratio for this segment was close to, but less than, 1.0. While the safety ratios do not indicate a high crash location, the increasing trend indicates a possible future safety problem. All safety ratios are well below 1.0 for all I-4 segments from C.R. 545 to 400 m (¼ mi.) southwest of the BeeLine Expressway (S.R. 528). The critical crash rate for a rural interstate is lower than the critical crash rate for an urban interstate. This is the primary reason that the safety ratios are higher for the segment from C.R. 532 to C.R. 545 than in the other segments.

For U.S. 192 (S.R. 530) and S.R. 536, safety ratios were very low, which indicate that these roadways are much safer than the statewide average four-lane urban arterial. However, safety ratios for S.R. 535 were approximately 1.8 in 1993, 1.7 in 1994, 0.8 in 1995, and 1.2 in 1996, indicating that this roadway has a higher rate of crashes than other six-lane arterials within Florida. Although the safety ratios are lower than 1.0 for all roadways except S.R. 535, each facility is discussed below.

Rear end crashes were the predominant crash type occurring on all facilities including I-4. Besides rear end crashes, sideswipes and fixed object crashes occurred most often along I-4. A large number of crashes were also classified as other; however, no overall patterns

were observed among these. A total of 16 persons were killed in 13 crashes on I-4 between C.R. 532 and 400 m (¼ mi.) southwest of the BeeLine Expressway (S.R. 528) during the 4 year period.

Crash activity was generally low on U.S. 192 (S.R. 530) and S.R. 536. Neither road had more than 12 crashes in any year, except for 1996 where U.S. 192 (S.R. 530) experienced 22 crashes. These crashes occurred while U.S. 192 (S.R. 530) was being widened to six-lanes. Rear end, sideswipe, and fixed object crashes also occurred more frequently on U.S. 192 (S.R. 530) during 1996 than in previous years. Based on further review of FDOT crash data, no crashes involving pedestrians or bicyclists occurred on U.S. 192 (S.R. 530) and S.R. 536 during the 4 year period. There were no fatalities on U.S. 192 (S.R. 530) during the 4 year period. S.R. 536 had one fatality in 1993, despite the low safety ratio of 0.12.

Rear end, angle, and left turn crashes were the most common crash types that occurred on S.R. 535 near I-4. It should be noted that the I-4/S.R. 535 interchange was under reconstruction between September 1993 and October 1995. The number of these crashes dropped considerably in 1995 over each of the previous 2 years. The number of angle and left turn crashes were approximately the same during 1995 and 1996; however, rear end crashes increased in 1996. Over the 4 year period, two crashes involving pedestrians and one involving a bicyclist occurred on S.R. 535. Two people were killed in a crash along S.R. 535 during 1996. A high number of injuries have occurred along S.R. 535, more than on any segment of I-4 except from S.R. 535 to Central Florida Parkway. That segment of I-4 had approximately the same number of injuries in 1993 and 1994, but is five times the length and carries more than double the traffic volume. Although safety ratios have declined in 1995 and 1996, S.R. 535 has a safety problem and warrants further review, based on the number and types of crashes and the magnitude of the safety ratios.

Table 4-6 summarizes crash data for S.R. 535 similar to Table 4-5; however, the S.R. 535 study area was broken into two segments, and crash data from 1992 through 1996 was included. The first segment covers S.R. 535 from north of the I-4 interchange to south of the I-4 interchange, including the ramp terminal intersections. The second segment covers S.R. 535 from the I-4 eastbound off-ramp/Vineland Avenue intersection to Vinings Way. The lower section of Table 4-6 shows the results for the two segments combined, which are the same as the results shown in Table 4-5. Segment one is nearly 60 percent of the total length of S.R. 535 under review.

Nearly 90 percent of the crashes occurred in segment one, which is the I-4 interchange area. The safety ratio for this segment exceeded 2.0 in years 1992, 1993, and 1994, but fell to just over 1.0 in 1995. In 1996, the safety ratio increased to 1.5. The safety ratio for segment two was less than 0.5 for all 5 years. Therefore, the high crash segment of S.R. 535 is adjacent to I-4.

For segment one, the number of crashes and safety ratios were somewhat higher in 1993 and 1994 than in 1992. However, the total number of crashes declined approximately 50

Table 4-6
DETAILED SAFETY ANALYSIS
FOR S.R. 535

S.R. 535 SEGMENT NUMBER	S.R. 535 SEGMENT DESCRIPTION	YEAR	Annual VMT (millions)	TOTAL CRASHES	CRASH TYPE								CRASH CATEGORY			NUMBER OF FATALITIES	NUMBER OF INJURIES	SAFETY RATIO
					Rear End	Head On	Angle	Left Turn	Side-Swipe	Bridge Pier or Abut.	Fixed Object	Other	Fatality	Injury	Property Damage Only			
1	Northwest of I-4 to Southeast of I-4 (EB Off-Ramp) 0.5 km (0.328 mi)	92	3.6	45	18	0	6	15	4	0	0	2	0	39	6	0	90	2.203
		93	4.0	57	27	1	13	14	1	0	0	1	0	40	17	0	91	2.560
		94	4.0	54	25	0	8	18	1	0	0	2	0	44	10	0	77	2.434
		95	4.1	27	9	0	6	6	3	0	3	0	0	23	4	0	24	1.060
		96	4.1	38	16	0	8	5	4	0	0	5	0	25	13	0	48	1.524
2	Southeast of I-4 (EB Off-Ramp) to Vinings Way 0.4 km (0.242 mi)	92	2.6	8	5	0	1	1	0	0	0	1	1	5	2	1	12	0.493
		93	3.0	5	1	0	3	0	1	0	0	0	0	3	2	0	3	0.283
		94	3.0	5	2	0	2	0	1	0	0	0	0	4	1	0	6	0.284
		95	3.0	4	1	0	2	1	0	0	0	0	0	4	0	0	6	0.199
		96	3.0	9	4	0	0	3	1	0	0	1	1	5	3	2	17	0.456
Total (1 & 2 Combined)	Northwest of I-4 to Vinings Way 0.9 km (0.570 mi)	92	6.2	53	23	0	7	16	4	0	0	3	1	44	8	1	102	1.687
		93	7.0	62	28	1	16	14	2	0	0	1	0	43	19	0	94	1.804
		94	7.0	59	27	0	10	18	2	0	0	2	0	48	11	0	83	1.723
		95	7.1	31	10	0	8	7	3	0	3	0	0	27	4	0	30	0.784
		96	7.1	47	20	0	8	8	5	0	0	6	1	30	16	2	65	1.216

percent in 1995. The decline in the number and types of crashes and the improved safety ratio in 1995 and 1996 indicate that the reconstruction has improved safety along S.R. 535; however, the roadway continues to have more crashes than the average statewide six-lane arterial.

Rear end, angle, and left turn crashes were the predominant types in segment one. As shown in Table 4-6, rear end collisions were at their highest during 1993 and 1994, which was during the construction period. Rear end collisions are either about the same or have been reduced slightly as determined from a comparison of the 1992 data to the 1995 and 1996 data. Angle crashes appear to have been at their peak during the reconstruction period, with no change between before and after construction. However, left turn crashes have been reduced by 50 percent in segment one, as shown by a comparison of 1992 through 1994 data versus 1995 and 1996 data. The reconstruction has replaced the southbound S.R. 535 to eastbound I-4 left turn movement by a two-lane loop ramp.

The location (milepost) of left turn crashes occurring in segment one has been reviewed. Eight left turn crashes per year have occurred at the S.R. 535/I-4 westbound ramps intersection in both 1992 and 1993. This has declined to three per year in 1994 and 1995, and only two in 1996. These left turn crashes involved either westbound and southbound vehicles or northbound and southbound vehicles prior to 1995, the latter being the most predominant. No left turn crashes involving both northbound and southbound vehicles occurred in 1995 or 1996. The number of left turn crashes involving westbound and southbound vehicles has not changed over the 1992 through 1996 period. Besides the left turn crashes, all other crashes in segment one appear to be random occurrences at random locations. Additional improvements may be necessary at this interchange to address safety concerns.

4.1.10 Intersections and Signalization

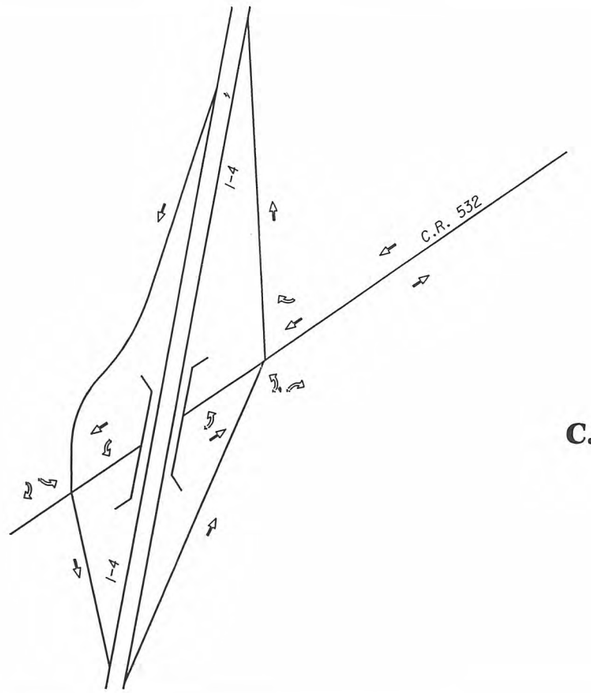
Although I-4 is a limited access facility with no at-grade intersections, there are at-grade intersections at interchanges within the study area. Some of the interchanges include flyover or loop ramps which provide a merge or diverge movement with the cross street. Other ramp termini provide channelized right turns at the cross street, which operate as a merge or diverge movement, or operate under yield or signalized control. In addition, other ramp termini provide at-grade left turn movements which operate under stop or signalized control.

Table 4-7 provides a list of intersection traffic control within the study area. Exhibit 4-4 provides a straight line diagram of U.S. 192 (S.R. 530), S.R. 536, C.R./S.R. 535, and Turkey Lake Road/Central Florida Parkway in the vicinity of I-4. All signalized intersections, including lane geometry, within 800 m (1/2 mi.) of I-4 are shown.

Table 4-7
INTERSECTION CONTROL

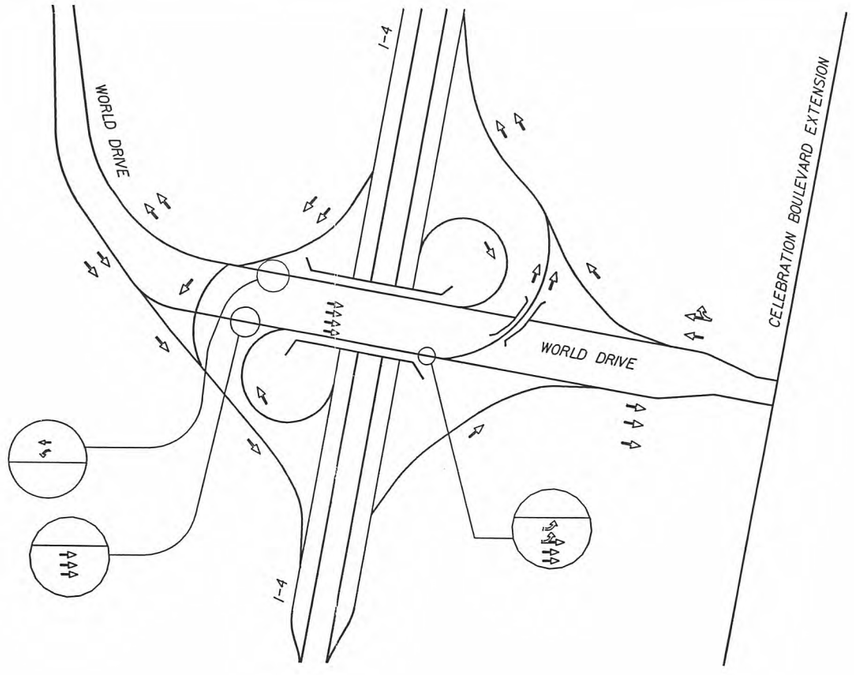
Interchange	Intersection *	Type of Control	Comments *
I-4/C.R. 532	C.R. 532/I-4 EB Ramps	Stop Sign	Stop control on ramp approach. Right turn is channelized and under yield control.
	C.R. 532/I-4 WB Ramps	Stop Sign	Stop control on all approaches.
I-4/World Drive	World Drive/I-4 WB On-Ramp	Stop Sign	Stop control for NB left turn only. All other movements are free-flow.
I-4/Southern Connector		None	All movements are free-flow.
I-4/U.S. 192 (S.R. 530)	All Ramp Intersections	Yield	All movements are either under yield control or are free-flow.
	U.S. 192/Celebration Place /Parkway Boulevard	Signal	
I-4/S.R. 536	All Ramp Intersections	Yield	All movements are either under yield control or are free-flow.
I-4/S.R. 535	S.R. 535/Hotel Plaza Boulevard	Signal	
	S.R. 535/I-4 WB Ramps	Signal	
	S.R. 535/I-4 EB Off-Ramp/Vineland Avenue	Signal	SB right turn is under Yield control.
	S.R. 535/Vinings Way	Signal	
I-4/Central Florida Parkway	Turkey Lake Rd/Central FL/I-4 WB On-Ramp	None	WB left turn is not permitted.
	Central Florida Parkway/I-4 EB Off-Ramp	Stop Sign	Stop control on ramp approach. Right turn is channelized and under yield control.
	Central Florida Parkway/Westwood Boulevard	Signal	
I-4/BeeLine Expressway		None	All ramps are free-flow.

* EB = Eastbound, WB = Westbound, NB = Northbound, and SB = Southbound.



C.R. 532 INTERCHANGE AREA

WORLD DRIVE INTERCHANGE AREA



LEGEND

BRIDGE

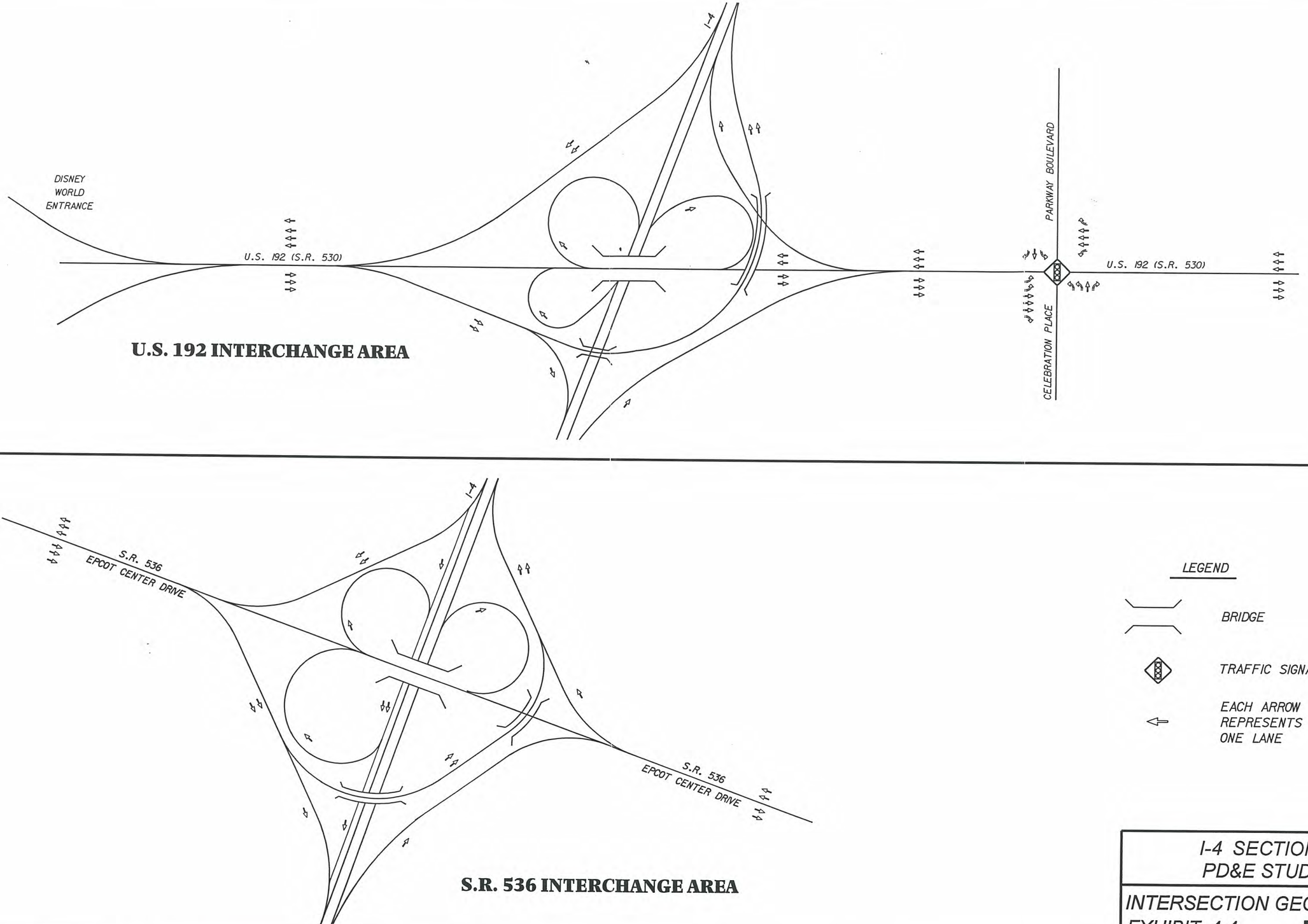
TRAFFIC SIGNAL

EACH ARROW REPRESENTS ONE LANE

28-JUL-1998 09:53
E:\24430\owldrv\intgeom.dgn
\\orlw00\TRANS\24430\owldrv\Jlx\fhp\pen

I-4 SECTION 1
PD&E STUDY

INTERSECTION GEOMETRY
EXHIBIT 4-4 HNTB



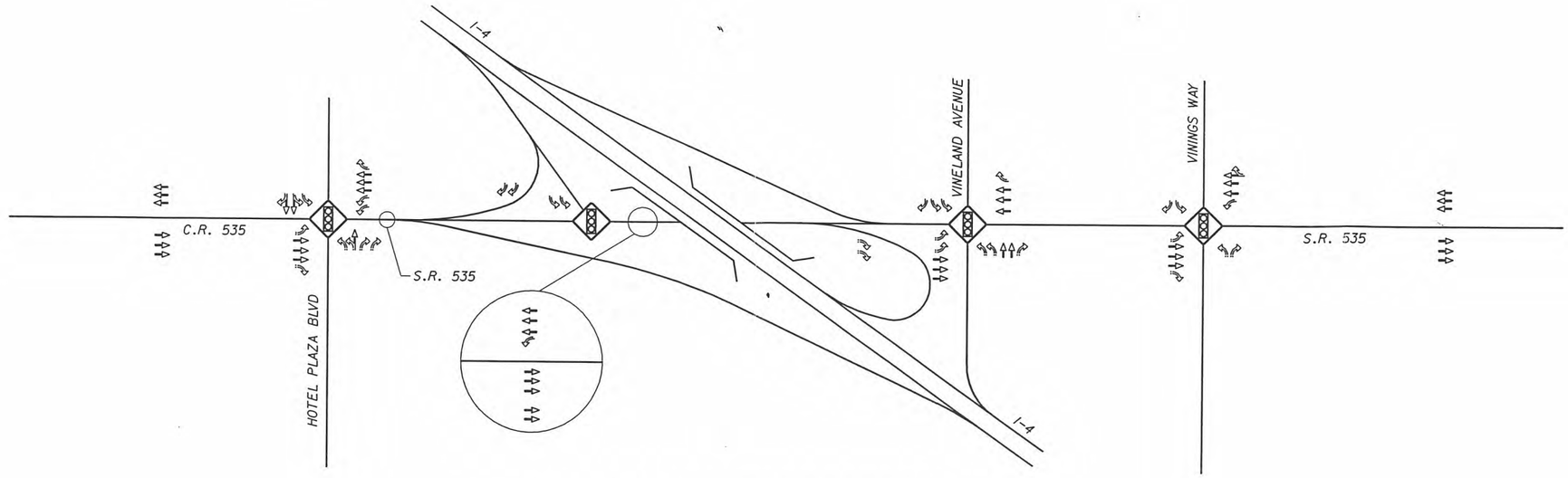
U.S. 192 INTERCHANGE AREA

S.R. 536 INTERCHANGE AREA

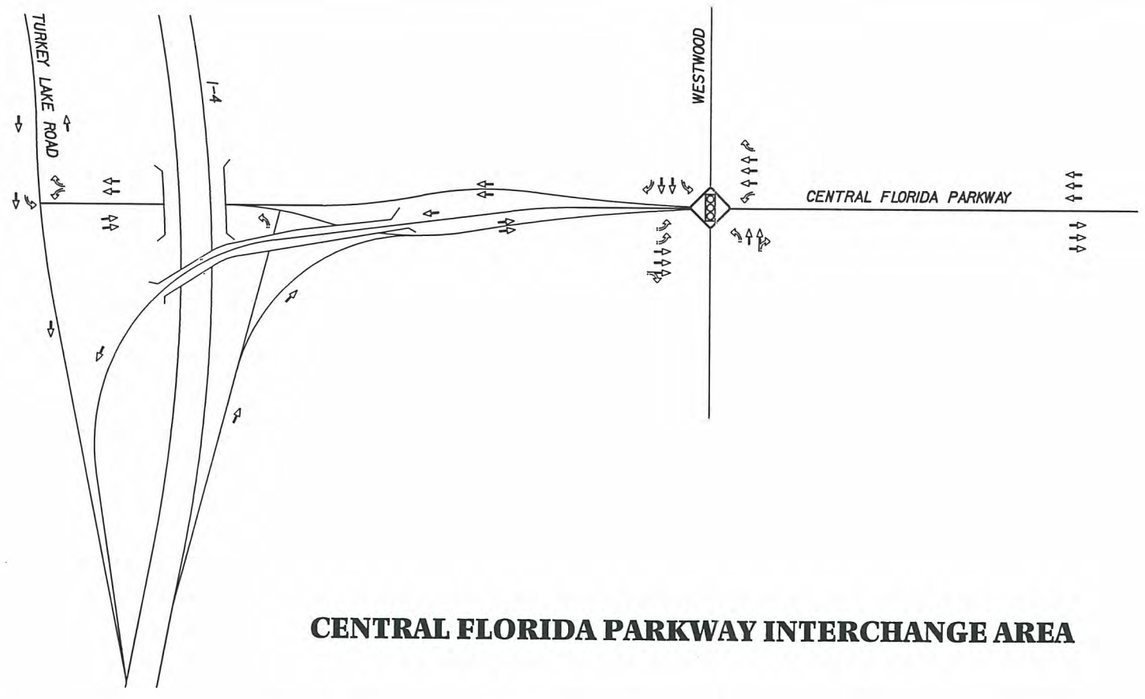
28-JUL-1998 09:53
E:\2443\Dowd\N1intgeom.dgn
\\arlwDOT RMS\2443\open\Ux\Tplpen

I-4 SECTION 1
PD&E STUDY

INTERSECTION GEOMETRY
EXHIBIT 4-4 HNTB



S.R. 535 INTERCHANGE AREA



CENTRAL FLORIDA PARKWAY INTERCHANGE AREA

LEGEND

BRIDGE

TRAFFIC SIGNAL

EACH ARROW REPRESENTS ONE LANE

I-4 SECTION 1
PD&E STUDY

INTERSECTION GEOMETRY
EXHIBIT 4-4

HNTB

The original I-4 construction included interchange access at C.R. 532, U.S. 192 (S.R. 530), and S.R. 535 within the study area. Each of these interchanges have been modified since opening plus a number of new interchanges added which are summarized below.

The I-4/C.R. 532 interchange was originally constructed as a half diamond, with ramps to and from the southwest. This interchange was recently modified to a full diamond by adding ramps to and from the northeast along I-4.

The I-4/World Drive interchange and the I-4 CD roads, which extend from southwest of this interchange to the Southern Connector Extension (S.R. 417) interchange, were recently constructed. The World Drive interchange provides full access to both directions along I-4. The Southern Connector Extension (S.R. 417) interchange provides access to and from the southwest along I-4. This interchange is the south terminus of S.R. 417.

The original I-4/U.S. 192 (S.R. 530) interchange was a partial cloverleaf, with loop and diamond ramps in the northeast and southwest quadrants of the interchange. The interchange provided full access, since left turns were permitted to or from the ramp termini along U.S. 192 (S.R. 530). This interchange was modified in the early 1970s which added diamond ramps in the remaining quadrants and an additional loop ramp in the northwest quadrant. A flyover ramp was constructed which carries eastbound U.S. 192 (S.R. 530) to eastbound (north) I-4 traffic.

In the early 1980s, S.R. 536 and the I-4/S.R. 536 interchange were constructed. The interchange is generally similar to the reconstructed I-4/U.S. 192 (S.R. 530) interchange in that it provides loop ramps in the northeast, northwest, and southwest quadrants, diamond ramps in all quadrants, and an eastbound S.R. 536 to eastbound (north) I-4 flyover ramp. Unlike the U.S. 192 interchange, the S.R. 536 interchange has a CD system in the westbound direction along I-4 which handles the weaving between the two loop ramps. At that time, auxiliary lanes were extended along I-4 between the S.R. 536 and S.R. 535 interchanges, resulting in a short eight-lane segment.

The S.R. 535 interchange was reconstructed between 1993 and 1995, which maintained the auxiliary lanes between S.R. 536 and S.R. 535. The original diamond interchange was modified to include a two-lane loop ramp in the southeast quadrant of the interchange. The I-4 eastbound off-ramp was relocated to the south to align with the S.R. 535/Vineland Avenue intersection. The reconstructed interchange improved traffic operations on S.R. 535. However, there are weaving problems on I-4 eastbound between S.R. 536 and east of S.R. 535.

The design plans for the reconstructed interchange were reviewed, and the design was found to meet current design criteria. Due to a combination of large weaving volumes and insufficient weaving distance, a bottleneck condition exists. The existing year 1996 peak hour volumes provided by FDOT for the eastbound ramps within this area are described below.

- Eastbound entrance ramp from S.R. 536 – 1,470 vehicles per hour;
- Eastbound exit ramp to S.R. 535 – 590 vehicles per hour;
- Eastbound entrance ramp (loop) from S.R. 535 – 1,310 vehicles per hour; and
- Eastbound entrance ramp (diamond) from S.R. 535 – 770 vehicles per hour.

There is approximately 2130 m (7000 ft.) of weaving distance between the entrance ramp from S.R. 536 and the diamond entrance ramp from S.R. 535. Increasing weaving distances could improve operating conditions. However, there has been a significant increase in the mainline traffic volume since the interchange was reconstructed. As a result, there is insufficient mainline capacity east of S.R. 535. The existing year 1996 peak hour volume for eastbound I-4 east of S.R. 535 is 7,440 vehicles per hour.

The Central Florida Parkway interchange was constructed in the early 1990s which provides connection to and from the southwest along I-4. Auxiliary lanes were also constructed between the Rest Area and Central Florida Parkway, resulting in a short eight-lane segment. The bridges on the I-4 mainline were part of the original construction. The BeeLine Expressway (S.R. 528) directional interchange was constructed in the early 1970s, when the Expressway was extended from the east on a new alignment.

4.1.11 Lighting

Overhead lighting is provided at several locations throughout the study area. Portions of the I-4 mainline, some interchanges, and cross streets have overhead lighting. Table 4-8 summarizes the locations where lighting currently exists and the type of lighting: high mast versus conventional.

Conventional lighting has been installed at the I-4/World Drive interchange recently completed. The coverage area includes the World Drive mainline, ramps, CD roads, and I-4 through the World Drive and Southern Connector (S.R. 417) interchanges.

4.1.12 Utilities and Railroads

An inventory of the existing utilities and railroad system was conducted within the study area. The information provided within this report was gathered by contacting 20 utility companies for potential utilities within approximately 150 m (500 ft.) of the I-4 right-of-way and approximately 460 m (1500 ft.) along each cross road. These utility companies were sent a letter with a set of 1:2000 aerials of the project to indicate approximate locations of existing and proposed utilities. No railroad companies were contacted, since there are no railroad tracks within or near the study area.

Table 4-8
I-4 LIGHTING LIMITS

Location	High Mast	Conventional	No Lighting	Comments
C.R. 532 Interchange			X	
C.R. 532 to West end of the World Dr. / Southern Connector CD Roads			X	
West end of the World Dr. / Southern Connector CD Roads to Southern Connector		X		This section includes the World Drive interchange.
Southern Connector (S.R. 417) Interchange		X		Conventional lighting exists along Southern Connector ramps at I-4.
Southern Connector to U.S. 192			X	
U.S. 192 Interchange	X			
U.S. 192 to S.R. 536			X	
S.R. 536 Interchange	X			
S.R. 536 to approx. M.P. 67.5			X	
Approx. M.P. 67.5 to approx. M.P. 69		X		This section includes the SR 535 interchange.
Approx. M.P. 69 to West end of Rest Area (Begin EB Decel. / End WB Accel. Lane)			X	
West end of Rest Area (Begin EB Decel. / End WB Accel. Lane) to Central Florida Parkway (M.P. 71)		X		This section includes the Rest Area.
Central Florida Parkway Interchange		X		
Central Florida Parkway (M.P. 71) to Bee Line Expressway			X	
Bee Line Expressway Interchange	X			

Overhead utilities include electrical transmission and cable television lines. Buried utilities include telephone communication lines (fiberoptic and copper), natural gas, sanitary sewer, and water transmission lines. These utilities are described below and shown on the conceptual design plans provided in the appendix.

Cable Television

Time Warner Cable provides cable television service within the study area. They have underground fiber optic cable along the north side of U.S. 192 (S.R. 530) crossing I-4. Aerial and underground fiber optic cable can also be found along the east side of S.R. 535, south of Vineland Avenue, and along Vineland Avenue northeast of S.R. 535. The underground cable runs along the east side of S.R. 535 under the I-4 overpass. Aerial coaxial and fiber optic cable runs along Vineland Avenue, Lake Avenue, and Palm Parkway near I-4. Underground fiber optic cable also runs along north side of Central Florida Parkway under I-4 and aerial coaxial and fiber optic cable runs along west side of Turkey Lake Road.

Adelphia Cable has buried coaxial cable along the north side of S.R. 545 crossing I-4.

Electric

Florida Power Corporation has 69 kV aerial transmission lines at several locations including along the south side of C.R. 545 over I-4, east side of S.R. 535 crossing I-4, north side of Lake Avenue which crosses I-4 in that vicinity, and crossing I-4 east of World Drive. They also have 230 kV aerial lines within an easement along southeast side of I-4, which cross I-4 within the southwest end of the I-4/World Drive interchange, runs along southwest side of I-4 northeast to U.S. 192 (S.R. 530), crossing I-4 on the south side of U.S. 192 (S.R. 530), and follows U.S. 192 (S.R. 530) to the east.

Orlando Utilities Commission has 230 kV aerial transmission lines along southeast side of I-4 outside of the right-of-way from C.R. 532 to World Drive within an easement. They also have 230 kV aerial transmission lines in the same easements as Florida Power Corporation which cross I-4 southwest of World Drive, run along southwest side of I-4 to U.S. 192 (S.R. 530), and cross I-4 on south side of U.S. 192 (S.R. 530). Tampa Electric Company also has 230 kV power lines within the same easements as Orlando Utilities Commission and Florida Power Corporation.

Natural Gas

Central Florida Pipeline operates and maintains 400 mm (16 in.) liquid gasoline fuel pipelines within the project area. This pipeline runs adjacent to the southeast side of I-4 southwest of C.R. 545, crosses I-4 adjacent to the Florida Power easement at the

southwest end of the World Drive interchange, runs along the southwest side of I-4 between World Drive and U.S. 192 (S.R. 530). It crosses I-4 in the Florida Power easement adjacent to U.S. 192 (S.R. 530).

The Florida Gas Transmission Company has a 450 mm (18 in.) steel high pressure natural gas transmission pipeline within the I-4 study area. It runs along the northwest side of I-4 near C.R. 545 and crosses I-4 northeast of C.R. 545. From that point, it runs roughly parallel to I-4 and follows the Southern Connector Extension (S.R. 417). They also have a 165 mm (6 5/8 in.) line that runs along the east side of S.R. 535 south of Vineland Avenue. It crosses S.R. 535 at Vineland Avenue and runs along the west side of S.R. 535 under the I-4 overpass.

TECO / Peoples Gas has a 150 mm (6 in.) gas line along S.R. 535 crossing I-4 east of S.R. 535. An additional 100 mm (4 in.) line runs along Turkey Lake Road and Central Florida Parkway, which runs under I-4. A 100 mm (4 in.) line runs along the north side of U.S. 192 and crosses under I-4.

Florida Public Utilities Company was contacted; they do not have any gas lines within the project.

Solid Waste Facilities

There are no solid waste facilities within the limits of this project.

Telephone

American Telephone & Telegraph (AT&T) Company, BellSouth, United Telephone System (Sprint-Florida), Vista United Telecommunications, Tele-Media Company, and Wiltel Business Networks Group East were contacted. AT&T and Wiltel Business Networks Group East do not have utilities within the study area.

Sprint-Florida has service lines along U.S. 192 (S.R. 530), C.R. 532, C.R. 545 and S.R. 535 which cross I-4. A fiber optic line runs along the southeast side of I-4 between S.R. 535 and Lake Avenue. Sprint also has service lines along Central Florida Parkway near I-4.

Vista-United Telecommunications has an underground system that follows Celebration Boulevard and Celebration Place. They plan to extend the system from the existing terminus along Celebration Boulevard to southwest of the World Drive interchange. The future plant in and around the Town of Celebration depends on the extent and timing of development within this community. Existing fiber optic cable runs along the south side of U.S. 192 (S.R. 530), which crosses I-4. They also have utility lines along I-4 near S.R. 535 and Vineland Avenue, crossing I-4 south of S.R. 535.

BellSouth has telephone service lines along Turkey Lake Road and Central Florida Parkway near I-4 and crossing I-4 southwest of Central Florida Parkway near the rest areas.

Potable Water/Sanitary Sewer/Reclaimed Water Facilities

The City of Kissimmee has 300 mm (12 in.) and 400 mm (16 in.) water lines and a 900 mm (36 in.) wastewater line along C.R. 532 at I-4.

Orange County maintains water and wastewater facilities within the northern limits of this I-4 project. They have a 150 mm (6 in.) force main and a 250 mm (10 in.) water line along Turkey Lake Road, Central Florida Parkway, and a 75 mm (3 in.) water line and a 100 mm (4 in.) force main along the southeast side of I-4 between Central Florida Parkway and the rest area. A 75 mm (3 in.) water line and 150 mm (6 in.) force main crosses I-4 between the two rest areas. Near the rest area on the southeast side of I-4, the 100 mm (4 in.) force main connects to a 150 mm (6 in.) force main that runs into the rest area. Additional service lines are provided to parcels along I-4 between S.R. 536 and Central Florida Parkway. Some developments adjacent to I-4 have their own private internal system for water and wastewater. Additionally, some parcels are not currently provided sewer service; in these instances privately owned septic tanks are used. A 300 mm (12 in.) reuse line runs along S.R. 535.

The Orlando Utilities Commission operates water and wastewater lines north of the BeeLine Expressway (S.R. 528). Therefore, they do not have any lines within the study area. Osceola County and the City of Orlando, Bureau of Wastewater, were contacted; they do not have service lines within the project limits.

I-4 Surveillance and Motorist Information System

This system consists of changeable message signs (CMS), closed circuit television (CCTV) cameras, and in-pavement loop assemblies which are interconnected to a central control center. The interconnect consists of multi-pair, coaxial, and fiber optic cable. Speed and traffic count data are collected from the loop assemblies, and the CCTV provide visual information of flow characteristics, breakdowns, and accidents. Through use of CMS, the system provides information to motorists on extended delays and problems occurring further downstream. There are three changeable message signs within the project limits: 1) westbound I-4 north of S.R. 535, 2) eastbound I-4 north of S.R. 535, and 3) eastbound I-4 south of World Drive. These locations were identified for future use in determining if they would conflict with preliminary signing schemes.

The system currently begins southwest of the Southern Connector (S.R. 417) interchange to the north end of the metropolitan area. The I-4/World Drive interchange project extends the system further southwest to approximately 730 m (2,400 ft.) south of Reedy Creek.

4.1.13 Pavement Conditions

A Pavement Condition Survey was performed on I-4 within the study area in 1996 by FDOT. The survey rates pavement according to three criteria: cracks, ride, and ruts. Each of these criteria are rated on a scale of one to ten, with ten representing pavement in perfect condition. A rating lower than seven is considered in need of rehabilitation. The section of I-4 within Orange County is in good condition with respect to these criteria; no value lower than 7.5 was shown. I-4 within Osceola County is also in very good condition; all pavement values are at least 9.2. The pavement condition survey is summarized in Table 4-9. The section of I-4 within Osceola County was last resurfaced in 1994; the section of I-4 within Orange County was resurfaced in 1990/1991. The PD&E study covering the six-lane widening of I-4 from southwest of C.R. 532 to U.S. 192 (S.R. 530) will rehabilitate the existing pavement on that section of I-4.

4.2 Existing Bridges

There are 27 existing bridge structures within the project limits. Most of the bridges are in pairs. A description of each of the structures, in terms of bridge number, location, type, year built, lanes on and under, horizontal and vertical clearances, number of spans, span lengths, structure length, deck widths, skews, and overall deck rating, is provided in Table 4-10.

I-4 passes over C.R. 532, Reedy Creek, Bonnet Creek, S.R. 535, and Central Florida Parkway, with twin spans at each location. Concrete box culverts exist where I-4 passes over Davenport Creek. The bridges over I-4 are C.R. 545, World Drive, Southern Connector Extension (S.R. 417), U.S. 192 (S.R. 530), S.R. 536, and the Central Florida Parkway flyover.

The descriptions and data provided in Table 4-10 are based on current Structural Inventory and Appraisal (SI&A) Reports provided by FDOT. These appraisals include a sufficiency rating for each structure, which is derived from a formula that evaluates factors that are indicative of the structure's ability to remain in service.

An overall deck rating of 6 or higher indicates that the bridge is in satisfactory condition. None of the bridges were rated below 6. However, several locations were rated as a 6 including one structure at C.R. 532, C.R. 545, and Reedy Creek, three structures at the U.S. 192 (S.R. 530) interchange, and one structure at Central Florida Parkway (not the flyover). A few others have ratings of 7.

Table 4-9
I-4 PAVEMENT CONDITION SURVEY

County	Section	Sub-Section	Segment	Roadway Side	Mile Post		Distance (mi.)	Mile Post Marker		Survey Item	Distress Ratings *
					Begin	End		Begin	End		
92 (Osceola)	130	000	Polk County Line to US 192	Westbound Lanes	0.000	6.821	6.821	57.6	64.4	Crack	10.0
										Ride	9.2
										Rutting	10.0
			US 192 to Orange County	Westbound Lanes	6.821	7.885	1.064	64.4	65.5	Crack	10.0
										Ride	9.2
										Rutting	9.0
			Polk County to E. of US 192	Eastbound Lanes	0.000	7.058	7.058	57.6	64.6	Crack	10.0
										Ride	9.2
										Rutting	10.0
			E. of US 192 to Orange Co.	Eastbound Lanes	7.058	7.885	0.827	64.6	65.5	Crack	10.0
										Ride	9.2
										Rutting	10.0
75 (Orange)	280	000	Osceola Co. to E. of SR 536	Westbound Lanes	0.000	1.828	1.828	65.5	67.3	Crack	7.5
										Ride	8.0
										Rutting	9.0
			E. of SR 536 to W. of SR 535	Westbound Lanes	1.828	2.130	0.302	67.3	67.6	Crack	9.0
										Ride	8.1
										Rutting	9.0
			W. of SR 535 to E. of SR 535	Westbound Lanes	2.130	3.347	1.217	67.6	68.8	Crack	10.0
										Ride	8.1
										Rutting	9.0
			E. of SR 535 to E. of Bee Line	Westbound Lanes	3.347	7.698	4.351	68.8	73.2	Crack	9.0
										Ride	8.4
										Rutting	9.0
			Osceola Co. to W. of SR 535	Eastbound Lanes	0.000	2.130	2.130	65.5	67.6	Crack	10.0
										Ride	7.7
										Rutting	9.0
			W. of SR 535 to E. of SR 535	Eastbound Lanes	2.130	3.347	1.217	67.6	68.8	Crack	10.0
										Ride	8.3
										Rutting	9.0
			E. of SR 535 to E. of Bee Line	Eastbound Lanes	3.347	7.698	4.351	68.8	73.2	Crack	10.0
										Ride	7.9
										Rutting	9.0

* Survey Year 1996.

Table 4-10
I-4 BRIDGE DATA

Bridge Number	Bridge Location	(1) Structure Type	Year Built	Lanes On	Lanes Under	General Vertical Alignment	Minimum Vertical Clearance (m)	(2) Horizontal Clearance				Number of Spans	Max. Span Length (m)	Structure Length (m)	Deck Width (m)	(3) Skew (°)	(4) Deck Rating
								Eastbound I-4		Westbound I-4							
								Left (m)	Right (m)	Left (m)	Right (m)						
920095*	C.R. 532 EB	5	1960	2	3	I-4 over	4.44	2.4	2.4	2.4	2.4	4	15.8	53.9	13.0	29	7
920094	C.R. 532 WB	5	1960	2	3	I-4 over	4.41	2.4	2.4	2.4	2.4	4	15.8	53.9	13.0	29	6
920097	Davenport Creek EB	1	1960	2	0	I-4 over	Cast-in-place Concrete Box Culvert					4	3.7	20.4	0.0	40	N
920096	Davenport Creek WB	1	1960	2	0	I-4 over	Cast-in-place Concrete Box Culvert					4	3.7	20.4	0.0	40	N
920099	Reedy Creek EB	5	1960	2	0	I-4 over	NA	2.4	2.4	2.4	2.4	6	11.6	69.5	13.0	0	7
920098	Reedy Creek WB	5	1960	2	0	I-4 over	NA	2.4	2.4	2.4	2.4	6	11.6	69.5	13.0	0	6
920100	Bonnet Creek EB	5	1960	3	0	I-4 over	NA	3.0	3.0	3.0	3.0	4	11.6	46.3	17.9	0	8
920101	Bonnet Creek WB	5	1960	3	0	I-4 over	NA	3.0	3.0	3.0	3.0	4	11.6	46.3	17.8	0	8
750368**	S.R. 535 EB (750199)**	6	1995	4	9	I-4 over	5.20	4.8	4.8	4.8	4.8	2	35.4	63.4	25.3	41	8
750367**	S.R. 535 WB (750140)**	6	1995	3	9	I-4 over	5.20	3.0	3.0	3.0	3.0	2	35.4	63.4	18.0	41	8
750200	Central Florida Parkway EB	5	1960	3	3	I-4 over	5.13	3.0	3.0	3.0	3.0	1	26.5	26.5	17.9	0	7
750142	Central Florida Parkway WB	5	1960	3	3	I-4 over	4.87	3.0	3.0	3.0	3.0	1	26.5	26.5	17.9	0	6

Bridge Number	Bridge Location	(1) Structure Type	Year Built	Lanes On	Lanes Under	General Vertical Alignment	Minimum Vertical Clearance (m)	(2) Horizontal Clearance				Number of Spans	Max. Span Length (m)	Structure Length (m)	Deck Width (m)	(3) Skew (°)	(4) Deck Rating
								Eastbound I-4		Westbound I-4							
								Left (m)	Right (m)	Left (m)	Right (m)						
920029	C.R. 545	5	1960	2	2	over I-4	4.95	9.2	3.3	9.3	3.4	4	32.6	99.7	10.3	50	6
920176**	World Drive SB	5	1997	2	2	over I-4	6.13	9.2	23.4	9.2	23.4	1	22.1	22.1	17.1	12.8	RC
920170	World Drive NB	5	1997	3	8	over I-4	6.26	23.4	9.2	9.2	23.4	4	42.0	124.3	18.4	12.7	RC
920169**	S.R. 417 WB	4	1996	2	4	over I-4	6.30	10.4	22.6	22.1	10.2	4	64.9	191.3	14.9	40	9
920091	U.S. 192 (S.R. 530) EB	5	1970	3	5	over I-4	4.85	9.1	9.3	9.1	5.5	4	35.4	104.9	15.3	40	6
920121	U.S. 192 (S.R. 530) WB	5	1970	3	5	over I-4	4.85	9.1	9.3	9.1	5.5	4	35.4	104.9	15.3	40	6
920083	U.S. 192 (S.R. 530) SB Ramp	5	1970	2	4	over I-4	4.87	9.1	9.2	9.8	9.2	4	32.0	94.8	12.8	99	6
924158	Osceola Parkway	4	1995	4	8	over I-4	5.52	9.1	23.8	11.0	22.7	4	56.8	160.0	31.1	38.18	RC
750324	S.R. 536 SB Ramp	5	1982	2	4	over I-4	NA	9.7	9.1	9.3	9.2	4	31.1	86.0	13.0	99	7
750323	S.R. 536 EB	5	1984	3	9	over I-4	5.05	9.8	9.2	9.5	9.2	4	38.7	116.4	15.4	15	7
750322	S.R. 536 WB	5	1984	3	9	over I-4	5.09	9.8	9.2	9.5	9.2	4	38.7	116.4	15.4	15	7
750402	Sea World Flyover Ramp WB	4	1990	1	9	over I-4	5.02	7.7	7.7	8.2	7.5	8	56.7	380.1	9.1	99	7

Bridge Number	Bridge Location	(1) Structure Type	Year Built	Lanes On	Lanes Under	General Vertical Alignment	Minimum Vertical Clearance (m)	(2) Horizontal Clearance				Number of Spans	Max. Span Length (m)	Structure Length (m)	Deck Width (m)	(3) Skew (°)	(4) Deck Rating
								Of Bridge Above		Of Road Under							
								Left (m)	Right (m)	Left (m)	Right (m)						
920171	Ramp C-2 (World Dr.)	5	1997	4	8	over World Drive	5.19	3.4	3.0	5.5	5.5	4	41.4	123.2	21.0	9.5	RC
920084	U.S. 192 (S.R. 530) EB Ramp	5	1970	2	5	over U.S. 192	NA	2.4	2.4	5.7	9.4	6	27.4	120.1	12.8	99	7
750325	S.R. 536 EB Ramp	5	1982	2	7	over S.R.536	5.25	2.4	2.4	9.2	9.6	5	31.7	109.7	13.0	99	7

Notes: (1) Structure Type, see table at right.

(2) Horizontal Clearance: This is measured from the edge of the travel lane to the edge of the nearest obstruction; left is measured from the left edge of the left travel lane to an obstruction to the left.

(3) Skew: Angle between the centerline of a pier and a line normal to the roadway centerline.

(4) Deck Rating (Condition) is based on a scale from 1 to 10, with 10 representing the best and 6 representing satisfactory condition; N means not rated; RC means recently constructed (completed within the last 3 years).

* Bridge hit by oversized vehicle.

** Bridge number conflict; the number for World Drive SB was recently given a new number; the number originally assigned to World Drive SB was the same as the number assigned to S.R. 417 WB. Bridge inspection reports, SI & A reports, and plans show different numbers for S.R. 535.

NA - Not Applicable

(1) Structure Type	
1	Concrete
2	Concrete continuous (not used)
3	Steel (not used)
4	Steel continuous
5	Prestressed concrete
6	Prestressed concrete continuous
Types correspond to FDOT Bridge Inventory Database	

There are several locations along I-4 where bridge clearances do not meet current criteria of 5.05 m (16.5 ft.). These locations are:

- C.R. 532 (under I-4),
- Central Florida Parkway westbound (under I-4),
- C.R. 545 (over I-4),
- U.S. 192 (S.R. 530) including flyover ramp (over I-4), and
- Central Florida Parkway (Sea World) flyover ramp (over I-4).

4.3 Environmental Characteristics

4.3.1 Land Use Data

Existing land use information was compiled from the Florida Land Use Cover Classification Level III for Township 24 South, Range 28 East (provided by the Orange County Planning Department), a subject area reference map provided by RCID Planning and Engineering, and a windshield type field reconnaissance. Generalized existing land use is shown on Exhibit 4-5.

The future land use data was compiled from the Osceola County, Orange County and Reedy Creek Improvement District Comprehensive Plans, the Celebration Development of Regional Impact Application for Development Approval (Map H1) and the Little Lake Bryan Design Traffic Report. The last two documents were used because the Celebration and Little Lake Bryan DRIs were de-annexed from the Reedy Creek Improvement District, and have not been included on the latest Osceola County and Orange County Future Land Use Maps, respectively. Because each document uses different land use categories, a simplified list was developed which can apply to all of the documents. Future land use is shown on Exhibit 4-6.

Existing Land Use

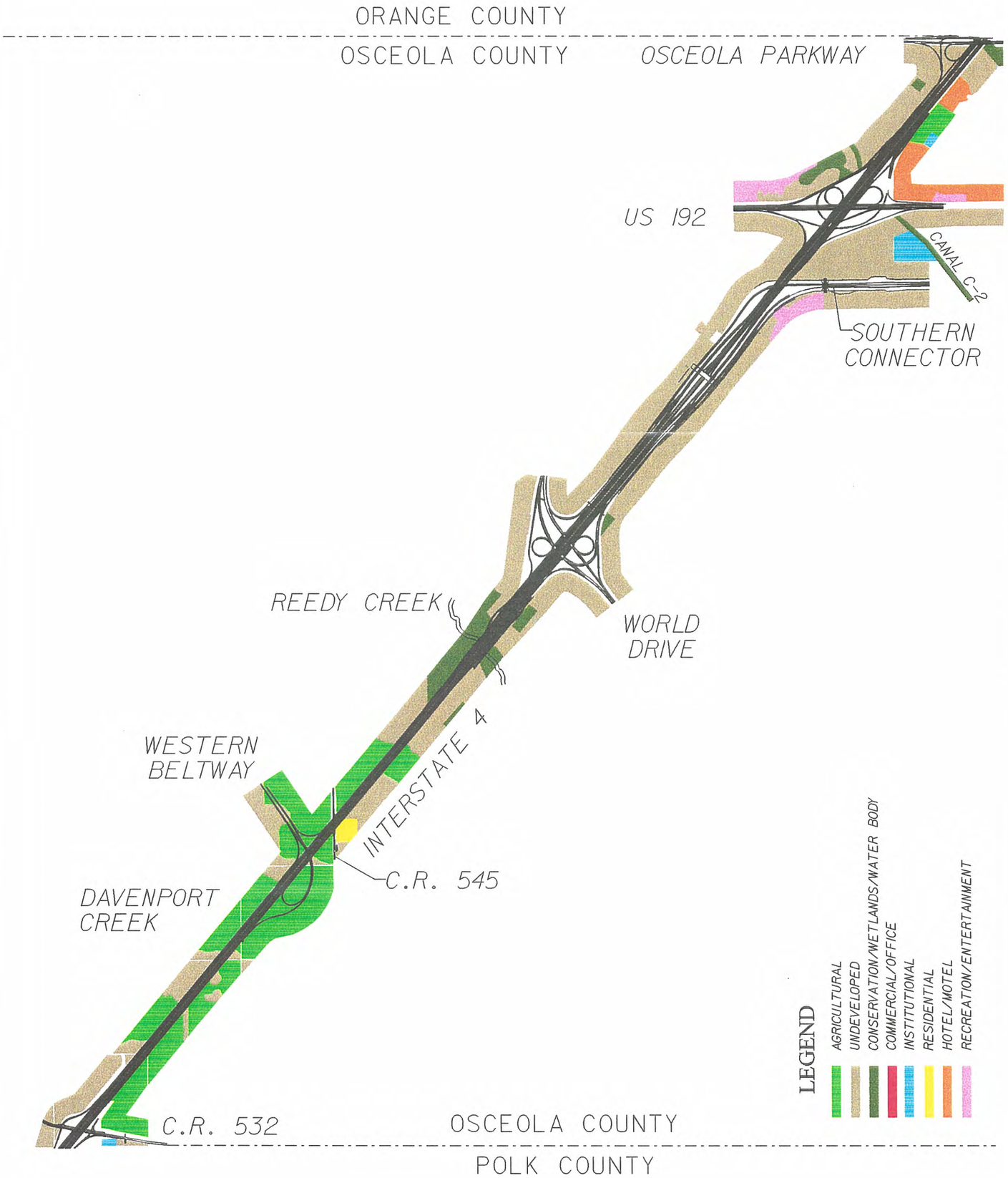
The existing land use from the Polk/Osceola County line to World Drive is primarily undeveloped or agriculture with the exception of one institutional use (Oakhill Baptist Church) at the I-4/C.R. 532 interchange and one residential use (Paradise RV Park) located south of I-4 at C.R. 545. Also located in this area is Reedy Creek, which crosses the I-4 corridor west of World Drive.

From World Drive to the Osceola/Orange County line, the level of existing development begins to increase. Existing uses around the I-4/U.S. 192 interchange are mixed and include the following: recreation/entertainment (Celebration Golf Course and Disney Sports Complex), institutional (Celebration Health Center and a water treatment facility), and hotel (Hyatt Orlando and Radisson Resort Parkway).

EXHIBIT 4-5

I-4 P.D. & E.

GENERALIZED EXISTING LAND USE



LEGEND

- AGRICULTURAL
- UNDEVELOPED
- CONSERVATION/WETLANDS/WATER BODY
- COMMERCIAL/OFFICE
- INSTITUTIONAL
- RESIDENTIAL
- HOTEL/MOTEL
- RECREATION/ENTERTAINMENT

EXHIBIT 4-5 Continued

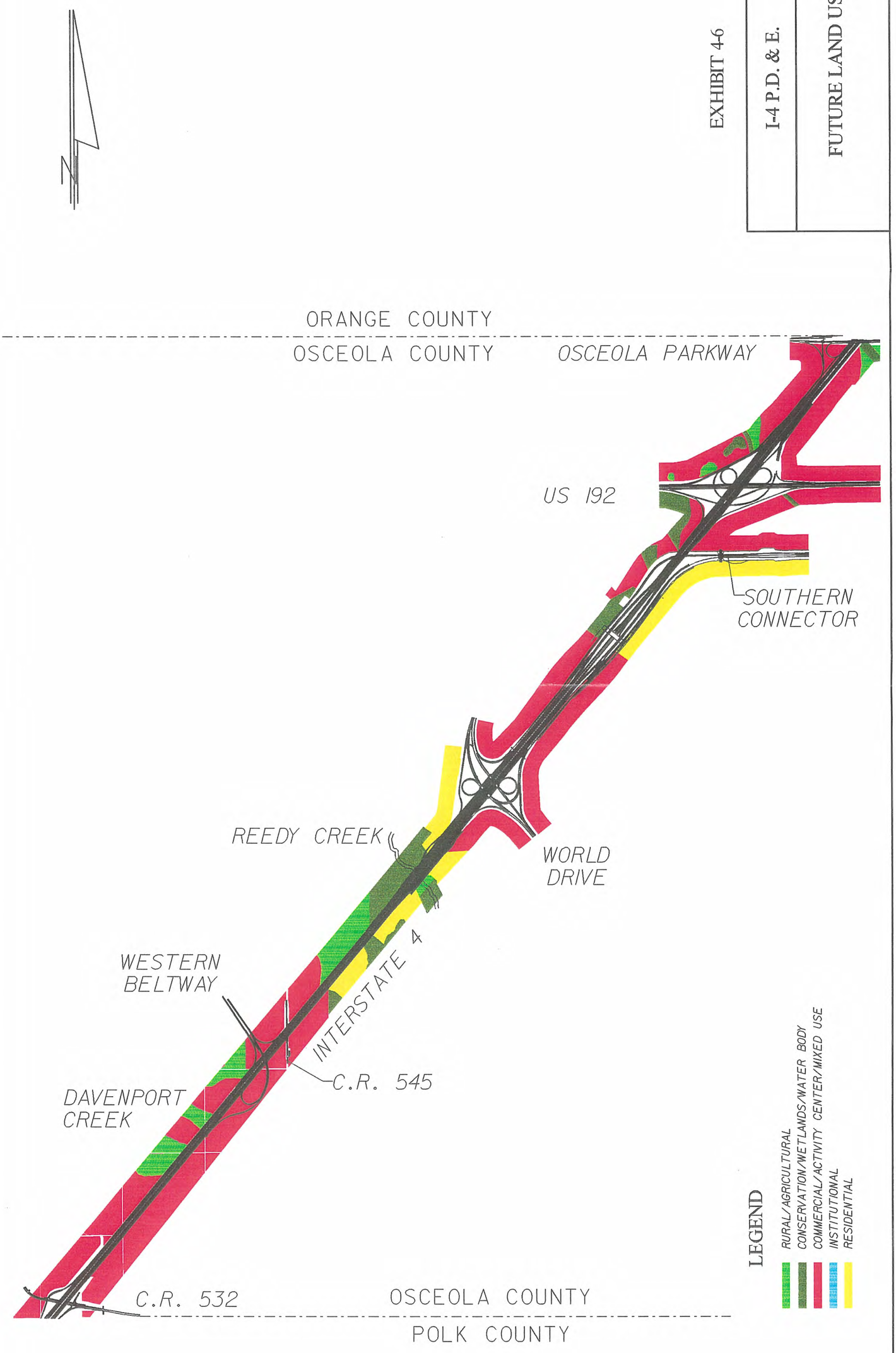
I-4 P.D. & E.

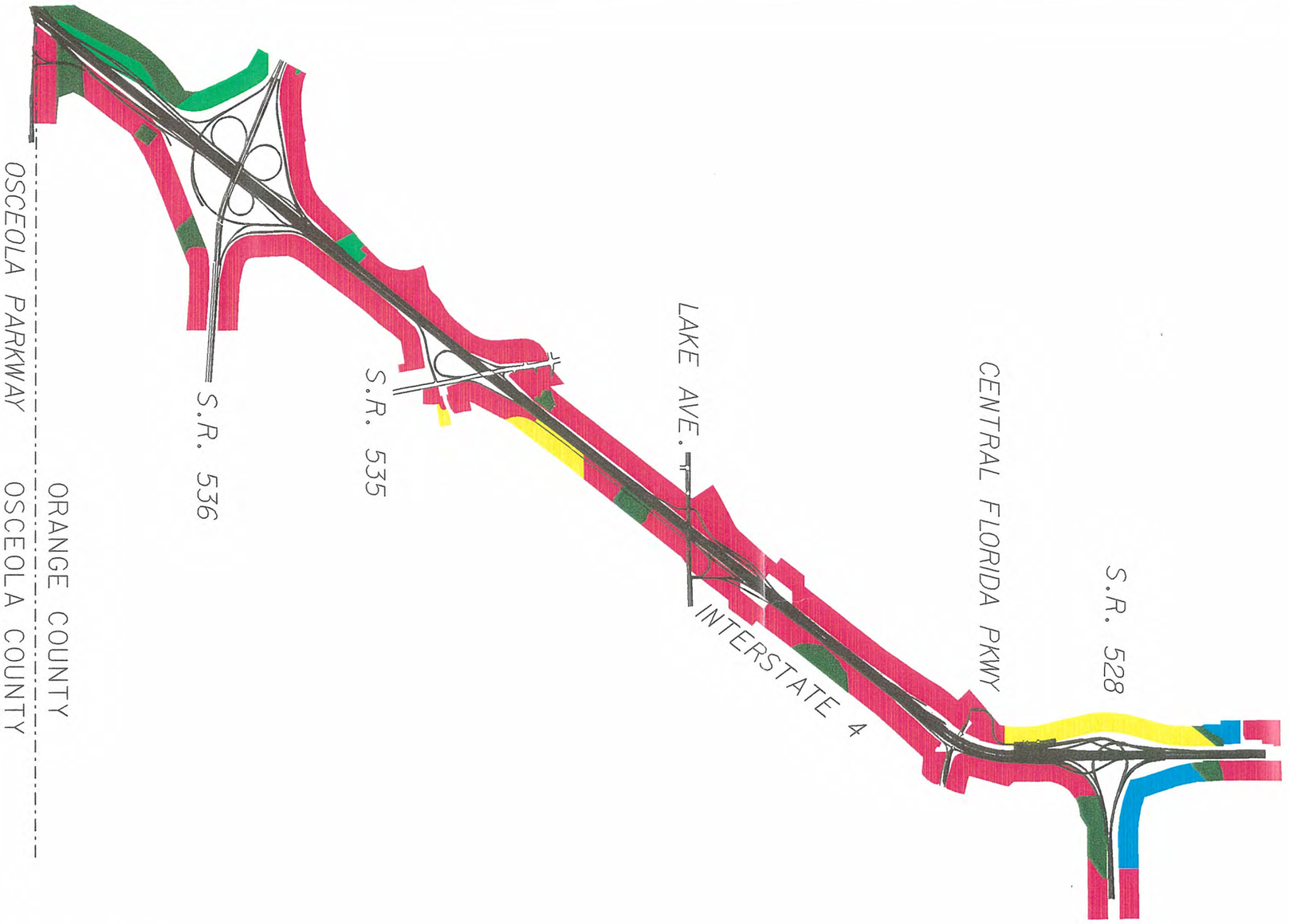
GENERALIZED EXISTING LAND USE

EXHIBIT 4-6

I-4 P.D. & E.

FUTURE LAND USE





LEGEND

- RURAL/AGRICULTURAL
- CONSERVATION/WETLANDS/WATER BODY
- COMMERCIAL/ACTIVITY CENTER/MIXED USE
- INSTITUTIONAL
- RESIDENTIAL

EXHIBIT 4-6 Continued

I-4 P.D. & E.
FUTURE LAND USE

Between the Osceola/Orange County line and S.R. 536, land west of the I-4/S.R. 536 interchange is undeveloped, agriculture or conservation. East of the I-4/S.R. 536 interchange, existing uses include recreation/entertainment (Marriott Orlando World Center golf course), commercial/office (Team Disney), and hotel (Homewood Suites Condominiums and Hampton Inn).

The area from S.R. 536 to S.R. 535 and around the I-4/S.R. 535 interchange is heavily developed with commercial, hotel, and residential uses. North of I-4 are the Disney Casting Center, SunTrust Bank, Hilton, Marriott Courtyard, Hotel Royal Plaza, Doubletree Suites, Chevron gas station, Days Inn, Waffle House, Giftland and the Crossroads Shopping Complex. South of I-4 are Lake Vista Village, Vistana Resort (condos and offices), Vista Way Apartments, Shell gas station, Wendy's, 7 Eleven, Holiday Inn Sunspree Resort, Lone Star restaurant, Landry Seafood restaurant and Plantation Park (condos).

Between S.R. 535 and the Central Florida Parkway, development is sporadic. South of I-4 consists of undeveloped land and agricultural uses and one institutional use (Mary Queen of the Universe Shrine). With the exception of one recreation/entertainment use (Pirate's Cove Mini-Golf) and hotel uses (Comfort Inn and Embassy Suites) between S.R. 535 and Lake Avenue, land north of I-4 is also primarily undeveloped or agriculture.
The area from the Central Florida Parkway to the BeeLine Expressway is heavily developed with residential (an RV Park and Monterey Lakes Apartments), institutional (Sand Lake Post Office), hotel (Westgate Lakes) and commercial/office uses (Busch Properties Corporate Office and Westwood Center Office Complex).

Major Planned Developments

There are several significant developments located adjacent to the I-4 corridor which are planned or already approved. These developments are either classified as Planned Developments (PD) or DRIs, and range in size from 10 acres to over 5,000 acres. A list of major developments located along I-4 is provided in Table 4-11. These developments are also shown in Exhibit 4-7.

While most of these developments have already received approval, only a few have actually started construction. Significant development currently exists within Celebration DRI, Parkway-Park Equus DRI, Marriott World Center DRI, Lake Vista Village PD, and Vistana PD. The level of development already approved in the I-4 corridor indicates that this area will experience tremendous growth in the future. The expansion of I-4 will help support that growth and accommodate these major planned developments.

Table 4-11
DRIs/MAJOR DEVELOPMENTS - DEVELOPMENT PROGRAM

DRI/Development	Location Adjacent to I-4	Size (Acres)	Development Program *											Status: Existing. Under Construction or Approved/Vacant
			Commercial (s.f.)	Hotel (rooms)	Resort Res./ Time Share (units)	Permanent Residential (d.u.)	Office (s.f.)	Business Park (s.f.)	Industrial (s.f.)	Medical Center (beds)	Conference Center (s.f.)	Golf Course (holes)	Theatre (seats)	
Rida/Champions Gate DRI	North	1,212	426,000	4,136	1,636	---	148,104	---	---	---	---	54	---	Approved/Vacant
Magnolia Oaks PD	North	10	114,250	---	---	---	---	---	---	---	---	---	---	Approved/Vacant
Magnolia Creek DRI	North + South	2,130	400,000	1,200	2,064	3,736	500,000	1,200,000	---	---	---	18	---	Approved/Vacant
Celebration DRI	North + South	5,150	2,125,000	810	325	8,065	3,100,000	---	3,560,000	150	---	18	---	Under Construction
Parkway-Park Equus DRI	South	194	144,000	2,018	360	652	---	---	---	---	---	---	1,200	Existing, Some Vacant
Xenorida DRI	South	216	471,077	5,050	---	520	1,250,000	---	---	---	---	---	---	Approved/Vacant
Greene Project DRI	South	865	265,000	6,000	600	1,200	300,000	---	---	---	---	18	---	Approved/Vacant
Bonnet Creek DRI	North	482	50,000	3,000	1,635	---	---	---	---	---	250,000	---	---	Approved/Vacant
Marriot World Center PD	South	206	---	2,003	401	---	---	---	---	---	---	18	---	Existing
Lake Vista Village PD/DRI	North	50	---	1,488	---	---	---	---	---	---	---	---	---	Existing
Vistana PD	South	131	30,805	---	1,034	---	64,485	18,724	---	---	---	---	---	Existing
Little Lake Bryan DRI	South	300	375,000	1,380	---	2,700	---	---	---	---	---	---	---	Under Construction
Lake Bryan DRI	Not Adjacent (South)	163	225,000	2,000	---	---	---	---	---	---	---	---	---	Approved/Vacant
Waterford Commons PD	South	---	399,000	1,245	---	547	72,500	---	---	---	---	---	---	Approved/Vacant
Vineland Pointe PD	South	113	85,600	245	358	440	---	---	---	---	---	---	---	Approved/Vacant
Vista Centre DRI	North	28	---	400	325	---	---	---	---	---	---	---	---	Under Construction
Ruby Lake Ranch PD	North	270	2.5 acres	---	765	97	---	---	---	---	---	---	---	Approved/Vacant
Interstate 4 Plaza DRI	South	72	175,000	1,200	315	---	---	---	---	---	---	---	---	Approved/Vacant
ILH Interchange Center DRI	South	77	130,000	1,600	1,000	---	---	---	---	---	---	---	---	Approved/Vacant

* Abbreviations: s.f. = square foot, d.u. = dwelling unit.

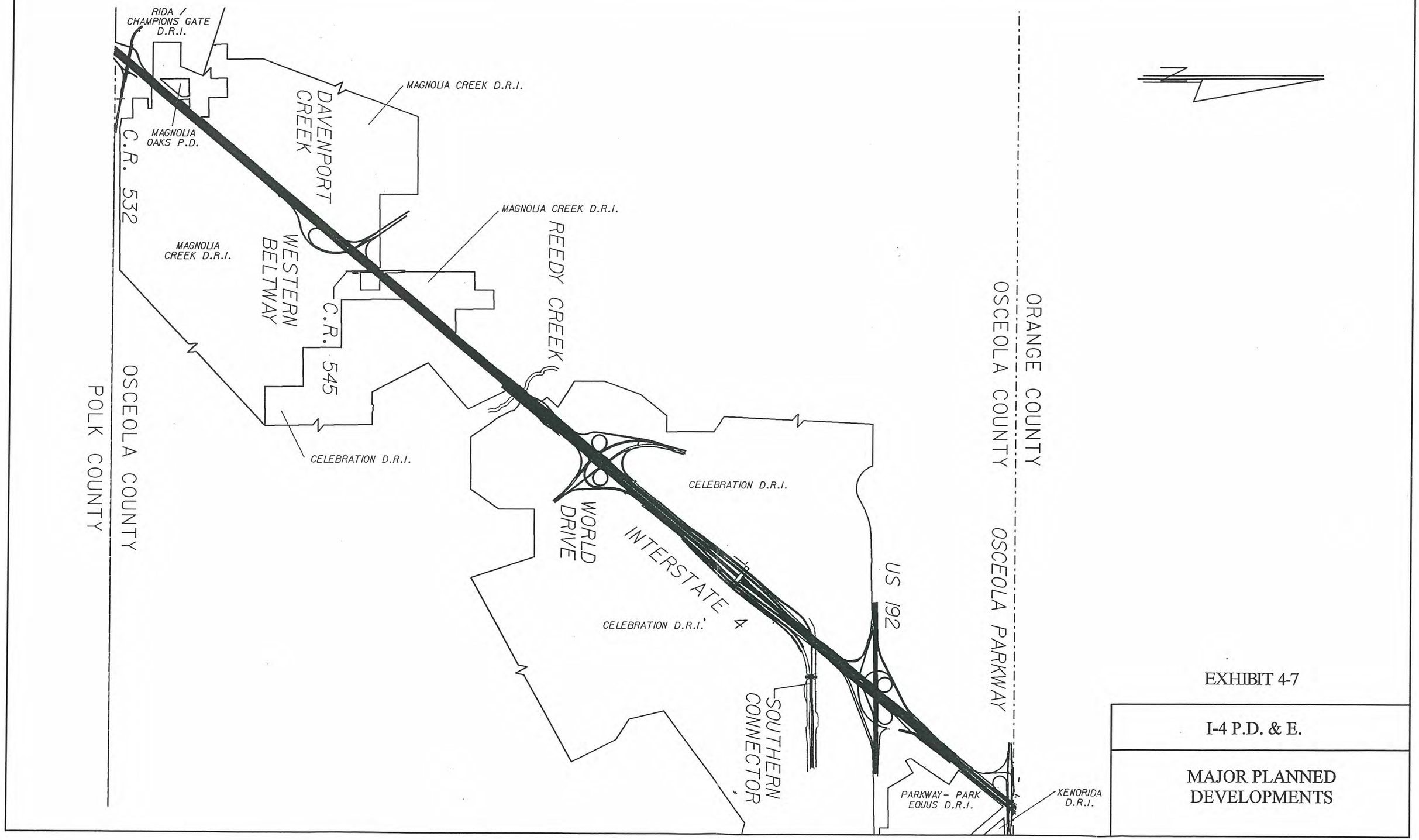


EXHIBIT 4-7

I-4 P.D. & E.

MAJOR PLANNED DEVELOPMENTS

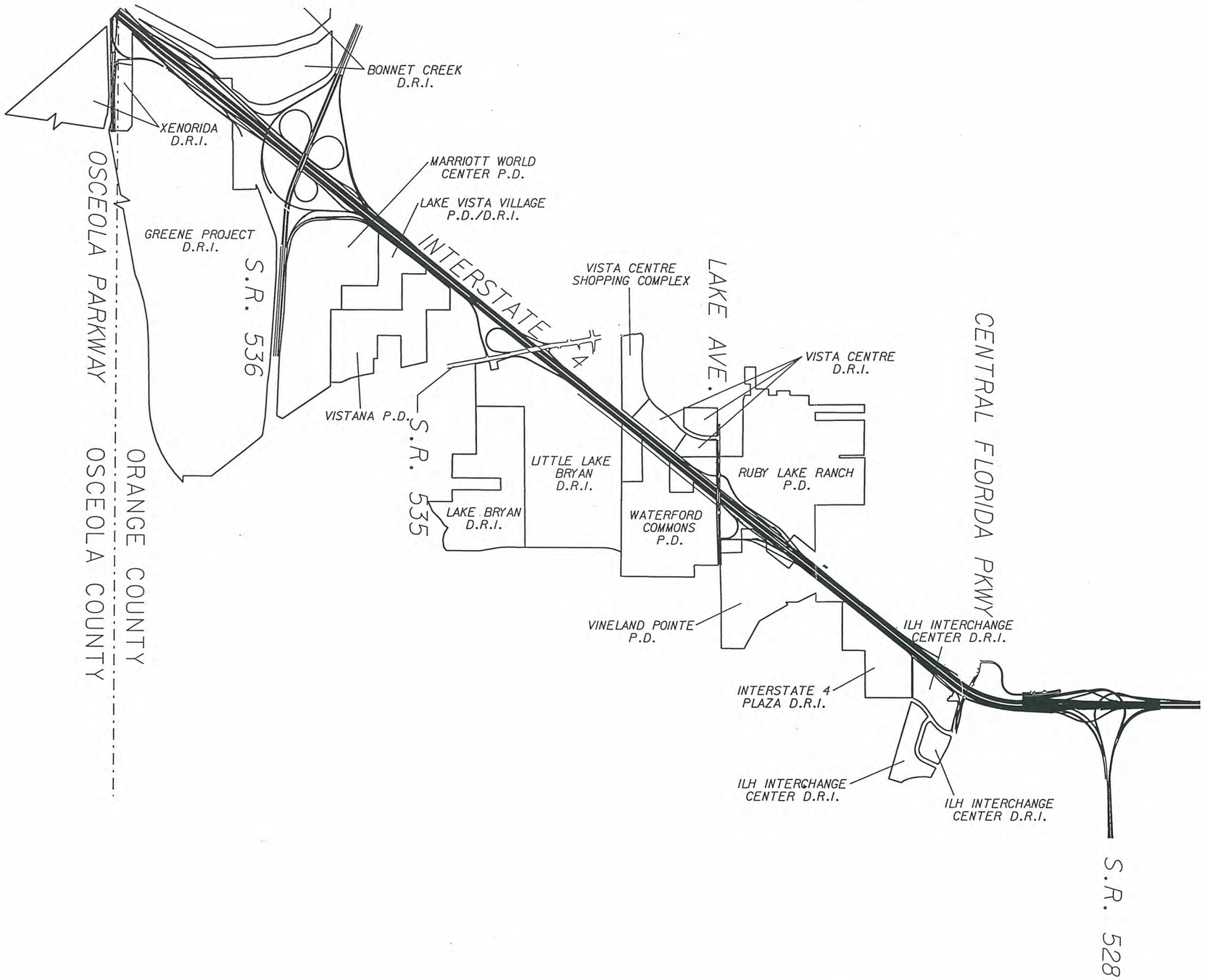


EXHIBIT 4-7 Continued

I-4 P.D. & E.

MAJOR PLANNED DEVELOPMENTS

Future Land Use

While the area from the Polk/Osceola County line to World Drive is currently undeveloped, the planned future land use includes commercial, hotel, recreation/entertainment and residential uses. There are several parcels of land north of I-4 which will remain agricultural and the area around Reedy Creek will retain its conservation designation in the future.

Between World Drive and the Osceola/Orange County line, future land uses include activity centers with a mixture of commercial, office, hotel and recreation/entertainment uses. A large residential area is planned south of I-4 near the Southern Connector.

The area north of I-4 from the Osceola/Orange County line to S.R. 536 will retain its agricultural and conservation uses in the future. South of I-4 will continue to be developed as activity centers with hotel and commercial uses.

From S.R. 536 to the BeeLine Expressway, activity centers with a mixture of uses are planned for the entire corridor, including a small residential area east of S.R. 535 and some conservation uses around Bonnett Creek west of the Central Florida Parkway. There is also a significant residential area planned north of the I-4/BeeLine Expressway interchange.

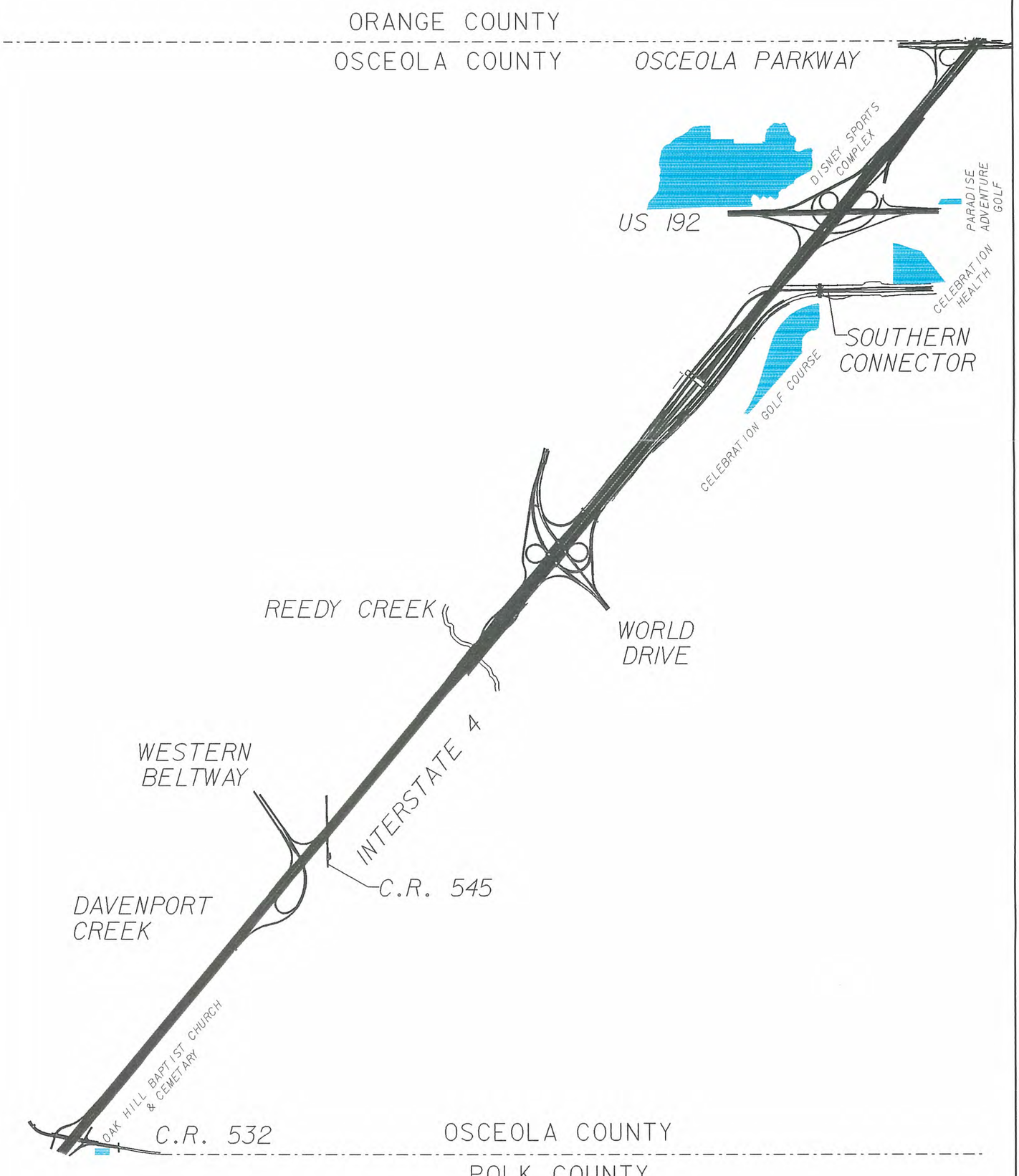
It is clear from the map depicting future land use that the I-4 corridor is planned for intense development consisting of commercial, hotel, office, entertainment/recreation and some residential. This represents an intensification of the types of uses which already exist along I-4.

4.3.2 Cultural Features and Community Services

Community Services

Community services are those public and private facilities which serve the needs of surrounding areas, provide services to the community at large, and provide a sense of community for the area's residents. These facilities, shown on Exhibit 4-8, include schools, recreation areas, churches, social service agencies, medical facilities, community centers, and police and fire protection. Community services within Section 1 of the I-4 corridor were identified through existing data review, contact with the various public agencies in the corridor, as well as several field reviews along the corridor.

Recreation areas located within the I-4 corridor include Celebration Golf Course, the Disney Sports Complex, Paradise Adventure Golf, Typhoon Lagoon, the Marriott World Center Golf Course, and Pirate's Cove Mini-Golf.


ORANGE COUNTY
OSCEOLA COUNTY
OSCEOLA PARKWAY
DISNEY SPORTS COMPLEX
PARADISE ADVENTURE GOLF
US 192
CELEBRATION HEALTH
SOUTHERN CONNECTOR
CELEBRATION GOLF COURSE
REEDY CREEK
WORLD DRIVE
WESTERN BELTWAY
INTERSTATE 4
C.R. 545
DAVENPORT CREEK
OAK HILL BAPTIST CHURCH & CEMETARY
C.R. 532
OSCEOLA COUNTY
POLK COUNTY

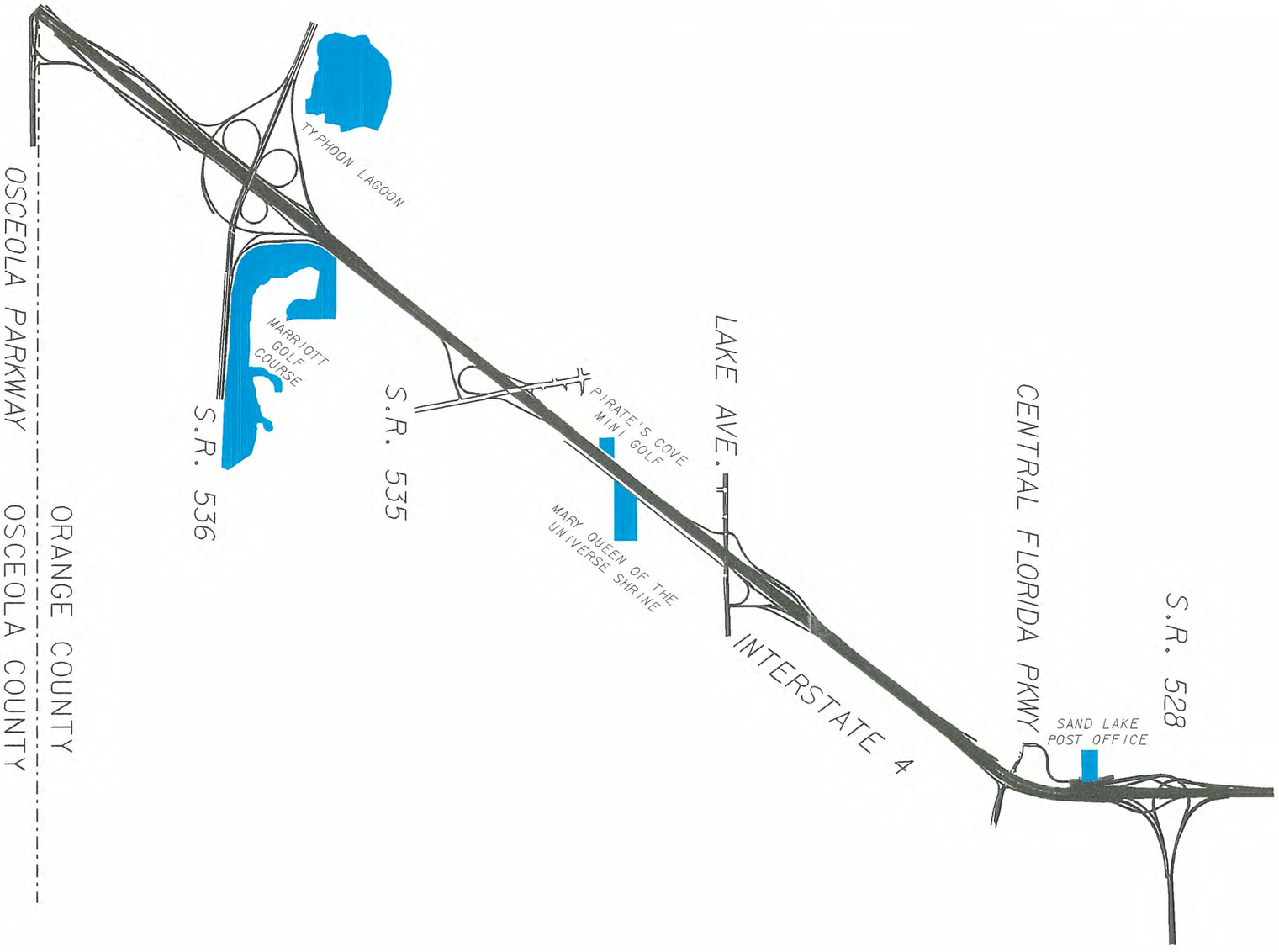


EXHIBIT 4-8 Continued

I-4 P.D. & E.
COMMUNITY SERVICES

Churches in the study area include Oakhill Baptist Church and Cemetery, and Mary Queen of the Universe Shrine.

The only medical facility located in the I-4 corridor is the Celebration Health Center.

There are no existing or planned school sites, social service agencies, community centers, or police and fire protection facilities located in the study area.

Other community services within the I-4 corridor include two major intermodal transfer facilities - the Orlando International Airport and the Kissimmee Amtrak Station. Although both of these facilities are located several kilometers (miles) from the I-4 corridor, they are mentioned here because they both have large service areas.

Additionally, the Florida Overland Express (FOX) high speed rail line is proposing a terminal along International Drive.

The Sand Lake Branch Post Office is located within 150 m (500 ft.) of I-4 in the northern part of segment one. A small water treatment facility is located next to the Hyatt Hotel off of Parkway Boulevard.

As an existing roadway corridor, improvements to Interstate 4 are not expected to create any disruption to those properties located more than 150 m (500 ft.) from the corridor.

4.3.3 Natural and Biological Features

Existing natural and biological features were evaluated along the I-4 corridor. Characterization of the location, extent and condition of features such as floodplains, wetlands, wildlife habitats and protected species is essential to accurately determine and provide adequate compensation for project impacts. The study area consists of a corridor extending 360 m (1200 ft.) from either side of the centerline of the existing I-4 roadway. The total corridor width is 720 m (2400 ft.) and includes all natural features lying wholly or partially within this area. At major interchange locations, corridor width varies, but generally extends 300 m (1000 ft.) outward from the edge of pavement.

Wetlands

A total of 210 wetlands, representing a variety of community types, are present along the corridor through Osceola and Orange counties. These range from extensive and semi-pristine areas, such as Reedy and Davenport Creeks and isolated cypress domes, to highly disturbed sites such as utility easements and ditches. Forested wetlands comprise the majority of the wetlands along the corridor, with non-forested and open water wetlands being approximately equally represented, as shown in Table 4-12. Forested wetlands within the project limits comprise five community types, primarily composed of cypress, hardwood and mixed forest swamps with bay and pond pine swamps represented to a

lesser extent. The non-forested wetlands are classified into habitat categories including waterways, inland ponds, shrub marshes, emergent marshes and wet prairies. No Outstanding Florida Waters or Aquatic Preserves are located within the project vicinity.

Table 4-12
FORESTED, NON-FORESTED, AND OPEN WATER WETLANDS

Forested		Non-Forested		Open Water	
Hardwood Swamp	36	Emergent Marshes	31	Drainage Ponds	38
Cypress Swamp	25	Shrub Marshes	29	Natural Waterways	9
Mixed Forested Swamp	18	Wet Prairies	5	Borrow Pits	7
Bay Swamp	3			Golf Course Ponds	4
Pond Pine Swamp	2			Canals	3
Total	**84**	**Total**	**65**	**Total**	**61**

Wetland quality and functional values were assessed using the U.S. Army Corps of Engineers Wetland Evaluation Technique, version 2.1 (WET 2.1). Using this procedure, one or more wetlands representative of each classification were selected for analysis. Functions such as importance to wildlife, capacity for flood storage, removal of nutrients, sediment stabilization and value in human recreation rate as low, moderate or high.

Three natural stream ecosystems are present along the project corridor. Reedy and Davenport Creeks are the most extensive swamp systems. Both are currently crossed by I-4 via bridges and box culverts. The Davenport Creek system is the last remaining linkage between the Green Swamp and Reedy Creek/Kissimmee River. Reedy Creek, being part of an extensive drainage basin and associated with a large cypress swamp, has been placed into conservation by the Celebration DRI. Specifically, riparian habitat 150 m (500 ft.) on either side of the stream centerline has been designated. Both of these systems rate high in such wetland functions as flood flow alteration and sediment stabilization as well as importance to wildlife functions (i.e., breeding, migration, wintering). The third stream system, Bonnet Creek, drains Bay Lake and Cypress Creek and lands within the Reedy Creek Drainage Basin. This waterway is presently channelized and contains water control structures both upstream and downstream of the existing I-4 crossing. Little Lake Bryan, Lake Willis, and Big Sand Lake are the natural lakes occurring along the corridor. These range in size from less than 4 ha (10 ac.) in area to over 40 ha (100 ac.). Uplands around these waterbodies are partially developed either by I-4 or residential and light commercial activities. Recreation values for these lakes rate high compared to other wetlands within the study area as human uses of these areas include swimming, fishing/boating and nature appreciation. Many of the remaining non-

forested wetland communities are the result of anthropogenic activities, such as drainage ponds, borrow pits, roadside ditches and utility easements. While these systems do not generally rate high for wildlife or recreation values, other functions are important. For example, these altered and man-made wetlands provide important flood storage during storm events and help filter particulates from runoff. Mapping showing the wetland boundaries are shown in the conceptual plans in the appendix and in the Wetland Evaluation Report.

Protected Species

Twenty-three threatened and endangered species and thirteen species of special concern have been determined to occur in Osceola and Orange counties and are considered to potentially occur along the project corridor. Coordination with state and federal agencies and site surveys have identified specific localities for the protected species within the designated I-4 corridor, as provided in Table 4-13.

Table 4-13
PROTECTED SPECIES

Scientific Name	Common Name	State Status	Federal Status
Alligator mississippiensis	American alligator	S	T
Drymarchon corais	Eastern indigo snake	T	T
Egretta caerulea	Little blue heron	S	
Egretta tricolor	Tricolored heron	S	
Gopherus polyphemus	Gopher tortoise	S	
Lechea cernua	Scrub pinweed	T	
Lupinus aridorum	Scrub lupine	E	E
Nolina brittoniana	Britton's bear grass	E	E
Sceloporus woodi	Florida scrub lizard	*	

Note: T=threatened, E=endangered, S=species of special concern, *=not officially listed, but populations are monitored.

Certain habitats are essential to specific wildlife species because of location, quality or limited availability. Those habitat areas which have been designated by USFWS to be 'critical to the survival' of an endangered species have been designated as *critical habitat.* None of the habitats along the current project have been designated as critical habitat.

However, several habitat types are important to wildlife, particularly protected species. For example, wetlands provide foraging habitat and cover for wading birds and habitat for American alligators. No wading bird rookeries are documented within the project corridor, with the two closest localities (OSCE001001 and OSCE001011) being over a mile southeast of I-4 within Reedy Creek.

Scrub habitats important to several listed species are numerous along the corridor. Six scrub communities are present along the proposed I-4 expansion corridor, including oak scrub, sand pine scrub and scrubby flatwoods. All scrub areas within the proposed project corridor are geographically located on Florida's central ridge system. The scrub communities support animal and plant species adapted to xeric conditions. Under normal ecological conditions, the areas support a low density pine tree canopy with a sub-canopy of woody shrub species. The ground cover is typically dominated by both woody and herbaceous species that require high sun exposure. Although ground cover can achieve 100% areal cover, large areas of nonvegetated sand frequently occur. The soils are extremely well-drained, siliceous sand that contain little to no silt, clay or organic material, resulting in very low nutrient substrata. The quality of scrub communities along the proposed corridor have been affected by development, resulting in the fragmentation and/or isolation of several scrub communities. Beyond development impacts, canopy closure resulting from the lack of a natural fire regime reduces habitat quality for many plant and wildlife species. For example, canopy closure reduces sunlight on the forest floor, creating a microclimate in which many herbaceous species cannot persist. As most protected plant species that occur in scrub are herbaceous, maintenance of groundcover diversity is important. Although protected Florida mice (*Podomys floridanus*) were not observed during the site evaluations, potential habitat was identified in all of the scrub areas along this project.

Additionally, several red-cockaded woodpecker (*Picoides borealis*) colonies and appropriate habitat, three Florida scrub jay (*Aphelocoma coerulescens*) colonies, a gopher frog (*Rana capito*) population and three bald eagle (*Haliaeetus leucocephalus*) nests have been documented to occur adjacent to the project site, but all of these are at least one mile from the existing roadway. Three populations of sand skinks (*Neoseps reynoldsi*) are also present near the corridor, with the closest locality being approximately a half mile away.

Floodplains

The extent of floodplains was estimated based on 100-year flood elevations on Flood Insurance Rate Maps (FIRM) published by the Federal Emergency Management Agency (FEMA). It should be noted that part of the project area encompassing a significant portion of the Reedy Creek Swamp is independently insured and therefore not included in the FEMA flood area mapping. Surface waters within this area are managed by the Reedy Creek Improvement District and flood zone determinations are not available. Along the project corridor, approximately 233 ha (576 ac.) lie within the FEMA 100-year floodplain. Floodplain limits have been shown on the conceptual plans contained in the appendix and in the Location Hydraulics Report.

5.0 DESIGN CONTROLS AND STANDARDS

The design criteria for this PD&E study has been established in metric values. These criteria, whenever possible, are based on design parameters outlined in the metric editions of the following publications:

- Roadway and Traffic Design Standards (FDOT, 1996)
- Roadway Plans Preparation Manual (FDOT, 1998)
- A Policy on Geometric Design of Highways and Streets (American Association of State Highway and Transportation Officials, AASHTO, 1994)

In addition, editions of the following non-metric publications were used to supplement the design criteria where needed:

- Manual of Uniform Minimum Standards for Design, Construction and Maintenance of Streets and Highways (FDOT, 1994)
- Manual on Uniform Traffic Control Devices (MUTCD) (FHWA, Washington, D.C., 1988)
- Roadside Design Guide (AASHTO, 1989)
- FDOT Drainage Manual Vol. 1 Standards (FDOT, 1992)
- Drainage Handbook Cross Drains (FDOT, 1996)
- Structures Design Guidelines (FDOT, 1994-1996)
- Structures Detailing Manual (FDOT, 1994-1996)

Tables 5-1 and 5-2 present the drainage and roadway design criteria, respectively, used in the development of the alternatives for this project. The listed criteria has been reviewed and accepted by FDOT District Five.

Table 5-1
DRAINAGE DESIGN CRITERIA

This project lies within Osceola and Orange Counties from C.R. 532 to the BeeLine Expressway (S.R. 528). The South Florida Water Management District (SFWMD) claims jurisdiction over this entire project. Portions of the project are also within the Reedy Creek Improvement District (RCID). This is a metric project; all computations will be performed in English units and converted to metric units.

The following criteria were collected from the applicable portions of the following manuals and conversations with agency staff:

1. FDOT — Drainage Manual Standards (Volume I - 1992)
   Drainage Manual General Ref. Documents (Vols. 1, 2 & 3-1987)

2. SFWMD — Management and Storage of Surface Waters Permit Information Manual Volume IV (3/94)

I. CULVERT DESIGN

A. All cross drains shall be designed to have sufficient hydraulic capacity to convey the 50 year (design frequency) storm. All culverts shall be analyzed for the base flood (100 year) and the greatest flood (500 year or over-topping flood).

B. Backwater shall not significantly change land use values unless flood rights are purchased.

C. The headwater for design frequency conditions shall be kept at or below the travel lanes in compliance with the FDOT Drainage Manual.

D. The highest tailwater elevation which can be reasonably expected to occur coincident with the design storm event shall be used.

E. The minimum culvert size is 450 mm (18 in.) reinforced concrete pipe (RCP).

F. The design of all cross culverts shall comply with the guidelines set forth in Section 4.12 Design Procedures of the FDOT Drainage Manual.

II. STORMWATER MANAGEMENT CRITERIA

This project will be governed under three major regulatory entities (FDOT, SFWMD & RCID). The stormwater management criteria in this section is separated to identify requirements of each agency.

Table 5-1 Continued

A. FDOT Criteria:

Critical Duration Analysis, which analyzes the project under various duration storm events (for a given frequency) to determine which duration is the critical (generates the largest peak rate and/or volume). See the FDOT Drainage Manual.

Total Rainfall (inches)

Duration	Frequency (year)					
	2	5	10	25	50	100
1	2.42	2.92	3.25	3.73	4.10	4.50
2	2.90	3.55	4.00	4.62	5.10	5.50
4	3.28	4.00	4.68	5.40	6.00	6.60
8	3.84	4.80	5.60	6.40	7.20	8.00
24	4.80	6.24	7.44	8.60	9.84	10.56
72	5.90	7.50	8.70	10.50	12.10	13.90
168	7.60	9.50	11.30	13.30	15.00	16.90
240	8.30	11.00	13.00	15.00	16.80	18.80

B. South Florida Water Management District (SFWMD) Criteria

1. Quantity: Attenuate the difference between the pre and post development discharge for the 25 year/24 hour Orange County storm event in Orange County, and the 10 year/3 day Osceola County event in Osceola County. These storm events are preferred by the District over the SFWMD 25 year/3 day storm event (P=11.69 in./or approximately 292 mm) as specified in the permit manual.

2. Quality:
   - Wet detention shall be provided for the first inch of runoff from the developed project drainage area, or 63 mm (2.5 in.) of runoff over the additional impervious area, whichever is greater.
   - Dry detention volume shall be provided equal to 75 percent of the above amount computed for wet detention.
   - Retention volume shall be provided equal to 50 percent of the above amount computed for wet detention.
   - Existing untreated impervious areas may be treated to compensate for new untreated impervious areas which cannot be treated due to elevation or other constraints. These areas are site specific and must be pre-approved by the SFWMD.

Table 5-1 Continued

3. All wet detention facilities shall have a minimum area, at the control elevation, equal to 0.2 ha (0.5 ac.) with a minimum width of 30.5 m (100 ft.).

4. The drawdown devise in wet detention ponds shall recover no more than 12 mm (½ in.) of the treatment volume in 24 hours. Full pond recovery should occur within 14 days.

C. Reedy Creek Improvement District (RCID)

1. Comply with SFWMD criteria.

2. Perform a pre/post analysis utilizing the 50 year/3 day storm event (P=12.91 in./or approximately 323 mm) with the SFWMD rainfall distribution. If the post discharge rate is greater than 0.95 cubic meters per second per square kilometer (13 cubic feet per second per square mile, CSM), then there will be a drainage fee based on the excess runoff and the project area.

D. General Pond Configuration

1. Ponds shall include a 6 m (4.5 m minimum) maintenance berm at a maximum of 1:8 slope. The berm shall be sodded.
2. Corners of the ponds shall be rounded to provide a minimum 6 m (20 ft.) turning radius for maintenance vehicles.
3. 0.3 m (1 ft.) of freeboard is required above the anticipated maximum water elevation.
4. When pond areas are not accessible directly from the road right-of-way, an access easement shall be provided.
5. Wet detention facilities shall provide all of the above requirements as well as the following:
   - Treatment volume shall be no greater than 450 mm (18 in.) in depth.
   - The side slopes shall be 1:4 or flatter to a point 0.6 m (2 ft.) below the control elevation then no steeper than 1:2.

III. DISPLACED 100 YEAR FLOODPLAIN STORAGE VOLUME

The volume of 100 year floodplain storage displaced by the improvements must be replaced at a compensation ratio of 1:1.

Table 5-2
ROADWAY DESIGN CRITERIA

Design Element	Design Criteria	Sources *
A. General		
Functional Classification	Interstate	
Access Classification	Class 1	FDOT Administrative Rule 14-97
Design Vehicle	WB 18	FDOT
Design Year	2020	FDOT Design Traffic Report
Design Speed - Mainline (I-4) - Diamond Ramp - Loop Ramp - Collector-Distributor (CD) Road	 110km/h 80km/h 50km/h 90km/h	FDOT Direction in I-4 Multi-Modal Master Plan (MMMP) for mainline and ramps AASHTO page 607 for CD Road
B. Typical Section		
Lane Widths - Mainline (I-4) - HOV (high occupancy vehicle) - Auxiliary - One Lane Ramp - Two Lane Ramp	 3.6m 3.6m 3.6m 4.5m (See AASHTO Table X-3 7.2m for widening on curves)	FDOT Metric Roadway Plans Preparation Manual (PPM), Tables 2.1.1, 2.1.2 & 2.1.3 AASHTO Table X-3, page 935
Total Shoulder Widths[1] - Buffer Section General Use HOV - Barrier Section General Use HOV - Single Lane Ramp - Multi Lane Ramp	 Left - 1.2m, Right - 3.6m Left - 4.2m, Right - 1.2m Left - 3.6m, Right - 3.6m Left - 3.0m, Right - 3.6m Left - 1.8m, Right - 1.8m Left - 2.4m, Right - 3.6m	FDOT Metric Roadway Plans Preparation Manual, Table 2.3.1 I-4 Standards
Median Width (I-4)[2] - Buffer - Barrier	 21.8 [13.4+4.2+4.2] 19.4 [13.4+3+3]	FDOT Direction in I-4 MMMP
Typical Roadway Cross Section Slopes - Roadways - Inside Shoulder - Outside Shoulder	 0.02m/m to 0.03m/m 0.05m/m 0.06m/m	FDOT Metric Roadway Plans Preparation Manual, Figure 2.1.1, 2.3.1
Maximum Lane "Roll-Over" Between Through Lanes Between Through & Ramp	 4% 4% to 6%, 5% desirable	AASHTO, Page 738 FDOT Metric Roadway Plans Preparation Manual, Figure 2.1.1
Maximum Shoulder "Roll-Over"	 7%	FDOT Roadway and Traffic Design Standard Index No. 510
Roadside Border	25m	FDOT Metric Roadway Plans Preparation Manual, Table 2.5.1

Table 5-2 Continued

Design Element	Design Criteria	Sources *
Clear Zone (minimum from edge of travel way)[3] - Mainline (I-4) - One Lane Ramp - Multi Lane Ramp	 11m 3.0m minimum (loop) 4.2m minimum (diamond) 7.2m minimum (design speed dependent)	FDOT Metric Roadway Plans Preparation Manual, Table 2.12.1
Roadside Slopes All Roadways Fill over 6 meters	Per Table 2.4.1 Maintenance berm at mid-height (3 meters wide at 1:10 slope)	FDOT Metric Roadway Plans Preparation Manual, Table 2.4.1 FDOT Design Memorandum
C. Horizontal		
Maximum Deflection without a curve	0°45'00"	FDOT Metric Roadway Plans Preparation Manual, Table 2.8.1
Minimum Radius - Mainline (I-4) - Diamond Ramp - Loop Ramp	 585m (110km/h) 210m (80km/h) 75m (50km/h)	FDOT Metric Roadway Plans Preparation Manual, Table 2.8.3
Minimum Sight Distance Mainline (I-4) - Stopping (<2%Grade) - Stopping (>2%Grade) - Decision	 225m See Table 2.7.1 335m to 390m	FDOT Metric Roadway Plans Preparation Manual, Table 2.7.1 AASHTO, Table III-3, page 127
Superelevation Transition - Tangent - Curve Maximum Superelevation - Mainline (I-4) and ramps	 80% 20% 0.10m/m	FDOT Roadway and Traffic Design Standard Index No. 510 FDOT Metric Roadway Plans Preparation Manual, Table 2.9.1
Entrance Ramp Types - Single lane - Dual lane Exit Ramp Types - Single lane - Dual lane	 Parallel Type (per Index 525) Parallel Type (per Index 525) Taper[4] (per Index 525) Taper[4] (per Index 525)	FDOT Direction in I-4 MMMP
Entrance Ramp Lengths - Parallel Type Exit Ramp Lengths - Taper Type	 Per Index 525 Per Index 525	AASHTO, Table X-4, Page 945 FDOT Roadway and Traffic Design Standard Index No. 525 AASHTO, Table X-6, Page 949 FDOT Roadway and Traffic Design Standard Index No. 525

Table 5-2 Continued

Design Element	Design Criteria	Sources *
Lane Drop Taper - Mainline (I-4)	50:1 min; 70:1 desirable	AASHTO, page 909
Minimum Spacing for Mainline Ramp Terminals - Entrance to Exit - Exit to Entrance - Entrance to Entrance - Exit to Exit (See Figure X-72 for CD Roads)	600m 150m 300m 300m	AASHTO, Figure X-72, Page 943.
D. Vertical		
Maximum Profile Grade - Mainline (I-4) - Ramps - All others	3% 3% to 7% (speed dependent, see Table 2.6.1) 3% to 9% (speed dependent, see Table 2.6.1)	FDOT Metric Roadway Plans Preparation Manual, Table 2.6.1
Maximum Change in Grade without a Vertical Curve - Mainline (I-4) - Ramps - All others	0.20% (110km/h) 1.00% to 0.60% (50-80km/h) 1.00% to 0.60% (50-80km/h)	FDOT Metric Roadway Plans Preparation Manual, Table 2.6.2
Minimum Crest Vertical Curve - Mainline (I-4) - Service Interchanges - Diamond Ramp - Loop Ramp - All others	K=125 (110km/h) L=300m minimum, (550m within interchanges) K=48 (80km/h) K=9 (50km/h) Speed dependent, see Table 2.8.5	FDOT Metric Roadway Plans Preparation Manual, Table 2.8.5
Minimum Sag Vertical Curve - Mainline (I-4) - Service Interchanges - Diamond Ramp - Loop Ramp - All others	K=52 (110km/h) L=244m minimum desirable K=30 (80km/h) K=12 (50km/h) Speed dependent, see Table 2.8.6	FDOT Metric Roadway Plans Preparation Manual, Table 2.8.6

Table 5-2 Continued

Design Element	Design Criteria	Sources *
Base Clearances - Mainline - Ramps - Low point on ramps at cross roads	 0.9m 0.6m 0.3m	 FDOT Metric Roadway Plans Preparation Manual, Table 2.6.3
Minimum Vertical Clearance - Bridges of I-4 - Overhead Signs	 5.05m (16ft. 6in.) 5.35m (17ft. 6in.)	FDOT Metric Roadway Plans Preparation Manual, Table 2.10.2
E. Traffic Control		
Traffic Control Plan - Speed - Lane Widths	 Existing posted speed (desirable) Existing posted speed minus 10 mph (minimum) 3.6m desirable, 3.3m minimum (with one 3.6m lane on interstates)	 FDOT Metric Roadway Plans Preparation Manual, Section 10.15 FDOT Metric Roadway Plans Preparation Manual, Section 10.14.6
F. Structures		
Bridge Criteria	Per Structures Design Guidelines	FDOT

* The date of each source used is given on page 5-1.

[1] Refers to type of lane separation treatment between high occupancy vehicle (HOV) and general use lanes.

[2] Inside edge of travel lane to inside edge of travel lane with rail. Includes 13.4 m (44 ft.) rail envelope (outside wall to outside wall) plus shoulders.

[3] Applies to recovery slopes and fixed objects on tangent sections; does not apply to frangible base structures or extended clear zone in curves.

[4] Parallel where vertical and horizontal geometry control.

6.0 TRAFFIC

A data collection effort was undertaken as part of the I-4 Multi-Modal Master Plan (MMMP) study to assess existing (1994) traffic conditions along I-4. The I-4 MMMP Technical Memorandum Traffic Report, prepared in 1996, documents existing traffic conditions of the full 119 km (74 mi.) I-4 corridor in District Five. That report also contains information on existing and future traffic parameters, the modeling process associated with developing future traffic volume projections, the refinement of traffic volume projections for both Build and No-Build conditions, and associated level of service (LOS) analysis.

This PD&E study provides an updated analysis of existing (1996) conditions, which is discussed in Sections 6.1 and 6.4. The I-4 MMMP Traffic Report established the appropriate traffic factors used to develop design hour volumes and traffic analysis factors used in the LOS analyses. These factors are used in this study and are described in Section 6.3. The I-4 MMMP also included a separate technical memorandum on an external origin-destination survey, which provided more information on existing travel characteristics.

This PD&E study supplements the information provided in the I-4 MMMP Traffic Report, due to the changes in typical sections and modified high occupancy vehicle (HOV) treatments and access points. Estimates of future traffic volumes were developed and approved during the master planning process. Those traffic volume estimates are applicable to this study and have been reassigned to reflect changes in typical section, HOV treatments, and HOV access points. The details of this reassignment process is described in Section 6.5.

6.1 Existing Traffic Conditions

The primary purpose of collecting existing traffic data and traffic characteristics is to provide a benchmark for comparison to projected future conditions. Existing data also provide a basis for identification of existing problems which become priority areas for improvement in the future.

Table 6-1 shows existing (1996) and historical Annual Average Daily Traffic (AADT) volumes on I-4 and the crossroads which provide access to I-4. AADT volumes for years 1989 through 1994 are from the I-4 MMMP Traffic Report. The 1996 AADTs were provided by the Florida Department of Transportation (FDOT).

Table 6-1 shows that traffic along I-4 has been growing at nearly 6 percent per year. This growth rate is fairly consistent throughout Section 1. The 1996 volumes along I-4 are significantly greater than the 1994 volumes, which were used in the previous existing conditions analysis in the I-4 MMMP. The second part of Table 6-1 shows existing and historical AADTs for U.S. 192, S.R. 536, S.R. 535, and the BeeLine Expressway

Table 6-1

HISTORICAL TRAFFIC VOLUMES

Location	Year	Eastbound AADT	Westbound AADT	Total Two-Way AADT	Growth Rate *
I-4 Southwest of U.S. 192 (S.R. 530)	1989	24,209	24,797	49,006	
	1990	28,127	28,041	56,168	
	1991	26,600	25,200	51,800	
	1992	26,500	26,500	53,000	
	1993	27,000	27,500	54,500	
	1994	29,600	27,000	56,600	
	1996	35,400	34,200	69,600	4.66%
I-4 Northeast of U.S. 192 (S.R. 530)	1989	30,346	31,875	62,221	
	1990	34,133	32,624	66,757	
	1991	33,800	33,100	66,900	
	1992	33,000	34,000	67,000	
	1993	38,000	37,500	75,500	
	1994	47,000	44,500	91,500	
	1996	50,300	50,500	100,800	9.85%
I-4 Northeast of S.R. 536	1989	43,828	43,090	86,918	
	1990	46,302	45,234	91,536	
	1991	46,000	45,000	91,000	
	1992	45,000	44,000	89,000	
	1993	48,000	47,000	95,000	
	1994	45,500	45,500	91,000	
	1996	60,100	60,300	120,400	4.43%
I-4 Between S.R. 535 and Central Florida Parkway	1989	54,850	58,645	113,495	
	1990	57,931	60,805	118,736	
	1991	52,000	56,000	108,000	
	1992	51,500	55,500	107,000	
	1993	63,500	64,000	127,500	
	1994	68,000	66,500	134,500	
	1996	75,100	75,300	150,400	5.14%
I-4 Northeast of the BeeLine Expressway (S.R. 528)	1989	49,043	48,309	97,352	
	1992	54,800	54,700	109,500	
	1993	55,600	54,600	110,200	
	1994	55,300	55,400	110,700	
	1996	65,100	65,300	130,400	4.48%
** Average I-4 Section 1 Annual Growth Rate =					5.71%

* Growth trends were developed using linear regression. Growth rates were determined from the estimated 1989 and 1996 volumes from regression analysis.

** Arithmetic average of segment growth rates.

Table 6-1 (Continued)

HISTORICAL TRAFFIC VOLUMES

Location	Year	Eastbound AADT	Westbound AADT	Total Two-Way AADT	Growth Rate *
U.S. 192 West of I-4	1989	18,816	17,716	36,532	
	1990	29,209	27,907	57,116	
	1991	31,200	29,600	60,800	
	1992	32,500	31,500	64,000	
	1993	30,500	28,500	59,000	
	1994	25,000	28,500	53,500	
	1996	29,500	29,500	59,000	3.53%
U.S. 192 East of I-4	1989	16,883	16,288	33,171	
	1990	20,001	20,788	40,789	
	1991	24,400	25,100	49,500	
	1992	26,000	26,500	52,500	
	1993	23,500	23,500	47,000	
	1994	23,000	23,500	46,500	
	1996	21,800	21,700	43,500	2.69%
S.R. 536 West of I-4	1990	20,722	22,362	43,084	
	1991	21,000	24,800	45,800	
	1992	29,500	34,000	63,500	
	1993	25,500	29,500	55,000	
	1994	25,500	28,000	53,500	
	1996	23,900	23,900	47,800	1.33%
S.R. 535 Southeast of I-4	1989	---	---	26,984	
	1990	---	---	31,243	
	1991	---	---	29,900	
	1992	---	---	33,500	
	1993	---	---	33,500	
	1994	---	---	34,000	
	1996	23,700	23,700	47,400	9.19%
BeeLine Expressway East of International Drive	1989	26,062	26,408	52,470	
	1990	27,115	27,751	54,866	
	1991	21,900	23,500	45,400	
	1996	28,300	28,500	56,800	1.32%
** Average Section 1 Cross Street Annual Growth Rate =					3.61%

* Growth trends were developed using linear regression. Growth rates were determined from the estimated 1989 and 1996 volumes from regression analysis.

** Arithmetic average of segment growth rates.

(S.R. 528) near I-4. Overall the traffic volumes along these cross streets have been increasing at approximately 3.6 percent per year. Traffic growth along U.S. 192 is relatively consistent with the overall growth rate. However, traffic has been increasing at about 9 percent per year along S.R. 535 southeast of I-4 and about 1 percent per year along the BeeLine Expressway. Daily traffic volumes along S.R. 536 west of I-4 have fluctuated between approximately 45,000 and 60,000.

The existing (1996) AADT volumes along I-4 range from just under 80,000 west of the Southern Connector (S.R. 417) in Osceola County to approximately 150,000 between S.R. 535 and Central Florida Parkway. Traffic volumes decline east of the BeeLine Expressway to approximately 130,000. Table 2-1 of *Florida's Level of Service Standards and Guidelines Manual for Planning*, 1995 edition, (1995 LOS Manual) provides the statewide minimum level of service (LOS) standards for the state highway system. For freeways within urbanized areas over 500,000 population, the minimum acceptable LOS is D. Table E-1 of the 1995 LOS Manual provides Generalized AADT Volumes for Florida's Urbanized Areas. Based on the assumptions used to develop the volumes, the maximum AADT for LOS D and E (capacity) is 100,600 and 126,900, respectively, for a six-lane freeway. Based on these volumes, I-4 is currently operating at LOS E east of U.S. 192 to S.R. 536 and LOS F from S.R. 535 to the BeeLine Expressway. East of the BeeLine Expressway, I-4 currently operates at LOS E. A more detailed approach to existing LOS, based on hourly volumes, is given in section 6.4. A general explanation of the various LOS thresholds is provided in section 6.3.

Existing peak hour traffic characteristics was reviewed in detail in the I-4 MMMP Traffic Report. These travel characteristics were derived from FDOT traffic counts and supplemented with data collected as part of the external origin-destination study. This information is summarized in the following paragraphs.

Existing peak-to-daily ratios on I-4 near the C.R. 545 overpass are approximately 6.6 percent for the AM peak hour and 6.4 percent for the PM peak hour. The directional distribution (D) is 53.9 percent (westbound) during the AM peak hour and 59.2 percent (westbound) during the PM peak hour. FDOT's *Roadway Characteristics Per Operational Feature and Annual Classification Report for 1994* reports an average 30^{th} highest hour factor (K_{30}) of 10.0 percent for Osceola County and 7.89 percent for Orange County. This report also shows the average 30^{th} highest hour directional distribution (D_{30}) to be 56.5 percent in Osceola County and 51.1 percent in Orange County.

Although the I-4 MMMP Traffic Report reviewed the existing peak hour travel characteristics for the full I-4 corridor in District Five, the unique travel characteristics for Section 1 was discussed. Hourly traffic distributions show that the Disney and International Drive resort area have a reasonably even distribution of traffic from 7:00 AM to 7:00 PM, with less pronounced AM and PM peak hours. In areas closer to downtown Orlando and outside of Section 1, hourly traffic patterns display the traditional AM inbound and PM outbound peak hour characteristics. The presence of Walt Disney World, International Drive resort area, and Lockheed Martin (just north of Section 1)

south of downtown tends to offset the pattern such that directional peaks are not as pronounced as they would be in a more central city oriented area.

Existing (1994) daily truck (T) factors for I-4 from FDOT telemetered sites near the project varied from 12.78 percent in Osceola County to 5.30 percent in Orange County. Counts taken in conjunction with the I-4 MMMP external origin and destination study show that peak hour percent of trucks is approximately equal to daily truck percentages.

Limited information was available during the master planning process to determine peak hour factors (PHF). For the full 119 km (74 mi.) I-4 corridor in District Five, the 1992 two-way PHF varied from 0.88 to 0.95. The existing peak-to-daily ratios and K_{30}, D, D_{30}, T, and PHF factors were used in part to determine the appropriate factors used for future conditions analysis.

6.2 Multimodal Transportation Considerations

Much of the information within this section was summarized from the I-4 MMMP Traffic Report, Major Investment Study (MIS), and the Conceptual Engineering Report and updated as necessary.

Existing Transit Service

LYNX is the transit service provider for Osceola and Orange Counties. Currently, the LYNX transit system operates 54 bus routes that link residential areas with major employment sites and activity centers. Connections with other intermodal facilities include four bus routes to the Orlando International Airport. Other commuter services currently provided by LYNX include a computerized matching program for carpools and vanpools.

Three bus routes currently operate on I-4 within the Section 1 study area. Two of these routes provide only peak hour service for employees at Walt Disney World. The other route operates 7 days a week from 6:45 AM to 10:45 PM from downtown Orlando to the Magic Kingdom at Walt Disney World.

Up to the mid-1990s, the Orlando area bus network was radial with downtown as its focus. This type of network provided for rapid movement of people to the Central Business District (CBD), but forced long, indirect trips on those riders not wishing to travel downtown. While the Orlando CBD is still Central Florida's most concentrated employment destination, travel between a number of major non-CBD activity centers has increased significantly and will continue to do so in the foreseeable future. As a result, LYNX has expanded it bus routes to include many crosstown routes. Also, LYNX is in the process of developing a multi-centered transit network which focuses upon downtown Orlando as well as satellite regional transit centers. This network is expected to reduce the number of regional transit trips which require transfers and to facilitate transfers

between transit modes and routes. Some of these regional transit centers are currently in operation, but none of these are located in the Section 1 study area. LYNX is considering a regional transit center in the Walt Disney World area for employees, but not for the general public at this time.

Other transit carriers providing service within the study area include Walt Disney World Transportation, I-Ride, and private transportation services. The Walt Disney World transit service is the largest in Central Florida. A 1989 study recorded more than 70,000 daily trips, and a fleet size of 125 buses with 5 to 15 minute headways. Bus service serve primarily trips from the resorts to the attractions. Monorail service completes the Disney transportation service with more than 159,000 daily guest trips recorded in the 1989 study. This service operates at 3 minute average headways between the Ticket and Transportation Center to the Magic Kingdom.

In the summer of 1994, LYNX in association with business interests, established the I-Ride shuttle service between Wet-n-Wild and Sea World in the International Drive corridor. This service is now owned by a private contractor and utilizes a trolley bus which runs along the International Drive resort area.

Multi-Modal Aspects for I-4 Section 1 Corridor

Multimodal transportation considerations have been addressed extensively in the I-4 MMMP. A component of Tier 2 of the I-4 MMMP was a MIS. One of the purposes of a MIS is to identify whether a transit alternative should be considered as an alternative to meet the transportation need. The I-4 MIS brought together FDOT, the local metropolitan planning organizations (MPOs), the Federal Transit Administration (FTA), and the Federal Highway Administration (FHWA). The product of Tier 2 was a design concept and scope of six general use lanes, two HOV lanes, and light rail transit (LRT) for the majority of the 119 km (74mi.) I-4 corridor. This concept was adopted by the Orlando and Volusia County MPOs. Tier 3 of the I-4 MMMP further refined the design concept of Tier 2 and addressed interchange improvements, HOV access, park-and-ride, buffer/barrier highway separation treatments, and system management strategies.

Multimodal considerations are an integral part of the FDOT Interstate Highway Policy. That policy establishes the maximum number of lanes for interstate highways:

- In rural areas, no more than six lanes can be constructed and
- In urban areas, no more than ten lanes can be constructed.

For urban areas, any expansion beyond the basic six lanes must provide for long distance through trips and/or high occupancy vehicle trips, which includes transit. These additional lanes must be physically separated from the six general use lanes by a barrier or painted buffer. This policy represents a change from the single mode planning of the past by promoting urban interstate highways as multi-modal corridors and optimizing the

movement of people rather than the flow of vehicles. Since this policy served as a guide in the development of the I-4 MMMP, multimodal issues were given major consideration in the master planning efforts.

Future Transit Service

As part of the Regional Systems Plan prepared by LYNX and the FDOT I-4 MIS, LRT service was identified as a needed and cost-effective element of an I-4 corridor improvement strategy. A secondary LRT corridor was identified in the Regional Systems Plan, connecting I-4 to the Orlando International Airport. Also, Orange County has identified the need for rail transit in the International Drive Convention Center District. Alignment studies are currently underway on these projects. Engineering and design for the project in the International Drive area is underway, and the project is expected to be open for service in the year 2001.

The High Speed Rail (HSR) study is being conducted by Florida Overland Express (FOX). This study is conducting an Environmental Impact Statement (EIS) for alignment alternatives between Orlando and Tampa. The I-4 corridor is being considered as an alternative alignment from generally southwest of S.R. 536 to Tampa. This could involve the I-4 median transit envelope from the Polk/Osceola County line to S.R. 536.

The substantial expansion and improvements planned for transit within the metropolitan area will provide additional mobility options. The improvements to I-4 are consistent with those efforts. The addition of HOV lanes to I-4 will help to make a complete and comprehensive system, by promoting ridesharing and transit usage. This I-4 Section 1 PD&E study represents a refinement of the I-4 MMMP recommendations for Section 1, and is consistent with previous efforts with regard to multi-modal transportation issues.

6.3 Traffic Analysis Assumptions

Section 6.1 provided the background for the basis of the existing conditions analysis. The LOS concept is applied as a qualitative measure of the road user's perception of the quality of traffic flow along a roadway. The LOS is represented by one of six levels, "A" through "F", with LOS "A" representing free-flow conditions and LOS "F" representing breakdown conditions. Measures of effectiveness such as density, volume to capacity ratio, and average travel speed have been developed to quantitatively assess quality of flow. The maximum service flow rate for LOS "E" is generally considered to represent capacity of the facility. For most design or planning purposes, however, service levels "C" or "D" are used as the minimum standard because they provide a more acceptable quality of service to facility users. For this project, the minimum acceptable LOS for the HOV lanes is LOS "C". However, there is no minimum acceptable LOS for the general use lanes as long as an acceptable LOS is maintained in the HOV lanes.

The LOS analysis in the I-4 MMMP Traffic Report was based on the 1985 Highway Capacity Manual (HCM) procedures. The LOS analysis within the Design Traffic Technical Memorandum prepared in conjunction with this PD&E study was based on the 1994 update to the HCM, and was conducted using the Highway Capacity Software (HCS). The peak hour factor (PHF), heavy vehicle percentage, and driver population factors used in the analysis are shown in Table 6-2. An analysis of future conditions was given significant consideration in the I-4 MMMP. The I-4 MMMP Traffic Report developed the appropriate design traffic factors used to develop directional design hour volumes, which are provided in Table 6-2.

Table 6-2
DESIGN TRAFFIC AND ANALYSIS FACTORS *

Roadway	Category	Design K_{30} **		Directional Distribution D_{30} **	Factors Used in LOS Analysis		
		General Use Lanes	Special Use / HOV Lanes		Peak Hour Factor	Heavy Vehicle Percentage	Driver Population Factor
I-4 (Tourist, Recreational Area – Polk/ Osceola County line to north of the study area	Urban Interstate	9.0%	10.0%	55.0%	95.0%	10.0%	0.9
Arterials	Rural Non-Interstate	11.0%	----	55.0%	95.0%	10.0%	1.0
Arterials	Urban Non-Interstate	10.2%	----	55.0%	95.0%	5.0%	1.0

* These factors were developed and approved during the I-4 MMMP process and are given in the I-4 MMMP Technical Memorandum Traffic Report and the Design Traffic Technical Memorandum for this PD&E study.
** Design K and D factors represent the 30th Highest Hour.

The design traffic factors are applied to the future AADT volumes to obtain Directional Design Hour Volumes (DDHV volumes). The future AADT volumes were developed through a modeling process which is explained in detail in section 6.5. The future AADT and DDHV volumes and the traffic factors in Table 6-2 were approved during the I-4 MMMP process, and are carried forward to this study.

6.4 Existing Levels of Service

The existing year 1996 AADTs and DDHVs and the corresponding LOS for the various roadway segments are given in Table 6-3. Based on the existing design hour LOS analysis summarized in Table 6-3, all I-4 mainline segments, except the segment from S.R. 536 to S.R. 535, currently operate at LOS E or F. Table 6-3 also provides the traffic density for the segments from Southern Connector (S.R. 417) to S.R. 535, where the LOS is E or better. Since the LOS analysis summarized in Table 6-3 is based on design hour volumes and traffic characteristics of Section 1, the results are more precise than those discussed in section 6.2, which were based on daily volumes and generalized LOS tables. This section of I-4 contains unfamiliar drivers, and the use of a population factor of 0.90, as established in the I-4 MMMP Traffic Report, provides for a slightly lower capacity than a section with commuters or other familiar users.

Table 6-3

EXISTING (1996) I-4 MAINLINE LEVEL OF SERVICE

I-4 Mainline Segment	Number of Lanes	1996 AADT	1996 DDHV	Density		LOS
				(pc/mi/ln)	(veh/mi/ln)	
West of C.R. 532	4	83,400	4,130	---	---	F
C.R. 532 to Southern Connector	4	79,200	3,920	---	---	F
Southern Connector to U.S. 192	4	69,600	3,450	38.58	36.74	E
U.S. 192 to S.R. 536	6	100,800	4,990	36.36	34.63	E
S.R. 536 to S.R. 535	8	120,400	5,960	31.04	29.56	D
S.R. 535 to Central Florida Parkway	6	150,400	7,440	---	---	F
Central Florida Parkway to BeeLine Expressway (S.R. 538)	6	130,400	6,450	---	---	F

As previously stated, Table 2-1 of the 1995 LOS Manual shows that the minimum acceptable LOS is D for freeways within urbanized areas over 500,000 population. The majority of the Section 1 corridor does not meet this minimum LOS standard, which indicates a need for improvement. However, improvements must also consider the guidelines given in the FDOT Interstate Highway Policy.

6.5 Traffic Volume Projections

Information concerning future growth of the area, the modeling process used to develop traffic forecasts for the I-4 MMMP, and the initial development of design hour traffic was obtained from the I-4 MMMP Traffic Report, MIS, and Conceptual Engineering Report. This information, as appropriate, is summarized within this section.

The state of Florida has experienced tremendous growth in population over the last two decades. It has been predicted that the state's population will grow approximately 36 percent between 1995 and 2020. During that period, the largest population increase in the state is expected to occur in Central Florida. As a result, travel demand throughout Central Florida and the I-4 corridor is expected to increase significantly. On a regional basis, it is anticipated that the number of daily person-trips made will increase from 3.18 million in 1990 to 6.47 million in the year 2020. Therefore, the total daily person-trips is expected to double from 1990 levels by the year 2020.

An important part of forecasting traffic volumes for the I-4 corridor involves an understanding of population and employment growth, activity center development, and existing and future land use patterns. These items are covered in detail in the I-4 MIS. Walt Disney World is the largest activity center with the greatest total non-resident (i.e. hotels, motels, etc.) population and total employment. The International Drive area is very similar. Other major activity centers near the I-4 Section 1 study area include the Orange County Convention Center and Orlando International Airport, which are located adjacent to the BeeLine Expressway (S.R. 528) corridor.

The development of traffic volume projections was covered in detail in the I-4 MIS, I-4 MMMP Traffic Report, and the I-4 MMMP Conceptual Engineering Report. The modeling efforts for the I-4 MMMP tiers 1 and 2 were based on the 2010 Orlando Urban Area Transportation Study (OUATS) model. The model was expanded to include highway and transit network improvements and changes in socio-economic conditions that would be reasonably expected by the year 2020. This model featured the addition of HOV modeling capabilities and a comprehensive treatment of transit options. The model was developed in a consistent manner with the Florida Standard Urban Transportation Model Structure (FSUTMS), with the specific new multi-modal features.

Tier 2/MIS of the I-4 MMMP documented the need for transportation improvements within the I-4 corridor and is based on forecasts of substantial increases in travel demand within the already congested I-4 travel corridor. Several Conceptual Mobility

Enhancement Alternatives (CMEAs) were developed and evaluated during the tier 2/MIS process. This tier was concluded by the adoption of a combined highway and transit improvement strategy by the Orlando and Volusia County MPOs. The results of this tier as related to Section 1 include:

- the widening of I-4 to six general use lanes plus two HOV lanes throughout Section 1,
- construction of a LRT system from Celebration to Sanford,
- provision for express bus service in the I-4 corridor,
- and preservation of a high speed rail envelope from Polk County to the BeeLine Expressway (S.R. 528).

For refinement of the adopted MIS recommendations, more detailed traffic forecasts were required to provide a better understanding of the operational needs of I-4 roadway elements and opportunities for optimizing both existing elements and potential improvements. By the time the master planning process reached the end of Tier 2, the Orlando MPO was preparing a transportation plan update, which included the development of an enhanced model and updated database to model year 2020 conditions. This updated 2020 OUATS model was based on the I-4 Tier 2 model, but included the addition of Lake County and a portion of Polk County, as well as updates to model inputs such as external trip ends, gravity model parameters, and a renumbered traffic analysis zone system. The underlying highway network for the model is the 2020 Financially Feasible Plans of the Orlando and Volusia County MPOs. Specific network improvements are documented in the *2020 OUATS Plan Update* and the *2020 Transportation Plan Update Volusia County, Florida.* This model was validated in November 1995 and adopted by the Orlando MPO as the new regional model in December 1995.

In order to maintain consistency with future regional modeling activities, FDOT decided to change the model in tier 3 of the Master Plan to the adopted 2020 OUATS model. The baseline highway network of the model was used in forecasting traffic for both the 2020 build and no-build scenarios. Documentation of the model validation for the I-4 MMMP is provided in the *I-4 Multi-modal Master Plan Project Model Validation Report* (PBS&J Team, December 1995).

The tier 3 forecasts reflect refined conditions in terms of interchange improvements, HOV access locations, system management strategies, background highway system improvements, and transit assumptions. Development of the Build traffic forecasting models has assumed the location of LRT to be adjacent to or within the I-4 median through the Orlando area. The tier 3 traffic forecasts and analyses presented in the I-4 MMMP Traffic Report were anticipated to serve as design hour traffic for the PD&E studies and a starting point for the more detailed analysis needed to set final design parameters and geometry. Consistent with those recommendations, the projections developed for tier 3 of the Master Plan were carried forward for use in this PD&E study.

Output from the model represents peak season weekday average daily traffic (PSWADT). Seasonal adjustment factors were used to convert the PSWADT to annual average daily traffic (AADT). These AADTs were further refined as described in detail in the I-4 MMMP Traffic Report (section 3.2.2). The resulting AADTs were reported as future estimates of daily traffic. These AADTs were then converted to directional design hour volumes (DDHV) by multiplying the AADTs by the appropriate K_{30} (30^{th} Highest Hour) and D_{30} (Directional Distribution) factors. These factors, as provided in the I-4 MMMP Traffic Report, are summarized in Table 6-2. The I-4 MMMP Traffic Report is an approved document which establishes the traffic volume demand for the full 119 km (74 mi.) corridor including Section 1. For more detail regarding the development of AADTs and DDHVs, see Section 3 of the I-4 MMMP Traffic Report.

The volume projections for the year 2020 no-build condition and the associated LOS analysis contained with the I-4 MMMP Traffic Report remain applicable and are summarized in section 6.6 of this report. The volume projections for the year 2020 build condition and the corresponding LOS analysis from the I-4 MMMP Traffic Report are shown in Table 6-4. According to the LOS analysis, the general use lanes are expected to operate at LOS F throughout Section 1 in the design year 2020 with the improvements proposed in the I-4 MMMP.

Based on discussions with FDOT District Five, it was felt that the HOV lanes should have a DDHV of approximately 500 to 600 vehicles per hour to be viable. Since the DDHV for the HOV lanes just east of World Drive is nearly 500 vehicles per hour, HOV lanes appear justified east of World Drive. However, the I-4 MMMP projected HOV volumes between C.R. 532 and World Drive indicate that the HOV lanes would be underutilized. As a result, it appears that the segment from C.R. 532 to World Drive may not be practical for the use of HOV lanes.

Other issues of concern were the beltway to beltway connection between the Western Beltway and the Southern Connector/Central Florida Greeneway (S.R. 417) and the poor LOS of the general use lanes. This connection is being accommodated by the I-4 general use lanes. It was felt that additional capacity should be provided in the general use lanes between these two facilities to better serve this beltway to beltway connection. Due to these issues, alternatives were considered to better utilize this part of the facility. This included a review of the typical sections recommended in the I-4 MMMP and the transition between District One and Five's typical section at the county line.

The ultimate typical section proposed for I-4 within Polk County consists of six general use lanes and four special use lanes (6+4). The special use lanes are designated for use by HOV and long distance SOV. The I-4 MMMP typical section of six general use lanes and two HOV lanes (6+2) was planned to begin at the Polk/Osceola County line, which required that the transition from 6+4 to 6+2 occur at the county line. Several conclusions were made within the I-4 MMMP which remain valid and are appropriate for discussion here. These are listed below.

Table 6-4

YEAR 2020 BUILD I-4 MAINLINE LEVEL OF SERVICE
(I-4 MMMP Results)

I-4 Mainline Segment	Lane Group	Number of Lanes	2020 Build DDHV	LOS
West of C.R. 532	General Use	6	6,270	F
C.R. 532 to Western Beltway	General Use	8	7,100	F
	HOV	2	370	
Western Beltway to World Drive	General Use	8	7,340	F
	HOV	2	470	
World Drive to Southern Connector	General Use	6	5,430	F
	HOV	2	470	
Southern Connector to U.S. 192	General Use	8	7,510	F
	HOV	2	470	
U.S. 192 to Osceola Parkway	General Use	8	7,280	F
	HOV	2	560	
S.R. 536 to S.R. 535	General Use	8	9,180	F
	HOV	2	1,220	
S.R. 535 to Lake Avenue	General Use	8	8,730	F
	HOV	2	1,220	
Lake Avenue to Central Florida Parkway	General Use	8	9,490	F
	HOV	4	1,890	
Central Florida Parkway to the BeeLine Expressway (S.R. 528)	General Use	8	7,930	F
	HOV	4	1,890	
East of the BeeLine Expressway (S.R. 528)	General Use	8	8,380	F
	HOV	2	1,430	

HOV -- High Occupant Vehicles -- Allows only buses or vehicles having three or more occupants.

- Additional HOV lanes beyond the 6+2 typical section were not warranted for most of the I-4 corridor within District Five, even though the maximum number of basic lanes allowed by the FDOT Interstate Policy is represented by the 6+4 typical section.
- The Central Florida Greeneway (S.R. 417) will serve in the long-term as an alternative route for vehicles traveling through the Orlando area.
- There is a need to preserve for the potential 6+4 outside the beltway system.
- The HOV lanes would be restricted to HOV3+ traffic.

Based on the issues previously discussed, the transition between the District One and Five typical sections has been further coordinated with Districts One and Five. It was agreed that the transition at the Polk/Osceola County line should be re-evaluated. Considering the issues previously described, this transition was moved further east to the I-4/World Drive interchange. The special use lanes southwest of World Drive continue the treatment in District One, which permits long distance through single occupant vehicles (SOV) and local HOV2+ (two or more occupants). Throughout the remainder of Section 1, the HOV lanes are limited to HOV3+ (three or more occupants).

The relocated transition resolves the previous issues, which are explained as follows. The urban service area begins east of C.R. 545, which is between the Western Beltway and World Drive interchanges. By extending the special use treatment to World Drive, the transition to HOV3+ would occur at the first interchange within the urban service area, where the volumes first begin to warrant this HOV treatment. In addition, better utilization of this available capacity is achieved and general use lane operations are improved. This is due to the diversion of traffic from the general use lanes to the special use lanes. This better serves the beltway to beltway connection, which enhances these ramp to ramp operations. This point of transition provides a more logical terminus for the 6+4 typical section than the Polk/Osceola County line.

The relocated transition serves three purposes. First, it allows a direct connection to the World Drive interchange and the Walt Disney World resort area without requiring traffic to weave across the general use lanes, which are anticipated to be congested during peak periods. Second, it allows through trips access to the Southern Connector/Central Florida Greeneway (S.R. 417), which serves as a bypass route in the Orlando area and serves trips to the airport and the east side of the metropolitan area. Finally, it allows non-HOV traffic from District One to return to the general use lanes. While the revised typical section from the Polk/Osceola County line to World Drive is not consistent with the I-4 MMMP typical section, this change is consistent with the need to preserve for the 6+4 typical outside the beltway system, as mentioned in the I-4 MMMP. Also, the Southern Connector and Central Florida Greeneway can be considered, in part, as the extension of the special use lanes for SOV through trips within the Orlando metropolitan area.

In order to determine the expected operating conditions of the change in typical section between the Polk/Osceola County line and World Drive, traffic volumes representing this change were required. While the total demand given in the I-4 MMMP Traffic Report for

the year 2020 build condition remain valid, these volumes require further refinement to reflect the changes in typical sections and HOV access locations. This reassignment maintains the total demand at the Polk/Osceola County line shown in the I-4 MMMP. Exhibit 6-1 shows the I-4 MMMP HOV recommendations in graphic form for Section 1. Similarly, Exhibit 6-2 shows the I-4 HOV modified access plan for Section 1.

Lake Avenue was proposed as a half interchange within the I-4 MMMP, with ramp movements to and from the northeast along I-4. FHWA has indicated that the agency will not approve an new interchange unless it allows for all movements. This required the addition of ramps to serve westbound movements to and from I-4. With the addition of these ramps, diversion of traffic is expected between adjacent interchanges, especially Central Florida Parkway and congested S.R. 535. In order to determine the expected operating conditions of the full interchange, a reassignment of the I-4 MMMP traffic (tier 3) was necessary. The refined DDHVs and associated LOS analysis representing year 2020 Build conditions are described in section 6.6.

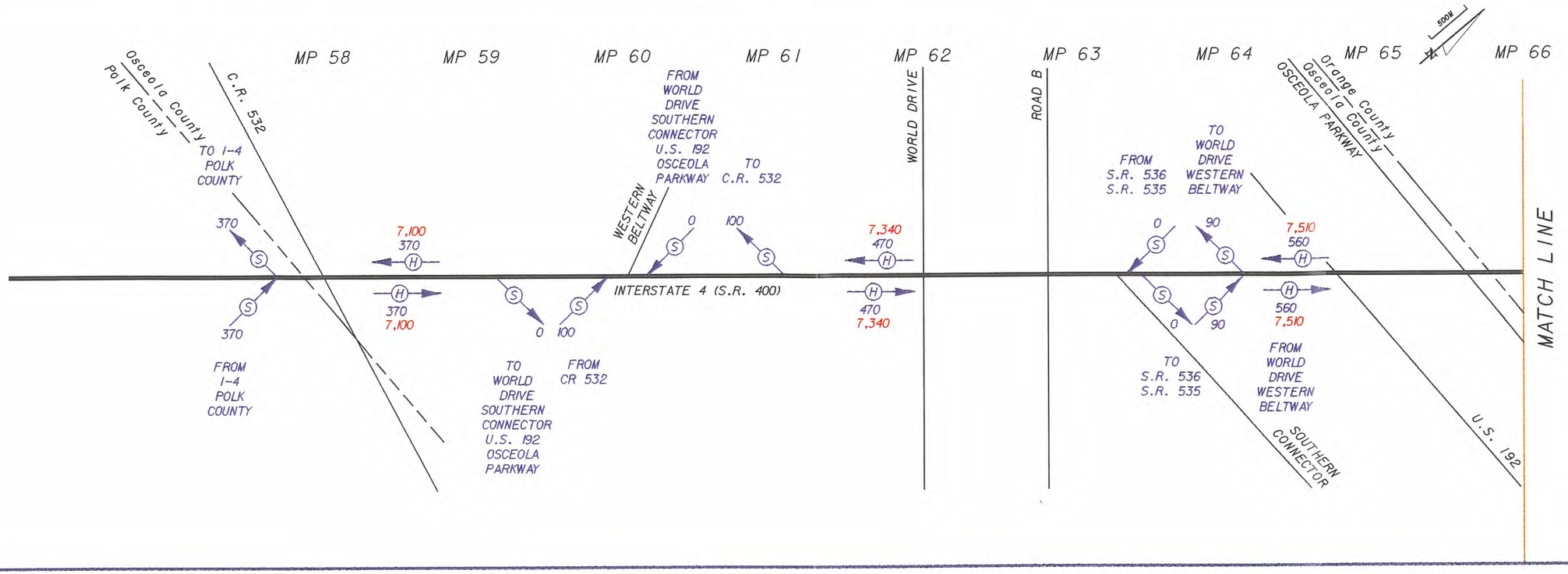
6.6 Level of Service

Design hour LOS analyses were performed for year 2020 for both the no-build and build conditions and are summarized in Tables 6-5 and 6-6. According to the results summarized in Table 6-5, I-4 throughout Section 1 is expected to be operating over capacity in the year 2020, without the proposed improvements. According to the no-build analysis, each mainline segment will exceed capacity by 7 to 70 percent. It should be noted that the no-build analysis does consider the six-laning of I-4 from west of the Polk/Osceola County line to U.S. 192 (S.R. 530). Therefore, the year 2020 no-build condition reflects six basic lanes throughout Section 1.

As previously stated, Table 2-1 of the 1995 LOS Manual shows that the minimum acceptable LOS is D for freeways within urbanized areas over 500,000 population. The results of the no-build analysis indicate that the Section 1 corridor will not meet this minimum LOS standard, which indicates a need for improvement beyond the interim six-lane widening. However, improvements must also consider the guidelines given in the FDOT Interstate Highway Policy.

Florida's Interstate Highway Policy recognizes the limits of cost-effective widening on existing interstate highway corridors and is transforming those corridors within urban areas into multi-modal corridors. This has created a situation in which compliance with long standing FDOT and FHWA minimum LOS design criteria for new or reconstructed general use lanes may no longer be appropriate. The FDOT Interstate Highway Policy limits the expansion of interstate highways to six basic general use lanes. Further improvements within urban areas are limited to a maximum of four additional physically separated lanes for HOV and through-trips. The intent of the Policy is to promote alternative transportation options, such as ridesharing, express bus, and LRT, to increase the people-moving capacity of the corridor rather than its vehicle-moving capacity.

STATE PROJ. NO.	SHEET NO.
92130-1425 75280-1479	



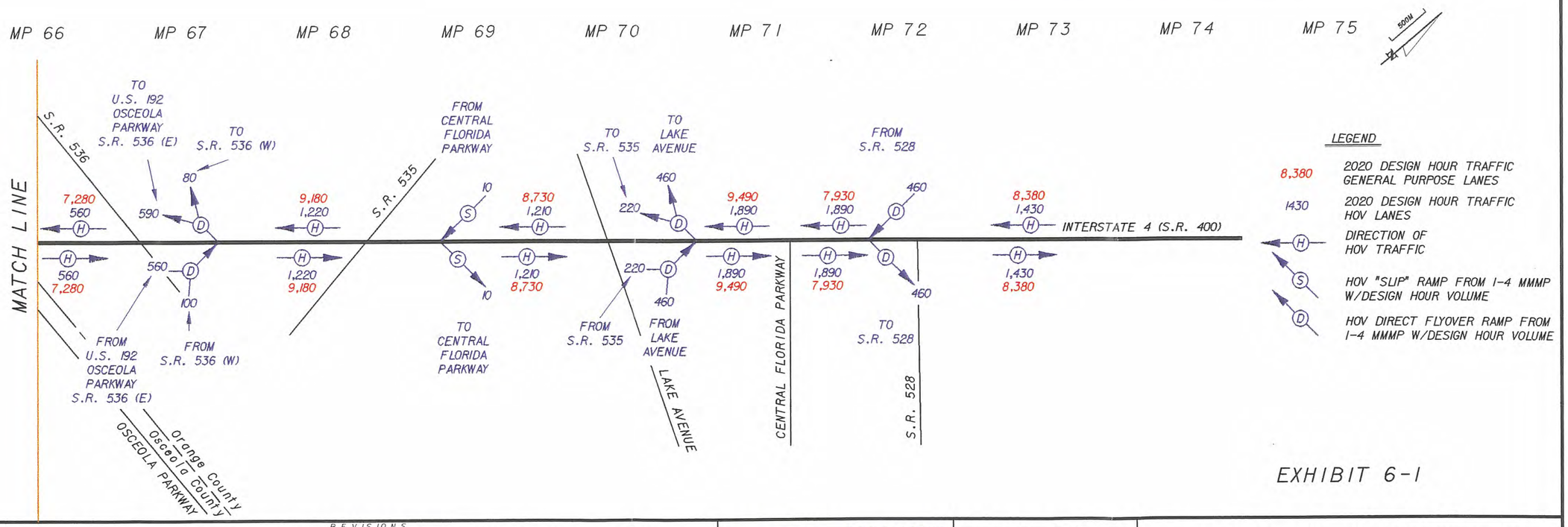


EXHIBIT 6-1

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

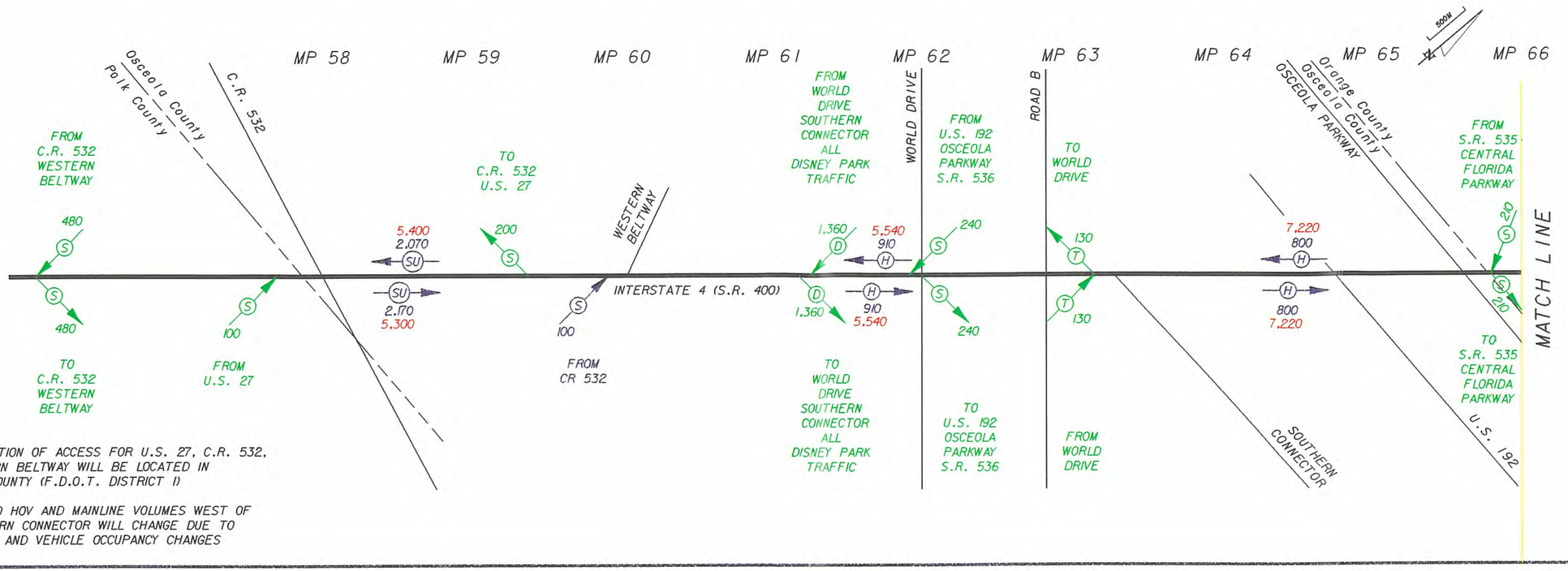
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 MMMP HOV RECOMMENDATION

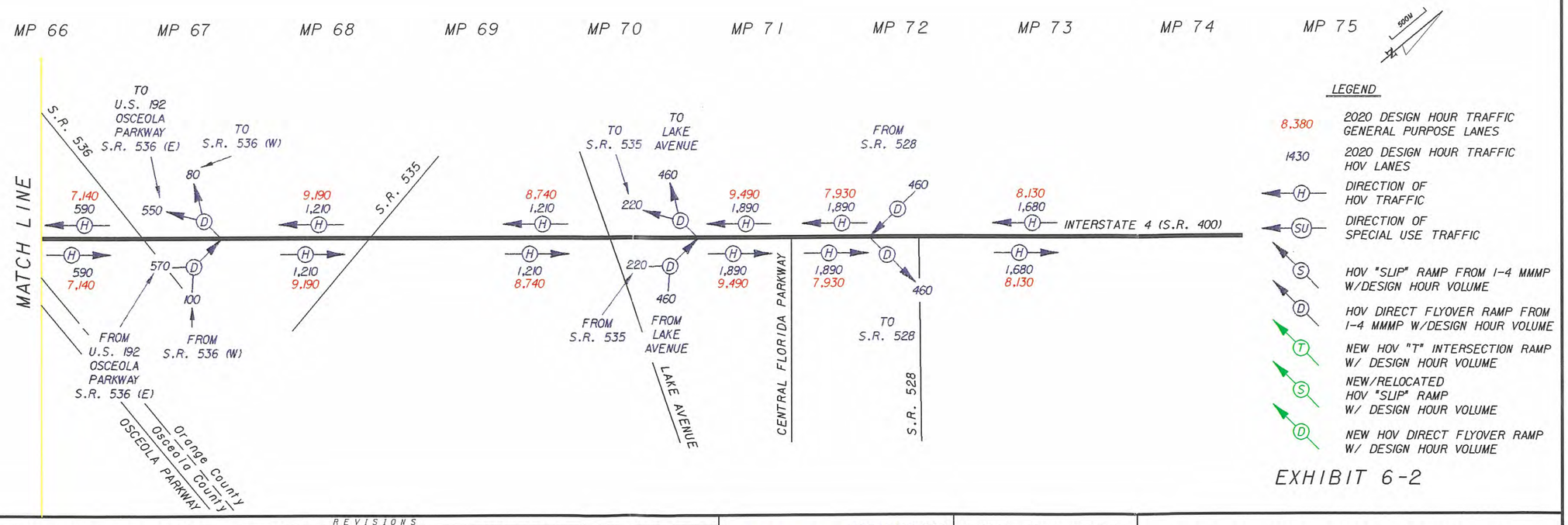
14-MAY-1998
\\orlw001trans\2443\pdd\dgn\hovplan1.dgn
\\orlw001trans\2443\open\lin\tcol.pen
NONE

STATE PROJ. NO.	SHEET NO.
92130-1425 75280-1479	



NOTE:
1. LOCATION OF ACCESS FOR U.S. 27, C.R. 532, WESTERN BELTWAY WILL BE LOCATED IN POLK COUNTY (F.D.O.T. DISTRICT 1)

2. 2020 HOV AND MAINLINE VOLUMES WEST OF SOUTHERN CONNECTOR WILL CHANGE DUE TO ACCESS AND VEHICLE OCCUPANCY CHANGES



LEGEND

8,380	2020 DESIGN HOUR TRAFFIC GENERAL PURPOSE LANES
1430	2020 DESIGN HOUR TRAFFIC HOV LANES
(H)	DIRECTION OF HOV TRAFFIC
(SU)	DIRECTION OF SPECIAL USE TRAFFIC
(S)	HOV "SLIP" RAMP FROM I-4 MMMP W/DESIGN HOUR VOLUME
(D)	HOV DIRECT FLYOVER RAMP FROM I-4 MMMP W/DESIGN HOUR VOLUME
(T)	NEW HOV "T" INTERSECTION RAMP W/ DESIGN HOUR VOLUME
(S)	NEW/RELOCATED HOV "SLIP" RAMP W/ DESIGN HOUR VOLUME
(D)	NEW HOV DIRECT FLYOVER RAMP W/ DESIGN HOUR VOLUME

EXHIBIT 6-2

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 HOV MODIFIED ACCESS PLAN

25-JUL-1998
08:24:43 A:\dn\dv\hoyplan2.dgn
\\orlw00\trans\2443A\pen\ULITOT.pen
NONE

Table 6-5

YEAR 2020 NO-BUILD I-4 MAINLINE LEVEL OF SERVICE

I-4 Mainline Segment	Number of Lanes	2020 No-Build AADT	2020 No-Build DDHV	LOS
West of C.R. 532	6	124,400	6,160	F
C.R. 532 to Western Beltway	6	146,200	7,240	F
Western Beltway to World Drive	6	146,000	7,230	F
World Drive to Southern Connector	6	103,600	5,130	F
Southern Connector to U.S. 192	6	142,600	7,060	F
U.S. 192 to Osceola Parkway	6	136,000	6,730	F
S.R. 536 to S.R. 535	8	179,600	8,890	F
S.R. 535 to Central Florida Parkway	6	167,800	8,310	F
East of the BeeLine Expressway (S.R. 528)	6	153,800	7,620	F

The results shown in Table 6-5 combined with the LOS standards and the FDOT Interstate Highway Policy show a need for additional special use lanes to provide improved mobility. The appropriate type of improvement, which was studied in great detail in the I-4 MMMP tiers 1 and 2, and adopted by the MPO, involves the addition of two HOV lanes throughout most of the I-4 corridor within District Five. The segment of I-4 between Lake Avenue and the BeeLine Expressway (S.R. 528) justifies the addition of four HOV lanes due to the high forecasted HOV demand on that segment.

The results of the year 2020 build volumes LOS analysis given in Table 6-6 reflect the extension of the 6+4 typical section into Osceola County, the transition to the 6+2 typical section at World Drive, and the 6+4 typical section between Lake Avenue and the BeeLine Expressway. This LOS analysis is based on the 1994 update to the HCM.

Table 6-6 shows that the LOS of the HOV lanes throughout Section 1 is C or better. East of the BeeLine Expressway (Section 2), the LOS of the HOV lanes is E. The general use lanes west of C.R. 532 are expected to operate at LOS D. Between C.R. 532 and Osceola Parkway, the general use lanes are expected to operate at LOS E. From S.R. 536 to the BeeLine Expressway, the general use lanes are expected to operate at LOS F.

Table 6-6

YEAR 2020 BUILD I-4 MAINLINE LEVEL OF SERVICE
(Modified HOV Access)

I-4 Mainline Segment	Lane Group	Number of Lanes	2020 Build DDHV	LOS
West of C.R. 532	General Use	6	4,230	D
	SU	4	2,070	C
C.R. 532 to Western Beltway	General Use	8	5,300	C
	SU	4	2,170	C
Western Beltway to World Drive	General Use	8	5,540	D
	SU	4	2,270	C
World Drive to Southern Connector	General Use	6	5,230	E
	HOV	2	670	B
Southern Connector to U.S. 192	General Use	8	7,220	E
	HOV	2	800	B
U.S. 192 to Osceola Parkway	General Use	8	7,180	E
	HOV	2	800	B
S.R. 536 to S.R. 535	General Use	8	9,410	F
	HOV	2	1,210	C
S.R. 535 to Lake Avenue	General Use	6	7,120	F
	HOV	2	1,210	C
Lake Avenue to Central Florida Parkway	General Use	8	9,160	F
	HOV	4	1,890	C
Central Florida Parkway to the BeeLine Expressway (S.R. 528)	General Use	8	7,930	F
	HOV	4	1,890	C
East of the BeeLine Expressway (S.R. 528)	General Use	8	8,130	F
	HOV	2	1,680	E

SU -- Special Use -- Allows for long distance single occupant and two occupant vehicles.
HOV -- High Occupant Vehicles -- Allows only buses or vehicles having three or more occupants.

6.7 Summary of Preliminary Findings

The results of the existing conditions analysis, shown in Table 6-3, show that the virtually the full length of I-4 in Section 1 is currently operating at an unacceptable LOS. This indicates a need for improvements. The results of the year 2020 no-build analysis, summarized in Table 6-4, show that the full Section 1 corridor will be over capacity, much of it substantially over capacity, without improvements beyond the interim six-lane widening.

The year 2020 build scenario reflects the refinement of the I-4 MMMP recommendations and modifications to the HOV access points. From World Drive to the BeeLine Expressway, HOV occupancy is restricted to 3 or more persons with no-through trips or trucks. LRT is assumed to be complete from Disney's Celebration to Sanford. Through provision of HOV lanes and LRT, significant improvements in personal mobility are provided. These improvements more than double the ability of the corridor to move people.

The results in Table 6-6 show that the HOV lanes would be well-utilized with several segments operating at LOS C. This performance shows that while volumes are short of the full vehicle capacity of the HOV lane, the lanes satisfy the operating objective of preserving conditions which allow substantial speed differentials compared to the general use lanes.

The analysis confirms that the transportation demand in the corridor will exceed the capacity of the recommended improvements. Even under the build scenario, LOS F can be expected on the general use lanes. This is not unexpected given the large latent demand for transportation services which exists in the I-4 corridor.

However, significantly better operating conditions along the general use lanes can be expected, compared to the no-build scenario. This is due to the provision of improved ramp merge/diverge treatments, additional of auxiliary lanes in sections having short interchange spacing, interchange improvements, and installation of aggressive system management/ITS technologies and strategies. These improvements serve to optimize the lane capacity of the general use lanes by providing longer sections for merging and weaving maneuvers, controlling traffic flow entering the corridor by geometric design, allowing for quicker response to non-recurring incidents, and offering improved information to highway users.

7.0 CORRIDOR ANALYSIS

Corridor analysis was covered in the I-4 Multi-Modal Master Plan (MMMP) and the I-4 Major Investment Study (MIS) which included the evaluation of alternative corridors, development and application of evaluation criteria, and the selection of viable corridors. However, these studies focused on the full 119 km (74 mi.) corridor in District Five. This section provides a summary of the corridor analysis efforts in those studies.

The I-4 MMMP developed and analyzed a wide range of highway and transit transportation alternatives, using a comprehensive three tier evaluation process. Alternative evaluations consisted of measuring the performance of each alternative against competing alternatives and a baseline condition. Evaluation criteria in each tier reflect the objectives of both the FDOT Interstate Highway Policy and the I-4 MMMP study objectives. Alternatives were rated according to how well they satisfied the evaluation criteria using a pre-established performance scale. The best performing alternatives, or features of an alternative, were then carried forward to the next tier for further evaluation.

Tier 1 consisted of a broad analysis of 14 different transportation alternatives which included both highway and transit elements for the purposes of eliminating many alternatives that were unreasonable. These alternatives included various mainline configurations including the number of general use and high occupancy vehicle (HOV) lanes, interregional and intraregional single occupancy vehicle (SOV) provisions, improvements to other surface streets which ranged from those in long range plans to major arterial additions/improvements, express bus service, light rail transit (LRT), and high speed rail (HSR). These alternatives represented general highway and transit improvement strategies applied uniformly throughout the 119 km (74 mi.) study corridor. Those alternatives which performed best with regard to optimization of person-capacity, greater level of access to intermodal facilities, reduction of vehicle emissions, and affordability were carried forward to Tier 2.

Tier 2 was responsive to new FHWA and Federal Transit Administration (FTA) regulations that require a MIS be performed for major transportation investments requiring federal funds. A baseline condition was established for comparison purposes and consisted of the existing I-4 highway and transit service plus committed improvements within FDOT's Five Year Transportation Plan, but contained no provisions for HOV lanes, LRT, or HSR. Seven alternatives were considered called Conceptual Mobility Enhancement Alternatives (CMEAs); one alternative having three different rail alignments. The following characteristics outline the underlying assumptions for each of the alternatives:

- Due to extensive development within the I-4 corridor, there was considered to be no reasonable alternative alignment for I-4; extensive widening of parallel roadways is not considered to be feasible due to resulting impact to existing development and corresponding low cost-effectiveness. However, one

alternative did consider enhanced widening of parallel arterials beyond long range plans in addition to I-4 improvements.

- No more than ten basic lanes were considered for I-4, consistent with the FDOT Interstate Highway Policy. Even with extensive transit service, these lane limitations may result in long-term traffic congestion in the general use lanes.

- Express bus service was considered, which would operate from park-and-ride lots located adjacent to I-4. LRT service was considered, which would operate between Celebration in Osceola County and Sanford in Seminole County. Four alternative LRT alignments were evaluated, using variations of I-4 right-of-way and the adjacent CSX rail line.

- Intercity HSR was assumed to pass through the metropolitan area in all alternatives. The alternatives assumed alternative alignments for HSR and that HSR is within the I-4 median for part or most of the corridor.

- HOV lanes were provided in all alternatives. Truck traffic and SOV through trips were excluded from the special use lanes when only one such lane was provided in each direction. Transportation System Management (TSM) techniques along with Intelligent Transportation System (ITS) applications were assumed to be implemented to maintain an acceptable level of service (LOS) on the HOV lanes.

Alternative evaluations conducted in the Tier 2/MIS concluded that the six general use and four special use/HOV lane (6+4) alternatives were not financially feasible within the Master Plan 2020 design year. It was also determined that through trips and trucks make up such a small percentage of the traffic population that the investment to provide two additional HOV/special use lanes was not warranted. Within the Orlando metropolitan area, the Central Florida Greeneway (S.R. 417) is proposed as a suitable long-term alternative for through trips. Therefore, the six general use and two HOV lane (6+2) alternative with LRT was adopted. The I-4 MMMP recommended that steps be taken to insure that a 6+4 potential section including a 13.4 m (44 ft.) rail envelope be possible for sections outside of the beltway system.

Tier 2/MIS evaluated each alternative's adherence to defined engineering standards, implementation impacts, and the likelihood of success in achieving study goals. With the establishment of a design concept and scope of 6+2+LRT for the majority of the corridor, Tier 3 refined and expanded the concept into a Master Plan recommendation. This tier addressed interchange improvements, HOV access, support facilities such as park-and-ride, highway buffer/barrier separation treatments, and system management strategies. Tier 3 also developed a staging and financing strategy for the proposed highway and transit improvements.

Coordination between Districts One and Five was conducted during Tier 3. District One proposes an ultimate 6+4 typical section with a 13.4 m (44 ft.) median to accommodate a future rail system. Interregional single occupant vehicles (SOV) and HOV2+ will be allowed in the four special use lanes. The Polk County Metropolitan Planning Organization (MPO) has adopted a 6+0 roadway typical section with enough median width to accommodate four future special use lanes and a transit envelope, as part of their 2020 Long Range Plan.

Tier 3 assumed that a transit envelope for HSR and LRT is provided within the I-4 median except near downtown. Through other studies, an alignment for the LRT has been determined from the I-4/Central Florida Parkway interchange to the north end of the metropolitan area. Within I-4 Section 1, the LRT alignment is outside of the I-4 right-of-way from the I-4/Central Florida Parkway interchange to northeast of the BeeLine Expressway. When the LRT is extended from Central Florida Parkway to Celebration, the alignment will be outside of the I-4 median transit envelope. This project preserves the transit envelope for potential use by HSR. The envelope which has been provided is 13.4 m (44 ft.) horizontally and 5.0 m (16.5 ft.) vertically.

8.0 ALTERNATIVE ALIGNMENT ANALYSIS

A wide range of potential alternatives have been considered for the I-4 Section 1 improvements including:

- No Build Alternative
- Transportation Systems Management (TSM) Alternatives
- Study Alternatives

Each of these alternatives is discussed in the following sections. The following improvements to I-4 will be in-place prior to any of the alternatives given in this report and are, therefore, part of the No Build, TSM, and Build Alternatives:

- Widening the I-4 mainline from four to six lanes from U.S. 27 in Polk County to U.S. 192 (S.R. 530) in Osceola County;
- C.R. 532 interchange modification to add on- and off-ramps to and from northeast along I-4 (construction complete);
- Planned construction of the Western Beltway and its interchange with I-4;
- World Drive Extension/I-4 interchange (construction complete);
- Collector-distributor (CD) roadways connecting the new World Drive Extension interchange to the Southern Connector Extension (construction complete); and
- Planned construction of the Osceola Parkway interchange.

There are also several improvements that are planned to routes paralleling I-4 which will better serve local traffic. These include:

- International Drive;
- Turkey Lake Road/Palm Parkway; and
- Vineland Avenue.

International Drive is a north-south roadway, located east of I-4, which extends from a point north of the Section 1 study area to S.R. 536. This roadway is planned to be extended further south to U.S. 192 (S.R. 530). Turkey Lake Road runs parallel to I-4 from Central Florida Parkway to the north beyond the Section 1 project limit. Palm Parkway runs north from an intersection with C.R. 535 to Lake Avenue. Turkey Lake Road is planned to be extended southward to align with Palm Parkway, which will result in a continuous roadway. Vineland Avenue runs parallel to I-4 from S.R. 535 to the north before becoming an unpaved road. The northern portion of this roadway will be realigned and extended to International Drive.

8.1 No Build Alternative

The No Build Alternative assumes that most of the existing transportation facilities in the project area remain unchanged. However, this alternative includes those improvements listed above. The new interchange planned at Lake Avenue in the I-4 Multi-Modal Master Plan (MMMP) is *not* considered part of the No Build Alternative. The No Build provides a baseline to show how the recommended improvements will meet the purpose and need of the project.

With the exception of the I-4 segment from S.R. 536 to S.R. 535, all of the I-4 mainline segments within Section 1 currently operate at level of service (LOS) 'E' or 'F'. As listed above, an interim improvement will widen I-4 to six-lanes from U.S. 27 west of the Polk/Osceola County line to U.S. 192. Even with this interim improvement, all of Section 1 is expected to be operating at LOS 'F' by design year 2020 without further improvements. These results are based on the analysis contained within the I-4 MMMP Traffic Report. Under the No Build scenario, no additional roadway capacity is provided to relieve this congestion other than those improvements listed above.

Based on this information, it is clear that the No Build Alternative would not satisfy the purpose and need for the project in terms of improving mobility throughout the corridor and providing some capacity enhancement. In addition, the No Build Alternative would be considered inconsistent with approved area-wide transportation plans and would result in decreased air quality, reduced traffic safety, and increased user costs. Deficient horizontal and vertical curvature, aging bridge structures, insufficient length of ramp terminals, inconsistent ramp terminal treatments, and existing drainage features would remain unchanged.

The No Build Alternative does, however, present several advantages over the alternatives considered. It would require no cost expenditures for right-of-way acquisition, business damages, and/or construction. In addition, there would be no disruption of local traffic during construction and no significant environmental impacts due to construction.

The No Build Alternative will continue to be considered a viable alternative through the public hearing process.

8.2 Transportation Systems Management Alternatives

Transportation Systems Management (TSM) Alternatives involve transportation improvements designed to maximize the utilization and efficiency of the present transportation system. The various forms of TSM options can include:

- Traffic signal timing improvements
- Intersection/Interchange improvements
- Auxiliary turn lanes

- One-way pairs
- Widening of parallel arterials
- Ridesharing
- High Occupancy Vehicle (HOV) lanes
- Reversible flow roadway systems
- Transit
- Intelligent Transportation System (ITS)
- Ramp-to-ramp auxiliary lanes

TSM was considered extensively during the development of the I-4 MMMP. Traffic signal timing improvements, intersection improvements, auxiliary turn lanes, and one-way pairs are more appropriate for the cross streets and at-grade ramp termini, and do not apply directly to I-4. These types of TSM measures would improve traffic flow heading to and from I-4, but would not necessarily improve conditions on I-4. Extensive widening of arterials was also given consideration during the I-4 MMMP, but was not shown to effectively enhance traffic flow on I-4.

Ridesharing is a TSM option which involves one person sharing a ride with other passengers in a common vehicle and is composed of carpools, vanpools and transit. This TSM option has the ability to increase person-trip capacity without requiring an increase in vehicle-trip capacity. There are several methods that can be used to encourage ridesharing. Park and ride lots provide a location for people to meet to share a ride and to park vehicles. However, the creation of park and ride lots will not guarantee increases in ridesharing, even if they are properly located. Also, ridesharing is relatively insensitive to increases in congestion, where HOV lanes do not exist. If HOV lanes are added to a facility, congestion in the general use lanes will provide an incentive for ridesharing and HOV lane use.

The land use in the I-4 Section 1 study area is principally dominated by major activity centers such as Walt Disney World, International Drive and other major employers which are destination arrivals. Park and ride facilities typically work best at the trip origin, such as residential areas. Few locations within the corridor are planned for residential developments; however, significant residential development is planned in the vicinity of the I-4/Lake Avenue interchange. A park and ride lot is planned adjacent to this interchange to serve the HOV travel demand to/from the northeast along I-4, which is described in further detail in section 9.21.

HOV lanes can be signed and enforced for the exclusive use of carpools, vanpools, taxis, shuttle buses, and/or transit, or some combinations of these. Typically, carpools and vanpools require either a minimum of two occupants per vehicle (HOV2+) or three occupants per vehicle (HOV3+). Due to the tourist and resort land uses within Section 1, vehicle occupancy rates are expected to be higher within Section 1 than along other sections of I-4 within the Orlando metropolitan area. Therefore, diversion of traffic volumes from the general use lanes to the HOV facility can be expected immediately after project opening, even without incentives for ridesharing. To further encourage the use of

the HOV lanes, it is anticipated that the facility will be initially operated as an HOV2+ facility. Design traffic projections show that to maintain a quality LOS in the HOV lane it must be converted to HOV3+ prior to the year 2020. As shown in the I-4 MMMP Traffic Report, the largest HOV traffic demand in the Orlando Metropolitan area is in Section 1, between Lake Avenue and the BeeLine Expressway. The I-4 MMMP recommended two HOV lanes in each direction for this segment of I-4, which basically serves as a ramp-to-ramp auxiliary lane.

Another TSM option that may be considered is the use of reversible lanes. Reversible lanes can be used for either general use or HOV lanes and are most successful on roadways with high K factors and/or high directional flows during peak periods. This results in very high volumes in one direction and much lower volumes in the other direction. Due to the existing and anticipated future peaking characteristics (see Table 6-2) on I-4 within Section 1, reversible lanes would not be appropriate.

Other transit options can be considered, such as a facility within a separate right-of-way. The I-4 MMMP recommended typical section included a 13.4 m (44 ft.) transit envelope within the median of I-4 from the Polk/Osceola County line to the BeeLine Expressway. The transit envelope is intended to provide the opportunity for future rail facilities to utilize the I-4 corridor. Light Rail Transit (LRT), which was recommended within the I-4 MMMP, provides an alternative transportation mode which would divert vehicle trips away from I-4. The LRT study has been recently completed and concluded that the extension for LRT service from Central Florida Parkway to Celebration would not be within the median of I-4. The High Speed Rail (HSR) study is also being conducted by Florida Overland Express (FOX). This study is conducting an Environmental Impact Statement (EIS) for alignment alternatives between Orlando and Tampa. The I-4 corridor is being considered as an alternative alignment from generally southwest of S.R. 536 to Tampa. This could involve the I-4 median transit envelope from the Polk/Osceola County line to S.R. 536.

ITS features currently exist within the corridor. However, an expanded treatment of these features will not improve conditions sufficiently without some other improvements. The Advanced Traffic Management System (ATMS) that currently exists will be expanded as part of the improvements recommended by this study.

A scope of services is currently being developed on the I-4 Surveillance and Motorist Information System (SMIS) Phase III. This design/build project will expand the existing system which currently extends from the I-4/World Drive interchange area to the northeast beyond the Section 1 study area. While the exact limits of the expansion has not been determined, the project will extend the SMIS from the I-4/World Drive interchange to the Polk/Osceola County line as a minimum. The maximum expansion would extend from World Drive to 2.4 km (1.5 mi.) southwest of U.S. 27 in Polk County. In addition, an extension of the SMIS is planned from its northeastern terminus on the north side of the Orlando metropolitan area (in the vicinity of Lake Mary Boulevard) to

near DeLand. The northern limit of that project has not been determined, although several locations are being considered.

The ITS Early Deployment Planning Study (Metro Orlando) has been conducted to identify needed functional areas, user services requirements, and system architecture. Included within the study is information on candidate technologies, a public/private workshop for local businesses, and the development of system components. The result of the study will be a User Service Plan, system architecture, and ITE implemental plan. The study primarily focuses on I-4 through downtown Orlando, which is in the Section 2 PD&E Study.

Long acceleration/deceleration lanes at ramp terminals may be considered to smooth operations and eliminate breakdown conditions where large ramp volumes and/or few gaps exist in the freeway stream. Ramp-to-ramp auxiliary lanes will be used where adjacent ramp gores are closely spaced and weaving volumes are high. CD roadways and grade-separated ramps will also be used to smooth operations. These last two treatments are especially useful where excessively large mainline volumes would exist between two adjacent interchanges and are being integrated into the improvement plans.

Sufficient study was completed in the I-4 MMMP to determine the general types of improvements for the entire 23 km (75 mile) I-4 corridor through District Five. The purpose of this PD&E study is to refine the recommendations for Section 1. It should be noted that the I-4 MMMP studied each Section of I-4 in enough detail to recommend typical sections, interchange improvements, HOV access locations, separation treatments between HOV and general use lanes, support facilities (i.e. park-and-ride and park-and-pool lots), and system mobility management needs. The I-4 MMMP considered TSM options in sufficient detail that further study is not warranted. Since the traffic demand on I-4 in Section 1 exceeds the capacity limitations set by the FDOT Interstate Policy, the recommendations in the I-4 MMMP, which are further refined in this PD&E study, are TSM improvements.

The Build alternatives for this project include many of the TSM options listed above. These alternatives include a transit envelope, HOV lanes, CD roadways, improved ramp-terminal treatments, auxiliary lanes, and grade-separated ramps. A 13.4 m (44 ft.) transit envelope is included in the Build alternatives to provide the opportunity for future rail facilities to utilize the I-4 corridor. As stated previously, the tourist and resort land uses within the corridor tend to increase vehicle occupancy rates, and taxi and shuttle bus services already exist within the corridor. This creates an immediate demand for HOV facilities, and the long-term level of congestion in the general use lanes will provide an incentive for ridesharing. In addition, the Build alternatives will provide CD roadways, longer acceleration/deceleration lanes at ramp terminals, ramp-to-ramp auxiliary lanes, and grade-separated ramps to remove geometric bottlenecks and to smooth weaving operations.

8.3 Study Alternatives

The I-4 MMMP addressed various possible mainline improvements and considered their cost effectiveness in the development of recommended improvements. The mainline improvements considered within the I-4 MMMP were constrained to the maximum laneage set by the FDOT Interstate Highway Policy. The improvements recommended in that study were consistent with that Policy. As stated in the previous section, the I-4 MMMP was sufficient in detail to determine the appropriate improvements for the overall corridor as well as improvements specific to each study Section. The study alternatives developed within this PD&E study further refine the recommendations in the I-4 MMMP. Refinements/modifications to the limits of the typical sections, alternative interchange concepts to enhance interchange capacity, and specific locations of CD roads and auxiliary lanes are developed in more detail in the following sections.

The FDOT Interstate Highway Policy, established in November 1991, limits the number of general use lanes to six. In urban areas, four additional lanes may be considered, which must be physically separated from the general use lanes. These lanes, called special use lanes, will be for the exclusive use of high occupancy vehicles, express bus service, and/or vehicles making long distance trips through the urban area. The number of lanes specified by the Policy refers to the number of basic lanes that may be used. Auxiliary lanes, which include long acceleration/deceleration lanes, weaving lanes at ramp terminals, and ramp-to-ramp lanes, may be used in addition to the number of basic lanes specified by the Policy.

The FDOT Interstate Highway Policy represents a change from traditional single mode planning by promoting urban interstate highways as multi-modal corridors and optimizing the movement of people rather than the flow of vehicles. This Policy is to enable interstate highways to continue to serve the needs of both commerce and personal mobility, preserve the environment, and support growth management goals. Where the maximum number of general use lanes is not expected to provide sufficient capacity, HOV lanes and transit provide the greatest potential for increasing person-trip capacity.

8.3.1 Typical Roadway Sections

The I-4 MMMP recommended the following typical sections within I-4 Section 1:

- Six general use and two HOV lanes (6+2) from C.R. 532 to northeast of Lake Avenue and
- Six general use and four HOV lanes (6+4) from northeast of Lake Avenue to the BeeLine Expressway (S.R. 528).

These typical sections are consistent with the FDOT Interstate Highway Policy and were determined in the I-4 MMMP to be cost feasible. While the maximum number of basic

lanes is represented by the (6+4) typical section, the I-4 MMMP determined that the additional special use/HOV lanes were not warranted for most of the I-4 corridor within District Five. As stated in the I-4 MMMP, the Central Florida Greeneway is proposed as a long-term alternative route for vehicles traveling through the Orlando area. The I-4 MMMP further recommended restricting the HOV lanes to HOV3+ traffic in year 2020. LRT was also recommended in the I-4 MMMP for the majority of the I-4 corridor within District Five which includes the northeastern portion of Section 1.

This PD&E study further evaluated the typical sections recommended in the I-4 MMMP, since this study considers a more detailed focus on actual typical sections and alignments rather than on the corridor level. Further coordination with FDOT concerning the transition between the I-4 typical section in District One versus District Five's typical has led to modifications to the typical sections for Section 1:

- Six general use and four special use lanes (6+4) from C.R. 532 to southwest of World Drive;
- Six general use and two HOV lanes (6+2) from southwest of World Drive to northeast of Lake Avenue; and
- Six general use and four HOV lanes (6+4) from northeast of Lake Avenue to the BeeLine Expressway.

The rationale for the change in typical sections is documented in section 6.5 of this report. The special use lanes southwest of World Drive continue the treatment in District One, which permits long distance through single occupant vehicles (SOV) and local HOV2+ (two or more occupants). The transition from special use lanes to HOV lanes has been moved from C.R. 532 as recommended in the I-4 MMMP to the south end of World Drive. This allows a direct connection to the Southern Connector/Central Florida Greeneway (S.R. 417), better implementing the intent of the I-4 MMMP as well as to World Drive for access to Walt Disney World and return to I-4 via the CD roadway system. Throughout the remainder of Section 1, SOVs and HOV2+ must use the general use lanes; the HOV/special use lanes are limited to HOV3+ (three or more occupants). It is anticipated that this will occur prior to the year 2020. The I-4 MMMP also discussed the need to preserve for the potential 6+4 outside the beltway system.

The I-4 MMMP recommended typical section provided a painted buffer separation between the HOV lane and general use lanes from the Polk/Osceola County line to Lake Avenue. Northeast of Lake Avenue, with the additional HOV lane in each direction (6+4), the I-4 MMMP recommended that barrier separation be provided. Consistent with this recommended treatment, the separation treatment was changed to be barrier between the Polk/Osceola County line and World Drive, corresponding with the change in typical section from 6+2 to 6+4. As a result of this change, this left a relatively short section (World Drive to Lake Avenue) of potential buffer separation treatment. Upon reevaluation of the two separation treatments, the barrier separation was chosen for the 6+2 section for the following reasons:

- The barrier separation provides better system continuity because barrier separation is provided throughout District One (Polk County) and a majority of this study area.
- The I-4 corridor in Section 1 is heavily traveled by tourists and typically has higher vehicle occupancy rates. Therefore, the HOV lanes have a higher level of opportunity of being used by a driver unfamiliar with the area. The barrier separation affords better control of traffic entering and exiting the HOV system.
- The barrier separation better facilitates HOV enforcement by having shoulders on both sides of the HOV lane. Further, the physical separation will aid general use lane flow when a HOV violation stop is made.

These recommended mainline typical sections are shown in Exhibit 8-1. This Exhibit also shows the various CD road and ramp typical sections.

8.3.2 Roadway Improvement Alternatives

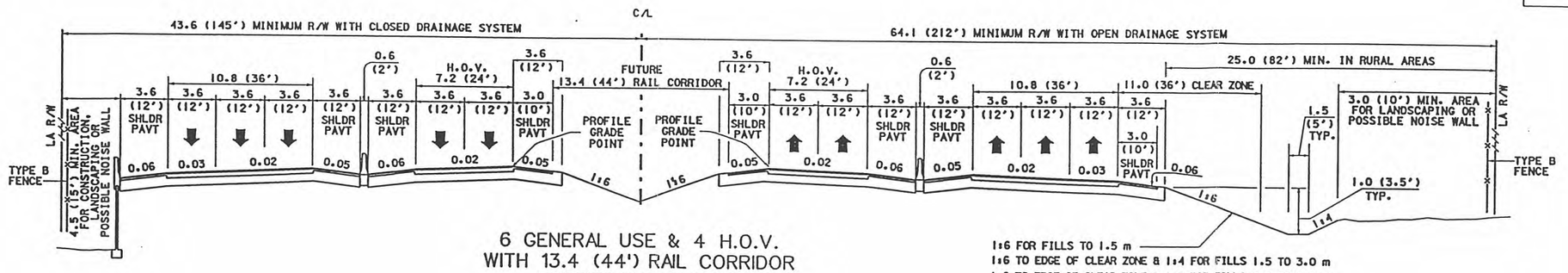
Corridor analysis and alternative roadway alignments were covered in the I-4 MMMP and the I-4 Major Investment Study (MIS). Both of those studies focused on the full 119 km (74 mi.) I-4 corridor in District Five. While the corridor analysis within those studies were sufficient to be carried forward into this PD&E study, alternative roadway alignments are given further study. Within the I-4 MMMP, there was considered to be no other reasonable alternative alignment for I-4, due to the extensive development within the I-4 corridor. Therefore, the alternative roadway alignments developed in this PD&E study are within the existing I-4 corridor.

Tier 2 of the I-4 MMMP established the design concept and scope of 6+2+LRT for the majority of the 119 km (74 mi.) corridor. Tier 3 refined and expanded the concept into a Master Plan recommendation and addressed interchange improvements, HOV access, support facilities such as park-and-ride, highway buffer/barrier separation treatments, and system management strategies. Since the I-4 MMMP focused on the full corridor, Tier 3 of the I-4 MMMP is considered to be a starting point, with further refinements given in each PD&E study section. This PD&E study focuses on the I-4 MMMP recommendations specific to Section 1 and refines them specifically to this portion of the corridor.

Consequently, the alternative alignments within this study focus primarily on HOV access/egress, interchange improvements, mainline operations improvements between adjacent closely-spaced interchanges, and ramp-terminal intersection improvements. These alternatives are broken down into four segments. Interchange improvements recommended in the I-4 MMMP for C.R. 532, World Drive, Southern Connector (S.R. 417), and S.R. 536 remain unchanged. All others are considered for modification.

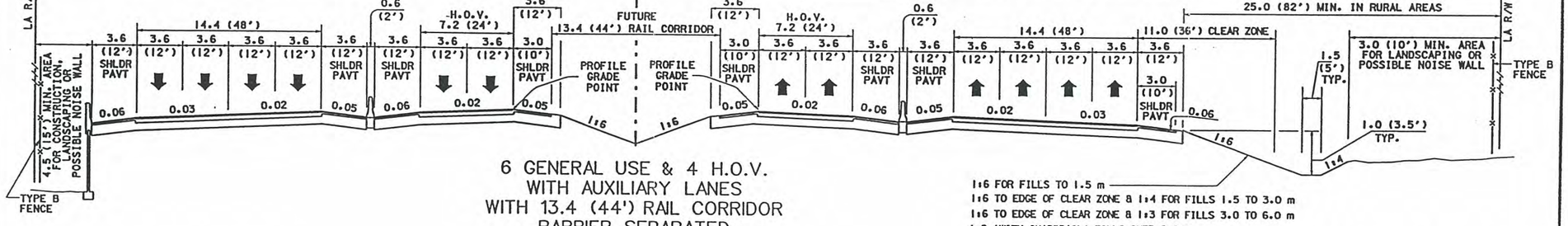
STATE PROJ. NO.	SHEET NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



6 GENERAL USE & 4 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED
NOT TO SCALE
STA. 00+00.000 TO STA. 43+00.000*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m



6 GENERAL USE & 4 H.O.V.
WITH AUXILIARY LANES
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED
NOT TO SCALE
STA. 00+00.000 TO STA. 43+00.000*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

DESIGN SPEED - 110 KM/H (70 MPH)

*NOTE: STATIONING IS BASED ON PREVIOUS PLANS AND NOT FIELD SURVEY.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
OSCEOLA	SR400 (I-4)	12.680 KM (7.88 MI.)	STA. 00+00.000 TO STA. 126+80.000 POLK / OSCEOLA COUNTY LINE TO OSCEOLA/ORANGE COUNTY LINE	92130	1425	171.8 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY / CONSULTANT / DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER / DATE:
NA	5147330	242526-1	John D. Sullivan, Jr. August 21, 1998		

04-AUG-1998 @:\2443\division\exhibit8-1.dgn
\\orlw001\trans\2443\open\ROW\Typ_Sect\exhibit8-1.dgn
NONE

EXHIBIT 8-1

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

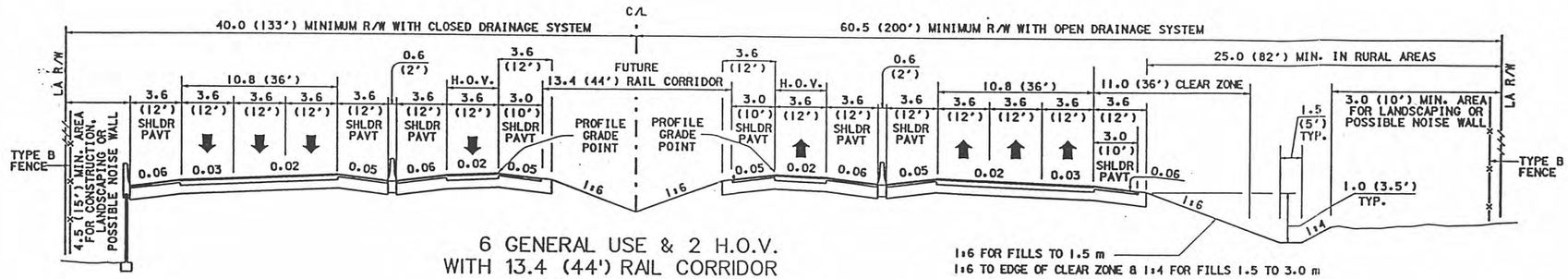
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

STATE PROJ. NO.	SHEET NO.

3/15

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION

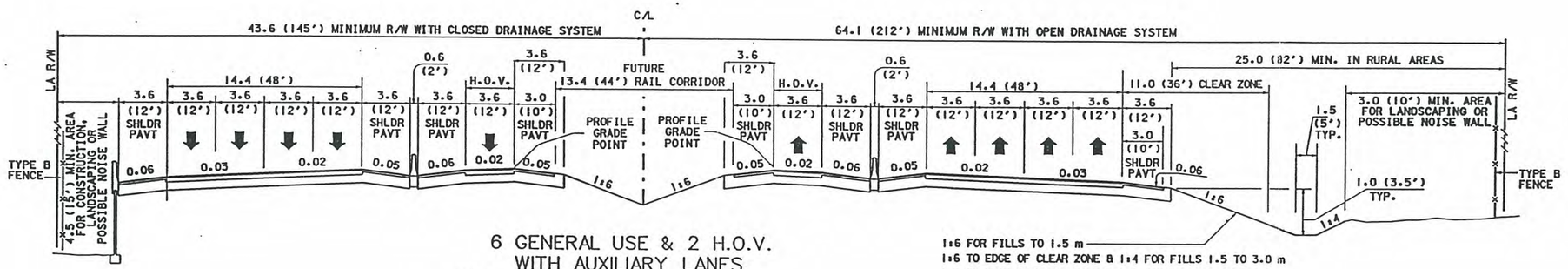


6 GENERAL USE & 2 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED

NOT TO SCALE

STA. 43+00.000 TO STA. 126+80.000*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m



6 GENERAL USE & 2 H.O.V.
WITH AUXILIARY LANES
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED

NOT TO SCALE

STA. 43+00.000 TO STA. 126+80.000*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

DESIGN SPEED - 110 KM/H (70 MPH)

*NOTE: STATIONING IS BASED ON PREVIOUS PLANS AND NOT FIELD SURVEY.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
OSCEOLA	SR400 (I-4)	12.680 KM (7.88 MI)	STA. 00+00.000 TO STA. 126+80.000 POLK / OSCEOLA COUNTY LINE TO OSCEOLA / ORANGE COUNTY LINE	92130	1425	171.8 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: / CONSULTANT / DATE:	CONCURRENCE: / DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: / FHWA DISTRICT ENGINEER / DATE:
NA	5147330	242526-1	John W. Freeman, P.E. August 7-1, 1998		

04-AUG-1998 e:\2443\data\exhibit8-1.dgn
\orlw00\trans\2443\open\rtplcen NONE

EXHIBIT 8-1 CONTINUED

REVISIONS												
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

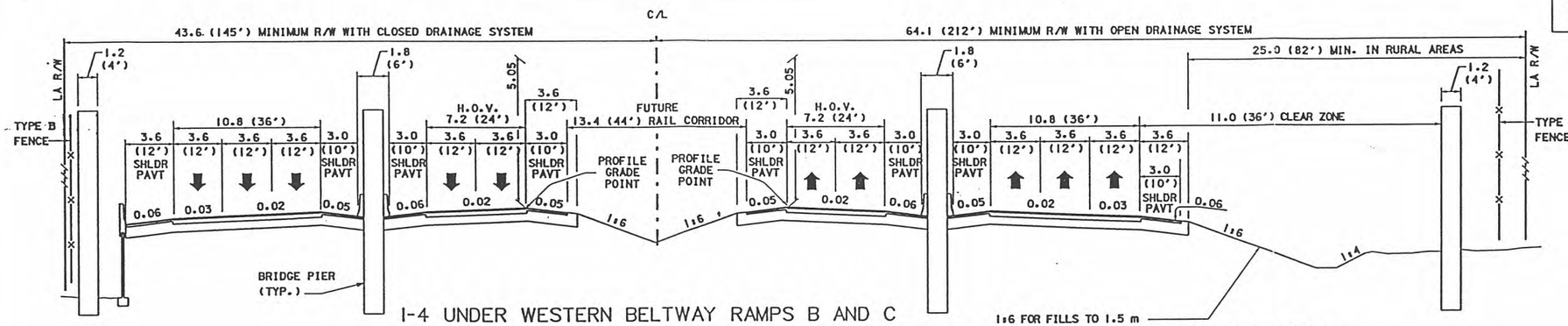
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

STATE PROJ. NO.	SHEET NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



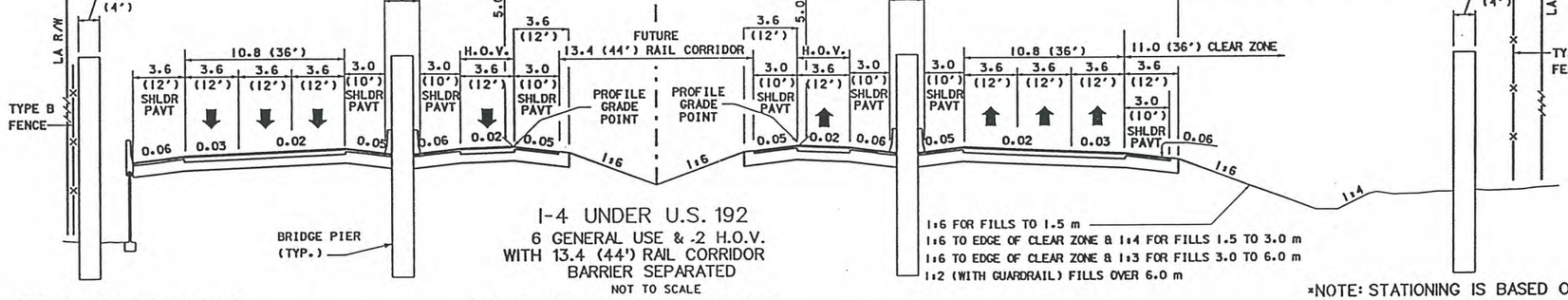
I-4 UNDER WESTERN BELTWAY RAMPS B AND C

6 GENERAL USE & 4 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED

NOT TO SCALE

STA. 31+89.342 TO STA. 33+62.111*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m



I-4 UNDER U.S. 192

6 GENERAL USE & 2 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED

NOT TO SCALE

STA. 103+11.640 TO STA. 107+14.041*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

DESIGN SPEED - 110 KM/H (70 MPH)

*NOTE: STATIONING IS BASED ON PREVIOUS PLANS AND NOT FIELD SURVEY.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
OSCEOLA	SR400 (I-4)	12.680 KM (7.88 MI.)	STA. 60+00.000 TO STA. 126+80.000 POLK / OSCEOLA COUNTY LINE TO OSCEOLA / ORANGE COUNTY LINE	92130	1425	171.8 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY:	CONCURRENCE:	CONCURRENCE:
NA	5147330	242526-1	CONSULTANT: John R. Friesen, P.E. DATE: August 21, 1998	DISTRICT DESIGN ENGINEER DATE:	FHWA DISTRICT ENGINEER DATE:

04-AUG-1998
e:\2443\dan\low\exhibit8-1.dgn
\\anlw00\trans\2443\pen\ilut1.pen
NONE

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

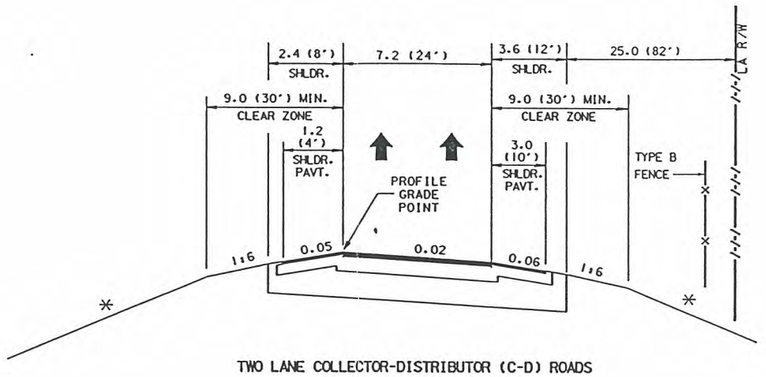
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

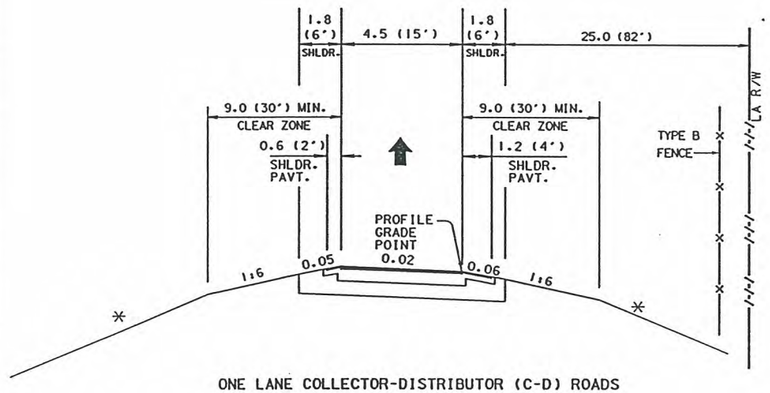
STATE PROJ. NO.	SHEET NO.

5/15

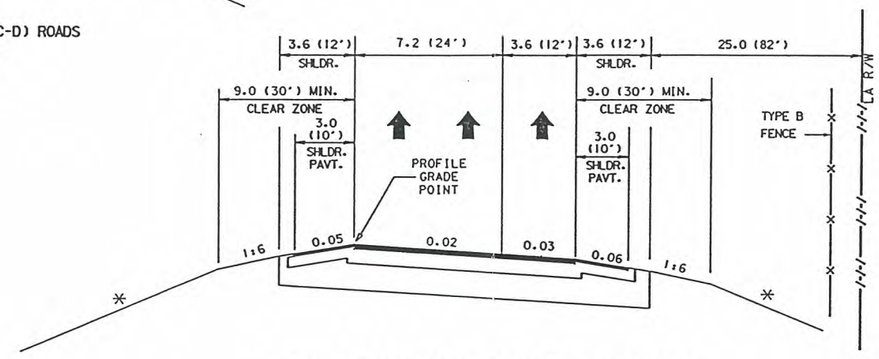
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



TWO LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH 25.0 (82') BORDER
NOT TO SCALE



ONE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE



THREE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE

DESIGN SPEED - 90 KM/H (55 MPH)

STATIONING IS NOT AVAILABLE.
FIELD SURVEY IS NOT AVAILABLE.

* 1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
OSCEOLA	SR400 (I-4)	2.680 KM (7.88 MI.)	STA. 00+00.000 TO STA. 126+80.000 POLK / OSCEOLA COUNTY LINE TO OSCEOLA / ORANGE COUNTY LINE	92130	1425	171.8 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: John R. Fuhrman	CONCURRENCE:	CONCURRENCE:
NA	5147330	242526-1	CONSULTANT: August 21, 1998 DATE:	DISTRICT DESIGN ENGINEER DATE:	FHWA DISTRICT ENGINEER DATE:

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

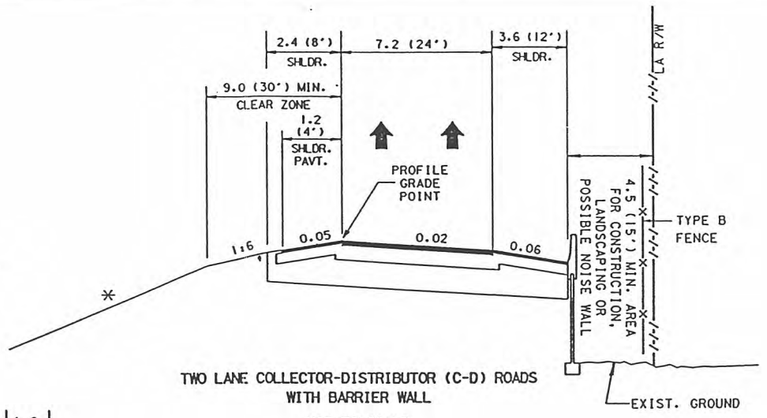
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

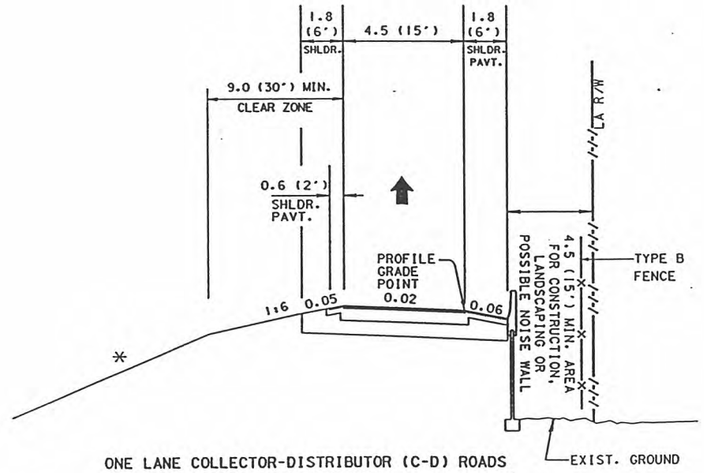
STATE PROJ. NO.	SHEET NO.

6/15

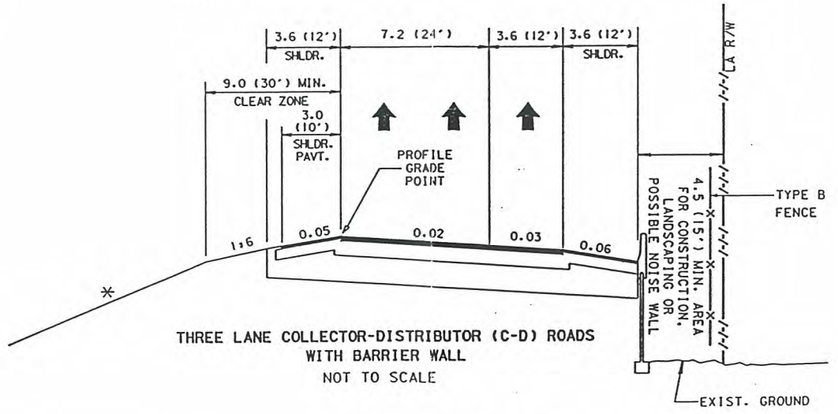
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



TWO LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH BARRIER WALL
NOT TO SCALE



ONE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH BARRIER WALL
NOT TO SCALE



THREE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH BARRIER WALL
NOT TO SCALE

DESIGN SPEED - 90 KM/H (55 MPH)

STATIONING IS NOT AVAILABLE.
FIELD SURVEY IS NOT AVAILABLE.

* 1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4: FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
OSCEOLA	SR400 (I-4)	12.680 KM (7.88 MI.)	STA. 00+00.000 TO STA. 126+80.000 POLK / OSCEOLA COUNTY LINE TO OSCEOLA / ORANGE COUNTY LINE	92130	1425	171.8 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY : CONSULTANT / DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER / DATE:
NA	5147330	242526-1	John R. Freeman, August 21, 1996		

04-AUG-1998 8:55
E:\2443\ADM\typicals\typicals.sscexhibit8-1.dgn
\\orlw001\trans\2443\dgn\2443dgn\exhibit8-1.dgn
NONE

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

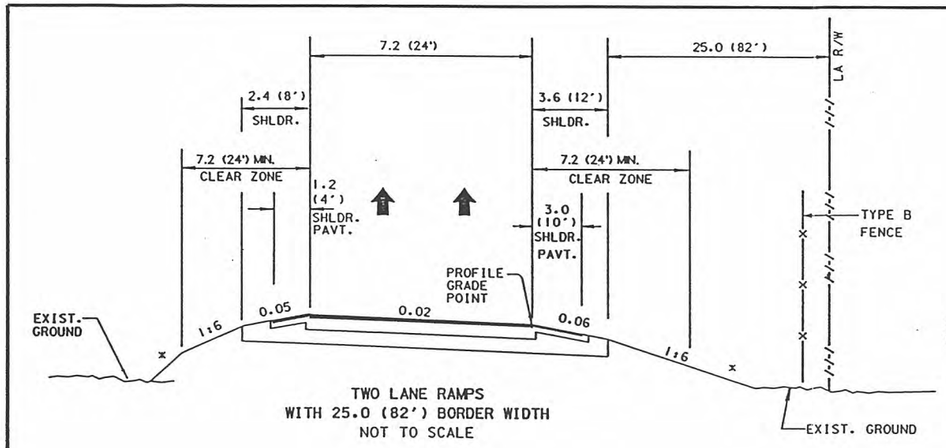
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

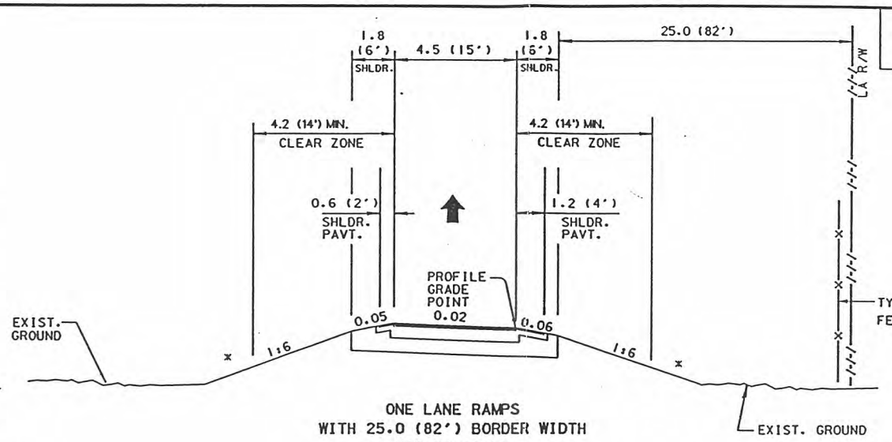
STATE PROJ. NO.	SHEET NO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION

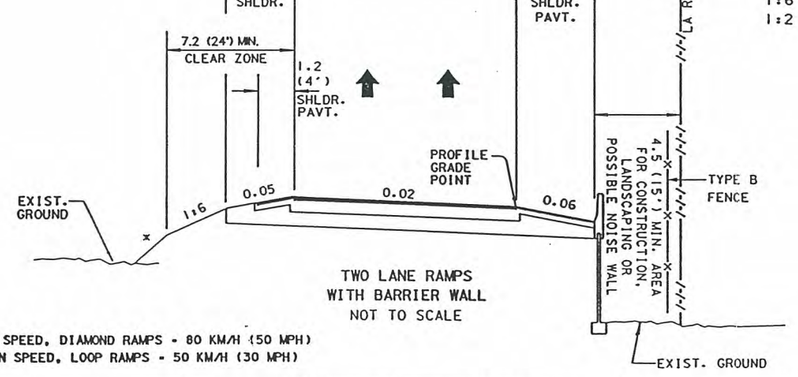
7/15



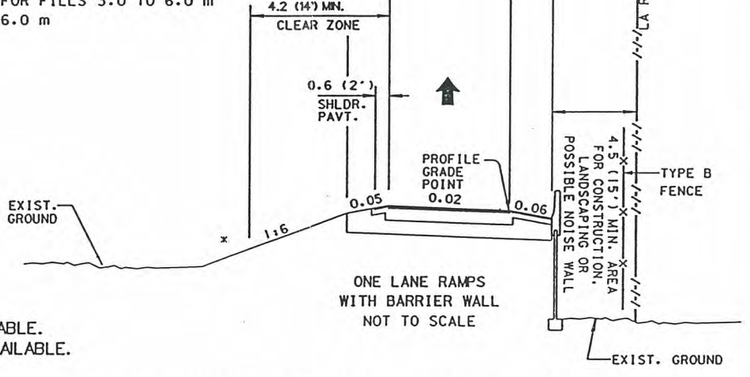
TWO LANE RAMPS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE



ONE LANE RAMPS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE



TWO LANE RAMPS
WITH BARRIER WALL
NOT TO SCALE



ONE LANE RAMPS
WITH BARRIER WALL
NOT TO SCALE

* 1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

DESIGN SPEED, DIAMOND RAMPS - 80 KM/H (50 MPH)
DESIGN SPEED, LOOP RAMPS - 50 KM/H (30 MPH)

STATIONING IS NOT AVAILABLE.
FIELD SURVEY IS NOT AVAILABLE.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
OSCEOLA	SR400 (I-4)	12.680 KM (7.88 MI.)	STA. 00+00.000 TO STA. 126+80.000 POLK / OSCEOLA COUNTY LINE TO OSCEOLA / ORANGE COUNTY LINE	92130	1425	171.8 M (CONSTRUCTION)
FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: CONSULTANT / DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER / DATE:	
NA	5147330	242526-1	John R. Driscoll, P.E. August 21, 1998			

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

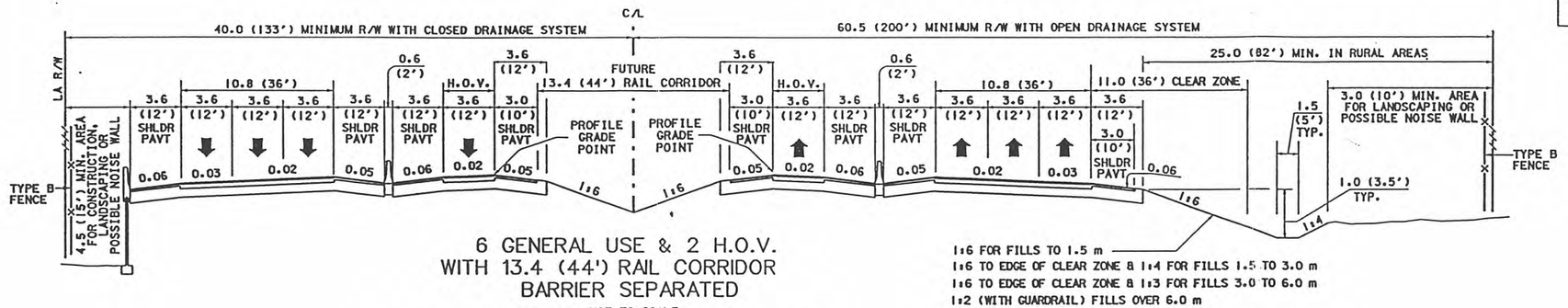
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

STATE PROJ. NO.	SHEET NO.

2/16

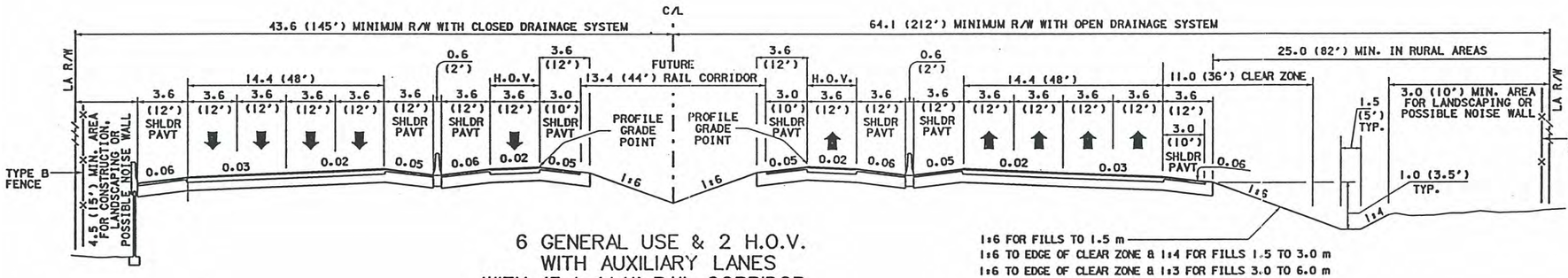


6 GENERAL USE & 2 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED

NOT TO SCALE

STA. 126+80.000 TO STA. 206+20.000*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m



6 GENERAL USE & 2 H.O.V.
WITH AUXILIARY LANES
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED

NOT TO SCALE

STA. 126+80.000 TO STA. 206+20.000*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

DESIGN SPEED - 110 KM/H (70 MPH)

*NOTE: STATIONING IS BASED ON PREVIOUS PLANS AND NOT FIELD SURVEY.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
ORANGE	SR400 (I-4)	9.113 KM (5.66 MI)	STA. 126+80.000 TO STA. 217+93.200 OSCEOLA/ORANGE COUNTY LINE TO WEST OF THE BEELINE EXPRESSWAY	75280	1479	147.3 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY CONSULTANT DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER DATE:
NH-4-2 (169) 65	5147254	242483-1	August 21, 1996		

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

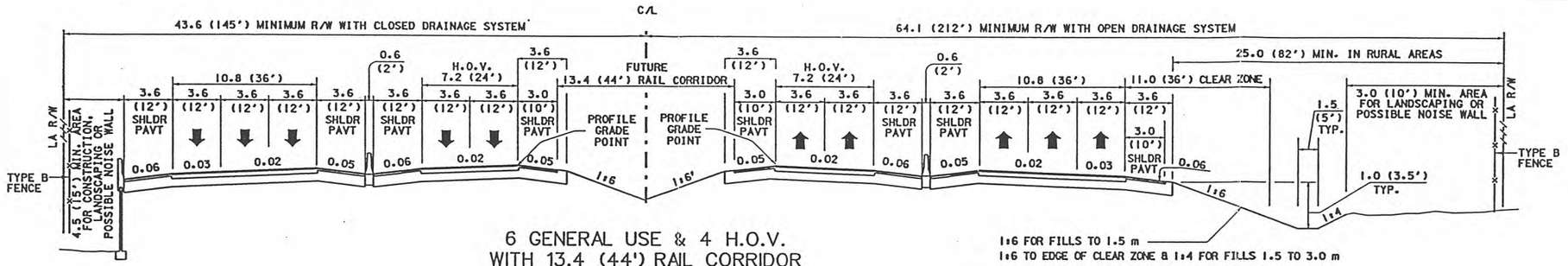
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

STATE PROJ. NO.	SHEET NO.

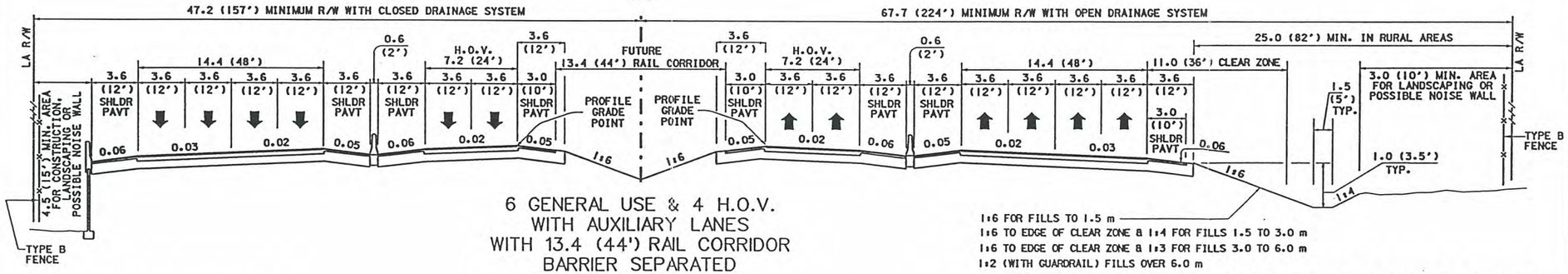
3/16

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



6 GENERAL USE & 4 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED
NOT TO SCALE
STA. 206+20.000 TO STA. 217+93.200*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m



6 GENERAL USE & 4 H.O.V.
WITH AUXILIARY LANES
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED
NOT TO SCALE
STA. 206+20.000 TO STA. 217+93.200*

1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

DESIGN SPEED - 110 KM/H (70 MPH)

*NOTE: STATIONING IS BASED ON PREVIOUS PLANS AND NOT FIELD SURVEY.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
ORANGE	SR400 (I-4)	9.113 KM (5.66 MI.)	STA. 126+89.000 TO STA. 217+93.200 OSCEOLA / ORANGE COUNTY LINE TO WEST OF THE BEELINE EXPRESSWAY (S.R. 528)	75280	1479	147.3 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY:	CONCURRENCE:	CONCURRENCE:
NH-4-2 (169) 65	5147254	242483-1	CONSULTANT: John R. Freeman Jr. DATE: August 24, 1998	DISTRICT DESIGN ENGINEER DATE:	FHWA DISTRICT ENGINEER DATE:

EXHIBIT 8-1 CONTINUED

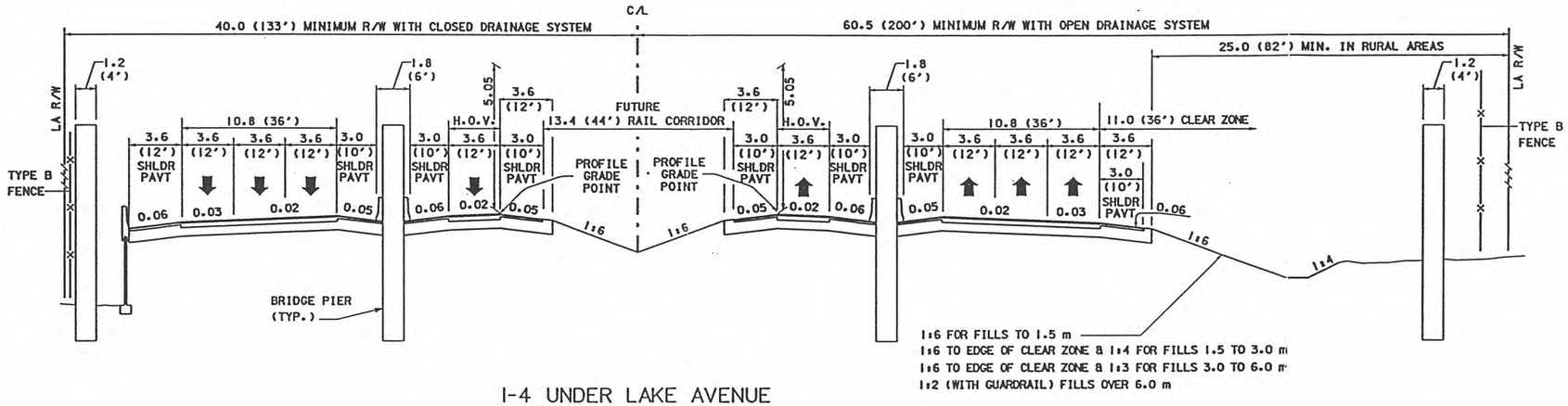
REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS | FLORIDA DEPARTMENT OF TRANSPORTATION | I-4 PD & E TYPICAL SECTIONS

STATE PROJ. NO.	SHEET NO.

4/16

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



I-4 UNDER LAKE AVENUE

6 GENERAL USE & 2 H.O.V.
WITH 13.4 (44') RAIL CORRIDOR
BARRIER SEPARATED
NOT TO SCALE

STA. 188+52.638 TO STA. 189+82.188*

DESIGN SPEED - 110 KM/H (70 MPH)

*NOTE: STATIONING IS BASED ON PREVIOUS PLANS AND NOT FIELD SURVEY.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
ORANGE	SR400 (I-4)	9.113 KM (5.66 MI.)	STA. 126+80.000 TO STA. 217+93.200 OSCEOLA/ORANGE COUNTY LINE TO WEST OF THE BEELINE EXPRESSWAY (S.R. 528)	75280	1479	147.3 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: CONSULTANT / DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER / DATE:
NH-4-2 (169) 65	5147254	242483-1	August 21, 1998		

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

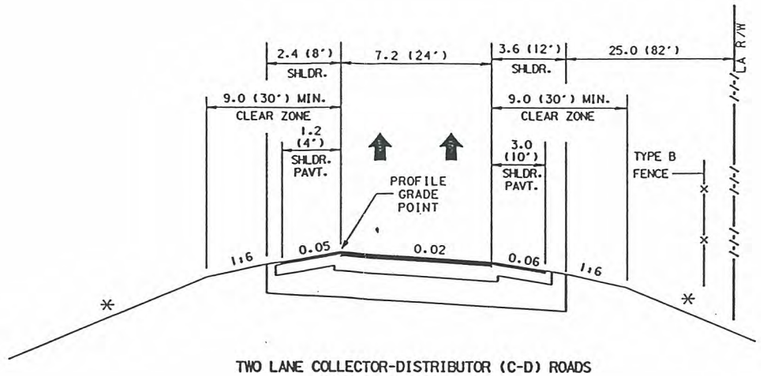
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

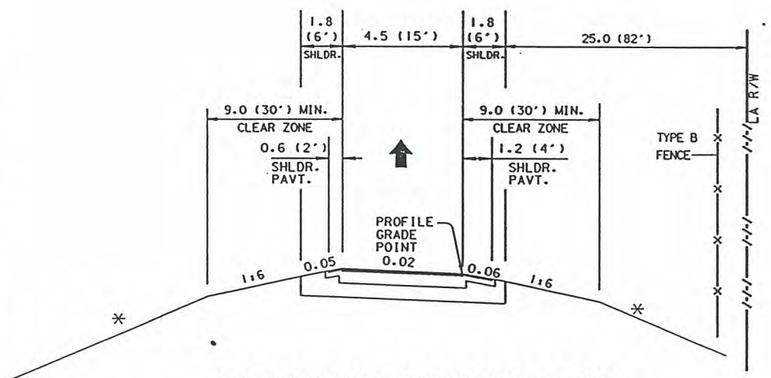
STATE PROJ. NO.	SHEET NO.

5/16

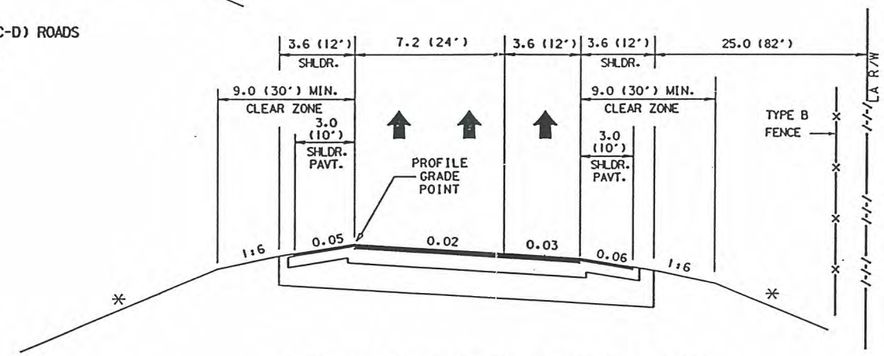
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



TWO LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH 25.0 (82') BORDER
NOT TO SCALE



ONE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE



THREE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE

DESIGN SPEED - 90 KM/H (55 MPH)

STATIONING IS NOT AVAILABLE.
FIELD SURVEY IS NOT AVAILABLE.

* 1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
ORANGE	SR400 (I-4)	9.113 KM (5.66 MI.)	STA. 126+80.000 TO STA. 217+93.200 OSCEOLA/ORANGE COUNTY LINE TO WEST OF THE BEELINE EXPRESSWAY (S.R. 528)	75280	1479	147.3 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: CONSULTANT / DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER / DATE:
NH-4-2 (169) 65	5147254	242483-1	John W. Hudson, Jr. August 21, 1998		

04-AUG-1998
e:\2443\roadway\exhibit8-1.dgn
\\orlw00\trans\2443\pan\ufplan
MIKE

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

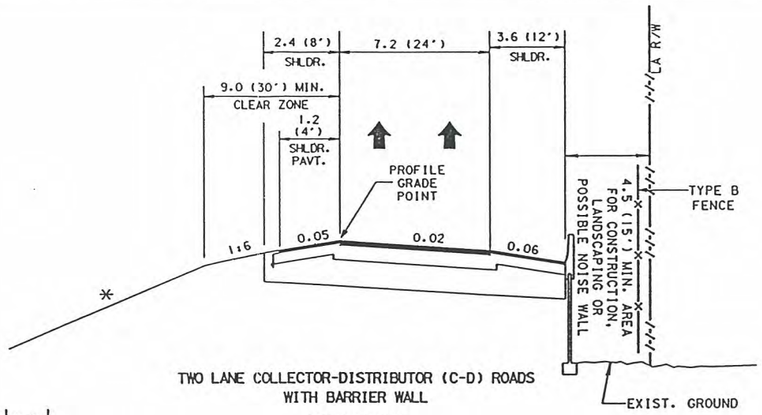
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

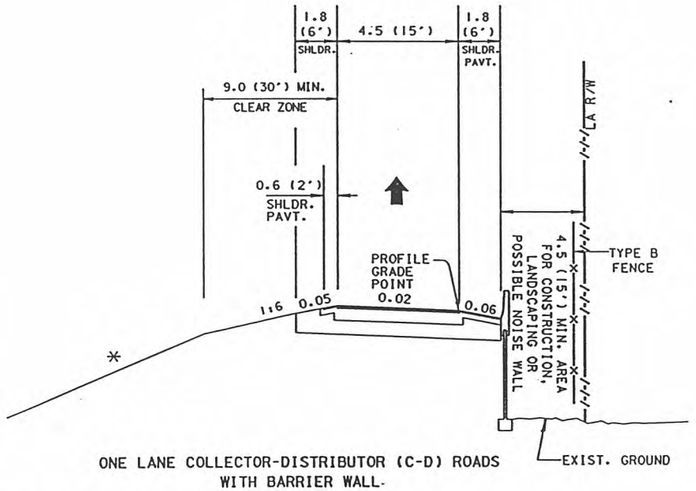
STATE PROJ. NO.	SHEET NO.

6/16

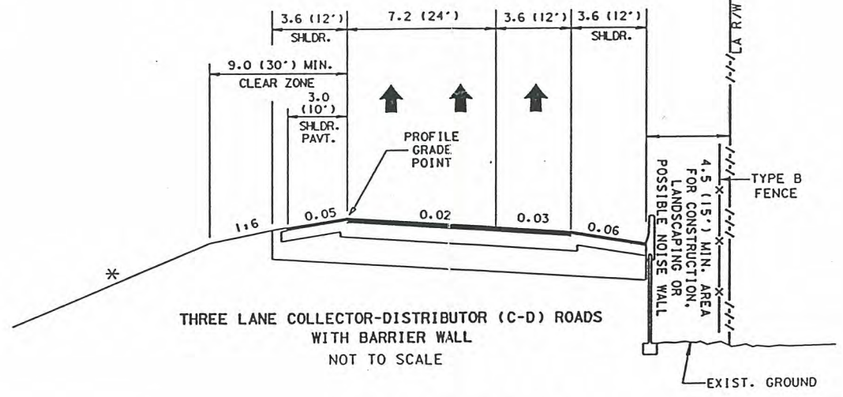
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION



TWO LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH BARRIER WALL
NOT TO SCALE



ONE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH BARRIER WALL
NOT TO SCALE



THREE LANE COLLECTOR-DISTRIBUTOR (C-D) ROADS
WITH BARRIER WALL
NOT TO SCALE

DESIGN SPEED - 90 KM/H (55 MPH)

STATIONING IS NOT AVAILABLE.
FIELD SURVEY IS NOT AVAILABLE.

* 1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4: FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
ORANGE	SR400 (I-4)	9.113 KM (5.66 MI.)	STA. 126+80.000 TO STA. 217+93.200 OSCEOLA/ORANGE COUNTY LINE TO WEST OF THE BEELINE EXPRESSWAY (S.R. 528)	75280	1479	147.3 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: CONSULTANT / DATE:	CONCURRENCE: DISTRICT DESIGN ENGINEER / DATE:	CONCURRENCE: FHWA DISTRICT ENGINEER / DATE:
NH-4-2 (169) 65	5147254	242483-1	John R. Freeman, J. August 21, 1996		

8-400998 1656
E:\24434\ROH\Options\TYPDSJPAGE.DGN

04-AUG-1998
e:\24434\davidw\exhibit8-1.dgn
\\orlw00\trans\24434\pen\VistaPlen
NONE

EXHIBIT 8-1 CONTINUED

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

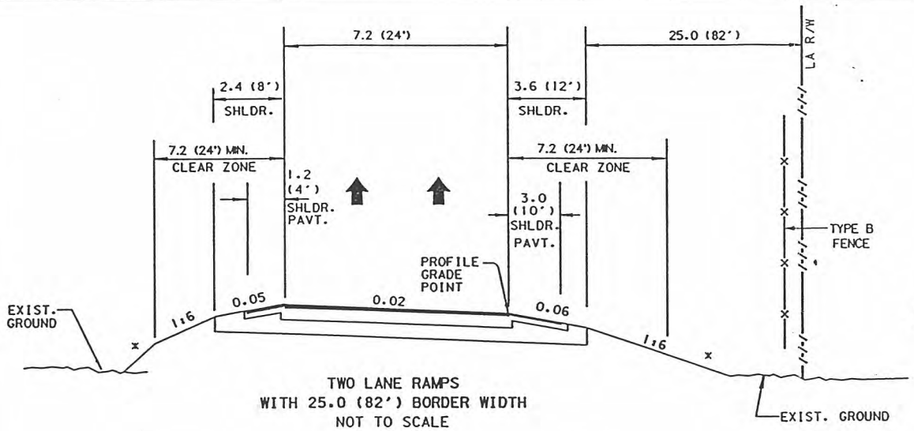
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

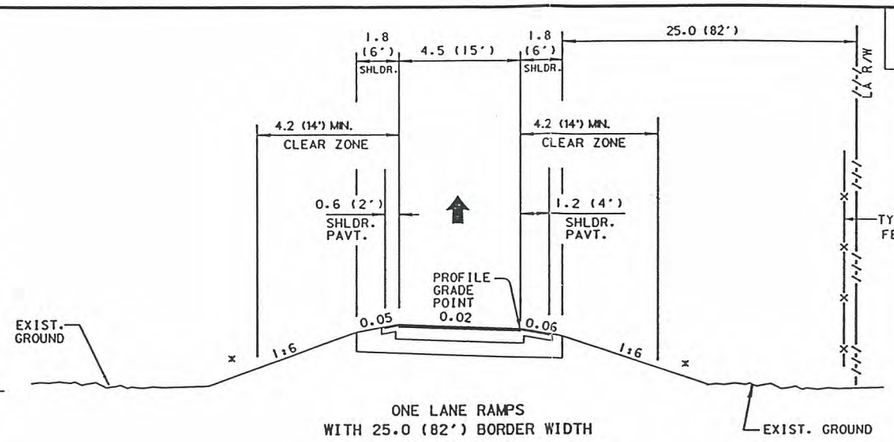
STATE PROJ. NO.	SHEET NO.

7/16

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSED TYPICAL SECTION

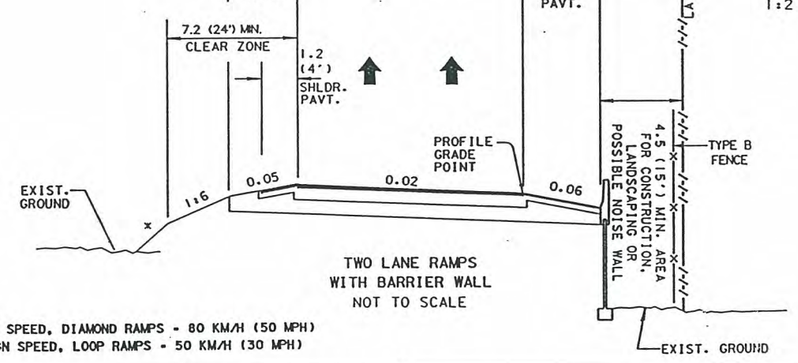


TWO LANE RAMPS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE

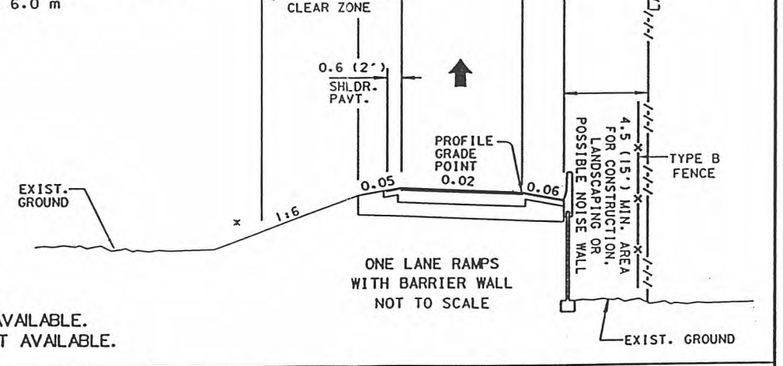


ONE LANE RAMPS
WITH 25.0 (82') BORDER WIDTH
NOT TO SCALE

* 1:6 FOR FILLS TO 1.5 m
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 1.5 TO 3.0 m
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 3.0 TO 6.0 m
1:2 (WITH GUARDRAIL) FILLS OVER 6.0 m



TWO LANE RAMPS
WITH BARRIER WALL
NOT TO SCALE



ONE LANE RAMPS
WITH BARRIER WALL
NOT TO SCALE

DESIGN SPEED, DIAMOND RAMPS - 80 KM/H (50 MPH)
DESIGN SPEED, LOOP RAMPS - 50 KM/H (30 MPH)

STATIONING IS NOT AVAILABLE.
FIELD SURVEY IS NOT AVAILABLE.

COUNTY	ROAD NO.	LENGTH	TERMINI	SECTION	JOB	EST. COST
ORANGE	SR400 (I-4)	9.113 KM (5.66 MI.)	STA. 126+80.000 TO STA. 217+93.200 OSCEOLA/ORANGE COUNTY LINE TO WEST OF THE BEELINE EXPRESSWAY (S.R. 528)	75280	1479	147.3 M (CONSTRUCTION)

FEDERAL AID PROJECT NO.	WPI NO.	FINANCIAL PROJECT ID	APPROVED BY: John R. Friedman	CONCURRENCE:	CONCURRENCE:
NH-4-2 (169) 65	5147254	242483-1	CONSULTANT DATE: August 21, 1998	DISTRICT DESIGN ENGINEER DATE:	FHWA DISTRICT ENGINEER DATE:

09-AUG-1998 16:56
E:\2443\MKDATA\plotdata\TYPST_DRAW2.DGN

04-AUG-1998
d:\2443\dgn\dwg\exhibit8-1.dgn
\\orlw001\trans\2443\dgn\ViaTalpen
NONE

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 PD & E
TYPICAL SECTIONS

EXHIBIT 8-1 CONTINUED

I-4 in Polk County Master Plan

The 6+4 typical section proposed in District One will provide six general use lanes and four special use lanes with a 13.4 m (44 ft.) wide median to accommodate HSR. The special use lanes will accommodate local HOV2+ and interregional SOV. This typical will begin at the Hillsborough/Polk County line at the end of the Tampa urban service boundary and continue to the Polk/Osceola County line or the District One/District Five boundary. Access to the special use lanes is limited in Polk County to the following slip ramp locations, which is explained in more detail below.

- Between the C.R. 582 and S.R. 33 interchanges,
- West of the proposed Polk County Parkway (East) interchange,
- Between the Polk County Parkway (East) and U.S. 27 interchanges, and
- In the area of the Polk/Osceola County line or the I-4/C.R. 532 interchange.

The selection of these locations was based on a minimum spacing of 4.8 km (3.0 mi.), demand at major destinations in the corridor, the spacing of interchanges, mainline geometry, and the potential for environmental impacts. Weaving analysis was also used to determine the minimum distance from adjacent interchanges for acceptable operations.

The first location serves the special use demand from the Lakeland interchanges at Kathleen Road, U.S. 98, and C.R. 582. This location is approximately 16 km (10 mi.) east of the Hillsborough/Polk County line. In the eastbound direction, traffic from each of those interchanges can weave across the general use lanes to enter the special use lanes. A westbound vehicle in the special use lanes can exit at this location and weave across the general use lanes to exit at one of the Lakeland interchanges.

The second location is west of the proposed Polk County Parkway (East) interchange, approximately 6.3 km (3.9 mi.) from the first location. This location provides an eastbound exit from the special use lanes which allows traffic to weave across the general use lanes and exit at Polk County Parkway (East). In the westbound direction, a slip ramp entrance allows traffic from the Polk County Parkway (East) to weave across the general use lanes to access the special use lanes.

The next location serves demand from the Polk County Parkway (East) interchange and was originally planned between the S.R. 559 and C.R. 557 interchanges. Physical, geometric, and environmental constraints required that the eastbound and westbound slip ramps be separated. The eastbound special use lane entrance ramp is located west of the S.R. 559 interchange and the westbound exit ramp is located east of the C.R. 557 interchange. Eastbound traffic from the Polk County Parkway (East) interchange can access the special use lanes by weaving across the general use lanes to access the entrance ramp. Westbound special use lane traffic can exit the special use lanes and weave across the general use lanes to exit at Polk County Parkway (East). The eastbound slip ramp is

located approximately 5.25 km (3.25 mi.) east of the second location. The westbound slip ramp is located 15.5 km (9.5 mi.) east of the second location.

As listed above, the fourth slip ramp location is in the area of the Polk/Osceola County line or the I-4/C.R. 532 interchange, which provides the transition between the District One and Five typical sections. A precise baseline station or location from a specific point, however, was not specified for this slip ramp. A LOS analysis conducted as part of the I-4 Polk County PD&E Study showed that the I-4 general use lanes east of this slip ramp would be unacceptable. The Preliminary Engineering Report for that PD&E study stated that the location of this slip ramp may be affected by the results of the I-4 MMMP. The location of this special use lane access has been further reviewed, as described below.

The I-4 MMMP typical section of six general use lanes and two HOV lanes (6+2) was planned to begin at the Polk/Osceola County line. This I-4 Section 1 PD&E study has reviewed the location of the transition from 6+4 to 6+2. Through further coordination with Districts One and Five, this transition was moved further east to the World Drive interchange. The background for this change are described in section 6.5 of this report. This transition serves three purposes. First, it allows a direct connection to the World Drive interchange and the Walt Disney World resort area without requiring traffic to weave across the general use lanes, which are anticipated to be congested during peak periods. Second, it allows through trips access to the Southern Connector/Central Florida Greeneway (S.R. 417), which serves as a bypass route in the Orlando area and serves trips to the airport and the east side of the metropolitan area. Finally, it allows non-HOV traffic from District One to return to the general use lanes. It also provides increased capacity within this area. The I-4 MMMP projected HOV volumes showed this lane to be underutilized. By extending the special use treatment to World Drive, better utilization of this available capacity is achieved and general use lane operations are improved. This is especially important between the Western Beltway and World Drive interchanges where Beltway/Greeneway traffic enters the I-4 system. The volume in the special use lanes allows for improved operations in the general use lanes to enhance these ramp to ramp operations. In the I-4 MMMP concept, all vehicles with less than three occupants (SOV and HOV2) plus traffic exiting at World Drive and Southern Connector would have had to exit the special use lanes at the county line, which is expected to be a large volume for one slip ramp. However, the transition at World Drive separates the movements heading for World Drive and the Southern Connector/Central Florida Greeneway (S.R. 417) from the traffic heading to the general use lanes, along the CD road. This point of transition provides a more logical terminus for the 6+4 typical section than the Polk/Osceola County line.

Traffic that would have exited the special use lanes at the Polk/Osceola County which desired access to the Western Beltway would no longer be accommodated by this change in transition point. Also, there is a significant volume of traffic that enters at U.S. 27 in the eastbound direction or exits to U.S. 27 in the westbound direction. These two considerations prompted the addition of two special use lane access points in Polk

County. A slip ramp was added west of U.S. 27 to allow eastbound special use lane traffic to weave across the general use lanes to exit at U.S. 27, C.R. 532, and Western Beltway. A slip ramp was added east of U.S. 27 to allow traffic from U.S. 27 and heading eastbound on I-4 to enter the special use lanes. A complementary set of ramps was added in the westbound direction in roughly the same locations as the eastbound ramps to accommodate the complementary movements.

The I-4 Section 1 study area has been divided into four segments. Roadway improvement alternatives/options for each segment are described below. Plan sheets are provided in Appendix A and are numbered sequentially from 1 through 15. A letter corresponding to the alternative/option is added to the sheet number as appropriate. For example, sheets 2A and 2B cover the part of segment one between C.R. 532 and the Western Beltway. The letter 'A' denotes option 1A and 'B' denotes option 1B.

Segment One: C.R. 532 to Southwest of U.S. 192 (S.R. 530)

This segment of I-4 includes the transition between the 6+4 typical section from District One to the 6+2 typical section in District Five. As explained above, this transition is planned to occur at the World Drive interchange. This segment is shown on plan sheets 1 through 6 in Appendix A. Two options are proposed for this segment, which differ by how the transition between special use lanes and HOV lanes is accommodated.

Option 1A provides a direct connect flyover ramp between the special use lanes and the World Drive CD roads for both eastbound and westbound traffic. East of the C.R. 532 interchange, the access points to/from the special use lanes for eastbound are explained as follows. The first access is an at-grade entrance slip ramp at the C.R. 532 interchange for U.S. 27 traffic. Another at-grade entrance slip ramp is located near the Western Beltway interchange which allows traffic to weave across the general use lanes from C.R. 532 to the special use lanes. The next access is the flyover ramp to the World Drive interchange. This ramp is a lane drop and represents the point of change between the special use lane and HOV lane designation. Within the World Drive interchange, an at-grade exit slip ramp is provided for traffic accessing the U.S. 192, Osceola Parkway, and S.R. 536 interchanges. This ramp also provides a second chance for the remaining SOV and HOV2 traffic to exit the HOV lanes. It is recommended that HOV enforcement begin east of this ramp. Further east, a HOV T-ramp provides a direct connection from the Disney's Celebration and World Drive to the HOV lanes via Road B. For the westbound direction, the complementary movements are provided by use of similar ramp configurations as in the eastbound direction.

The difference between Options 1A and 1B are related to HOV access in the westbound direction from World Drive to the Polk/Osceola County line. Due to environmental impacts in the Reedy Creek area and traffic operation concerns on the westbound CD system, the direct connect ramp for the westbound direction was eliminated in Option 1B. An at-grade entrance slip ramp at World Drive was relocated approximately 700 m (2,300 ft.) further west. This ramp would be considered to be the start of the special use lanes by

allowing traffic from the general use lanes to enter at this point. Also, the direct connect ramp provided in Option 1A assumes that traffic from the general use lanes would use the westbound CD road to access the flyover ramp. The year 2020 design hour traffic analysis showed that this weave would operate at LOS E for both the weaving and non-weaving vehicles. Due to potential significant environmental impacts, the weaving section could not be lengthened to 825.0 m (2,700 ft.), as recommended in the Design Traffic Report to achieve LOS D for weaving and non-weaving vehicles. An at-grade entrance slip ramp was added west of the Western Beltway to allow the traffic from the Southern Connector (S.R. 417) and World Drive which would use the flyover in option 1A to access the special use lane for option B. Traffic from the Western Beltway may also use this slip ramp. The at-grade exit slip ramp provided in option A west of the Western Beltway to allow traffic to exit the special use lanes for access to C.R. 532 was eliminated in option 1B.

The interchange concepts for C.R. 532, World Drive, and Southern Connector (S.R. 417) are the same for both options and reflect the concepts given in the I-4 MMMP. Traffic accessing the Southern Connector uses the World Drive CD; however, there are no modifications to the CD system in this area over what has been recently constructed and the Southern Connector interchange. The Western Beltway interchange is shown as a trumpet type in both options, as in the I-4 MMMP, but is studied separately. These interchange options are discussed in section 8.3.3.

Segment Two: Southwest of U.S. 192 (S.R. 530) to S.R. 536

Plan sheets numbered 7 through 10 cover the Southern Connector (S.R. 417), U.S. 192 (S.R. 530), Osceola Parkway, and the S.R. 536 interchanges. Sheets 7 through 9 have a lettering system A-F which corresponds to U.S. 192 (S.R. 530) interchange alternatives and eastbound CD alternative. These alternatives are listed below:

2A) U.S. 192 (S.R. 530) Master Plan Alternative with an Aerial CD system;
2B) U.S. 192 (S.R. 530) Master Plan Alternative with no CD system;
2C) U.S. 192 (S.R. 530) Wide Diamond Interchange with an Aerial CD system;
2D) U.S. 192 (S.R. 530) Wide Diamond Interchange with no CD system;
2E) U.S. 192 (S.R. 530) Three-Level Diamond Interchange with an Aerial CD system; and
2F) U.S. 192 (S.R. 530) Three-Level Diamond Interchange with no CD system.

In essence, there are three U.S. 192 (S.R. 530) interchange alternatives: the Master Plan, Wide Diamond, and Three-Level Diamond. For each of these three interchange alternatives, there are two alternatives for connection to the eastbound mainline, a CD option and no CD option. The CD option is aerial to minimize impacts to development immediately adjacent to the right-of-way on the northeast side of the interchange. Due to the close proximity of the Osceola Parkway interchange, each of the U.S. 192 (S.R. 530) interchange alternatives and CD alternatives impact the location of ramp terminals at

Osceola Parkway. This project assumes that the Osceola Parkway interchange is completed prior to the improvements recommended in this study. However, an additional ramp carrying eastbound I-4 to eastbound Osceola Parkway traffic is provided for those options with the aerial CD (options 2A, 2C, and 2E). Otherwise, the Osceola Parkway interchange concept as shown in the I-4 MMMP is the same as provided in this PD&E study.

The U.S. 192 (S.R. 530) Master Plan Alternative (options 2A and 2B) is the same as the concept shown in the I-4 MMMP. This alternative is somewhat similar to the existing interchange configuration. The eastbound I-4 to westbound U.S. 192 movement and the westbound U.S. 192 to westbound I-4 movement are accommodated by loop ramps in this alternative, similar to the existing interchange. A flyover ramp carries the eastbound U.S. 192 to eastbound I-4 movement, also similar to the existing interchange. However, the westbound I-4 to eastbound U.S. 192 movement is carried by a flyover ramp, instead of a loop ramp as in the existing interchange. This flyover eliminates the loop to loop weave which currently exists along westbound I-4. Even though this alternative is similar to the existing interchange, full reconstruction is required in order to accommodate the mainline widening and achieve current design criteria.

The U.S. 192 (S.R. 530) Wide Diamond Interchange (options 2C and 2D) provides a single-lane flyover ramp for the eastbound U.S. 192 to eastbound I-4 movement and ramp terminal intersections for the other ramp movements. In this alternative, the I-4 mainline is on the first level, with the ramp terminal intersections located on the second level. The U.S. 192 through movements pass over I-4 on a third level with separate structures for the eastbound and westbound directions. This allows the through movements to be totally independent of interchange operations. The U.S. 192 through bridge structures are horizontally to the outside of the second level. The flyover ramp is provided on a fourth level. All right turns at the ramp terminal intersections are channelized.

The U.S. 192 (S.R. 530) Three-Level Diamond Interchange (options 2E and 2F) also provides a single-lane flyover ramp for the eastbound U.S. 192 to eastbound I-4 movement and ramp terminal intersections for the other ramp movements. The I-4 mainline is on the first level, with the ramp terminal intersections on the second level. The U.S. 192 through movements pass over I-4 on a third level to the inside of the interchange. This also allows the U.S. 192 through movements to be independent of interchange operations. The ramp terminal intersections are provided on structures which are horizontally to the outside of the through movement structures.

The S.R. 536 interchange concept is generally the same as the concept shown in the I-4 MMMP. The ramps to/from S.R. 536 are braided with the ramps to/from Osceola Parkway. A CD system had been considered between S.R. 536 and S.R. 535, but the impact to adjacent development would result in excessively high right-of-way costs and eliminated this alternative.

HOV Access

For segment 2, HOV access is provided in the same locations for all options. As described for segment 1, a slip ramp is provided within the World Drive interchange to allow eastbound HOV traffic to exit the HOV lanes and weave across the general use lanes to exit at U.S. 192, Osceola Parkway, and S.R. 536. A direct connect ramp is provided within the S.R. 536 interchange to allow eastbound traffic from the U.S. 192, Osceola Parkway, and S.R. 536 interchanges to access the HOV lane. However, traffic from U.S. 192 must enter the I-4 mainline in a ramp-to-ramp auxiliary lane before exiting to the S.R. 536 CD system to access the HOV lane. The aerial CD provided in options 2A, 2C, and 2E is grade-separated from the eastbound entrance ramp from U.S. 192. This ramp could not be connected to the CD system without significant impacts to adjacent development. The eastbound entrance ramp from Osceola Parkway is braided with the eastbound exit ramp to S.R. 536. Eastbound traffic from Osceola Parkway can access the S.R. 536 CD system and the HOV direct connect ramp without entering the I-4 general use lanes. Another at-grade slip ramp is provided, between Osceola Parkway and S.R. 536, to allow traffic from the eastbound HOV lane to exit and weave across the general use lanes to access the S.R. 535, Lake Avenue, and Central Florida Parkway interchanges.

For the westbound direction, the direct connect ramp at S.R. 536 allows HOV traffic to exit to S.R. 536, Osceola Parkway, and U.S. 192. A continuous CD system is provided from S.R. 536 to U.S. 192, which eliminates the need for HOV traffic exiting at the direct connect ramps to travel in the general use lanes. An at-grade slip ramp is provided between S.R. 536 and Osceola Parkway to allow traffic from Central Florida Parkway, Lake Avenue, and S.R. 535 to weave across the general use lanes to enter the HOV lane. As described for segment 1, a slip ramp is provided within the World Drive interchange (option 1A only) to allow westbound traffic from S.R. 536, Osceola Parkway, and U.S. 192 to weave across the general use lanes to enter the HOV lanes. The eastbound and westbound direct connect ramps at S.R. 536 allow tourists and employees direct access to the Walt Disney World resort area via S.R. 536 without weaving across potentially congested general use lanes.

Segment Three: S.R. 536 to Northeast of Lake Avenue

Plan sheets numbered 11 through 13 cover this segment of I-4. This segment has three options:

3A) Lake Avenue Interchange Master Plan Alternative;
3B) Full Lake Avenue Interchange Alternative with short CD option; and
3C) Full Lake Avenue Interchange Alternative with no CD option.

Option 3A represents the MMMP alternative, which includes a half diamond interchange at Lake Avenue. This restricts access to and from the northeast along I-4. Option 3B shows a full interchange at Lake Avenue and has a short CD system extending from S.R. 535 interchange to the Lake Avenue interchange. The CD system is expected to improve

mainline operations, by reducing the expected high mainline volume and eliminating the weave section between the two interchanges. Option 3C also contains a full interchange at Lake Avenue, but without a CD road along the mainline. Due to the anticipated high weaving volume between the S.R. 535 and Lake Avenue, all Lake Avenue ramps for option 3C are located on the northeast side of the interchange to maximize mainline weaving area. The S.R. 535 interchange configuration is not being modified in this project, with the exception of the ramp terminals at the I-4 mainline.

HOV Access
Within this segment, HOV access is provided in the same locations regardless of option. In the eastbound direction, a flyover access ramp is provided to the HOV lanes, which represents a direction connection from Lake Avenue and a lane add to the HOV facility. Traffic accessing the HOV facility from S.R. 535 must use the general use lanes in options 3A and 3C and the CD road in option 3B. A flyover ramp is also provided in the westbound direction from the HOV lanes to Lake Avenue and S.R. 535. The ramp provides a direct connection to Lake Avenue and represents a lane drop in the HOV facility. Access is provided to S.R. 535 by returning to the general use lanes in options 3A and 3C or by the CD road in option 3B. This HOV access point represents the beginning of the 6+4 typical section between Lake Avenue and the BeeLine Expressway. The additional HOV lanes are needed due to the expected high HOV demand in this area.

Segment Four: Northeast of Lake Avenue to BeeLine Expressway (S.R. 528)

Plans sheets 14 and 15 cover this segment of I-4. Sheets 14A and 14B cover the Central Florida Parkway interchange alternatives, as listed below. Sheet 15 covers the BeeLine Expressway interchange.

4A) Central Florida Parkway Interchange Master Plan Alternative and
4B) Central Florida Parkway Interchange Value Engineering Alternative 1.

The Central Florida Parkway interchange configuration for option 4A is similar to the existing configuration, with the addition of diamond ramps to and from the northeast. Option 4B removes the existing flyover ramp and modifies the interchange to a standard diamond. This option was a Value Engineering recommendation. The flyover ramp in option 4A accommodates traffic from westbound Central Florida Parkway to westbound I-4. In option 4B, this traffic would be accommodated by dual left turn lanes at the Central Florida Parkway/I-4 westbound ramps intersection. The piers for the existing flyover ramp will impacted by mainline widening, which will require the ramp to be rebuilt if it is to remain.

HOV Access
For segment four, HOV access does not vary with either of the options. Direct connect flyover ramps are provided to/from the HOV lanes to/from the BeeLine Expressway. In the eastbound direction, the ramp represents a lane drop. In the westbound direction, the

ramp represents a lane add. This is the point of transition from the 6+4 typical section, which runs between Lake Avenue and the BeeLine Expressway, to the 6+2 typical section, which continues east of I-4 Section 1.

Sheet 15 shows the proposed BeeLine Expressway interchange. The interchange is a fully directional T interchange, which is generally the same as the existing configuration. This interchange will be rebuilt to accommodate proposed I-4 mainline widening, to accommodate the full access for the Central Florida Parkway interchange, and provide direct connect HOV access in both directions along the BeeLine Expressway.

8.3.3 Western Beltway Interchange Alternatives

Three interchange concepts are evaluated for the Western Beltway interchange. Option 1 is a trumpet-type interchange with the flyover ramp being the eastbound exit ramp from I-4 and the loop ramp being the eastbound entrance ramp to I-4. Initially, this option represented the concept developed in the I-4 MMMP. Options 2 and 3 are fully-directional T interchanges. These three alternatives were presented at the Public Meeting. Subsequent to the Public Meeting, the alternatives were revised based on input from FDOT.

For option 1, the design speed of the loop ramp was increased to 70 km/hr (45 mph). This allows for better system to system operation, but requires more right-of-way than the 50 km/hr (30 mph) loop ramp originally developed. This moves the flyover ramp further out from I-4 which impacts the 44.2 m (145 ft.) Orlando Utilities Commission (OUC) easement.

As previously stated, options 2 and 3 are fully directional interchanges. For both options, a design speed of 80 km/hr (50 mph) has been used for all ramps. Option 2 has both flyover ramps crossing I-4 in the same location, one over the other, whereas in option 3 the ramps are separated, crossing each other on the south side of I-4. In both options, I-4 remains at-grade. The southbound Western Beltway to eastbound I-4 ramp is on the third level in option 2 and passes over C.R. 545. For option 3, this flyover is on the second level and passes under the C.R. 545 overpass.

8.4 Evaluation Matrix

Input from Value Engineering Reviews, results of interim LOS analysis, and design reviews from the FDOT District Five Core Team were used to evaluate and refine portions of the alternatives described in sections 8.3.2 and 8.3.3. Most of these refinements are rather small in nature, but include such items as increasing weaving distances, increasing the number of lanes on a ramp, extending an entrance ramp along the mainline to provide additional weaving distance to accommodate heavy merge

volumes, and modifying the lane geometry at ramp-terminal intersections. Option 4B was a product of one of the Value Engineering reviews.

The evaluation criteria used to evaluate the options within each segment are described in the following section. The results of the evaluation are described in sections 8.4.2 and 8.4.3.

8.4.1 Evaluation Criteria

A wide range of evaluation measures addressing travel characteristics, project costs, and community and environmental impacts were analyzed as part of the evaluation of study alternatives. The following is a brief description of each evaluation measure:

Travel characteristics:

The evaluation of travel characteristics included a review of the year 2020 LOS analysis conducted for each alternative along each segment. An overall LOS was determined for the general use lanes and HOV lanes for each alternative, several critical interchanges, and critical cross streets to enhance cross street flow. Emphasis was placed on maintaining a LOS C or better in the HOV/special use lanes, with importance given to improving flow in the general use lanes over operations of CD roadways.

Project costs:

Project costs are broken down into construction and right-of-way costs. Construction costs include roadway, structures, retaining walls, drainage improvements, traffic engineering, maintenance of traffic, preliminary engineering at 10 percent of construction, and construction engineering and inspection (CEI) at 15 percent of construction costs. Right-of-way costs were based on the additional right-of-way necessary for each alternative to accommodate roadway and interchange improvements and stormwater management. These costs were provided by FDOT and include business damage estimates.

Community Impacts/Relocations:

This project has very few community impacts, since no neighborhoods would be divided and no residences would be relocated. Relocations are divided into business and residential relocations. The number of businesses which must be relocated due to direct impacts to property is quantified. Similarly, the number of residences which must be relocated due to direct impacts to property is also quantified.

Environmental Impacts:

Environmental impacts are the number of archeological, contamination, and historical sites impacted. The number of contamination sites are based on risk potential. Contamination potential is established based on the results of the Contamination Screening Evaluation Report (CSER) which provides preliminary findings from field visits and inspections throughout the study area combined with literature and a regulatory agency file review of the potential for finding petroleum or hazardous materials contamination on parcels within the study area. The number of parcels with potential for petroleum or hazardous materials contamination ranked High, Medium, and Low in terms of risk is determined for each alternative.

Environmental impacts also include the number of acres of wetlands and floodplains impacted. Wetland impacts are identified as a direct encroachment of a wetland by either excavation or placement of fill material. As in wetland impacts, floodplain impacted are those directly encroached upon by excavation or placement of fill material.

8.4.2 Comparative Evaluation

Table 8-1 provides a summary of the evaluation criteria for each alternative/segment for comparison purposes. Table 8-2 also provides a summary of the evaluation criteria for the Western Beltway interchange alternatives. The evaluation of the Western Beltway alternatives is discussed in section 8.4.3.

A series of public involvement activities were held during April 1998 for the purpose of receiving public input during the development and evaluation of study alternatives. Information presented at these meetings included a history of the project, graphics depicting the study alternatives described in section 8.3 and shown in Appendix A, and evaluation of data for the study alternatives as presented in Tables 8-1 and 8-2. This included an I-4 Public Workshop where each design alternative and the comparative evaluation matrices were presented. This workshop was conducted on April 14, 1998.

The evaluation matrix (Table 8-1) for the segment alternatives shows the following:

- For segment 1, the construction cost and environmental impacts are somewhat lower for option B than for option A. The travel characteristics are not significantly different between the two options.
- For segment 2, option F has the lowest total (construction and right-of-way) cost of the options without the aerial CD system. However, there is only $1.2 million difference between option B and F. With the aerial CD system, option E has the lowest total cost. Options C and D have the lowest impact on floodplains, whereas options E and F have the lowest wetlands impact. As shown by summing the acreage of floodplains and wetlands impacted, options E and F are shown to have the lowest environmental impact. Mainline travel

Table 8-1

COMPARATIVE EVALUATION MATRIX

Criteria	Segment 1 Station 0+00 to Station 98+00			Segment 2 Station 98+00 to 160+00							Segment 3 Station 160+00 to 206+00				Segment 4 Station 206+00 to 221+00		
	No-Build	A	B	No-Build	A	B	C	D	E	F	No-Build	A	B	C	No-Build	A	B
Travel Characteristics																	
Mainline LOS																	
Eastbound	F	E	E	F	E	E	E	E	E	E	F	F	F	F	F	F	F
Westbound	F	E	E	F	E	E	E	E	E	E	F	F	F	F	F	F	F
Mainline Weave																	
U.S. 192 to Osceola Parkway, Eastbound Only				F	D	F	D	F	D	F							
S.R. 535 to Lake Avenue Eastbound											n/a	n/a	D	E			
Westbound											n/a	n/a	D	E			
HOV LOS																	
Eastbound	n/a[1]	C	C	n/a	B	B	B	B	B	B	n/a	C	C	C	n/a	C	C
Westbound	n/a	C	C	n/a	B	B	B	B	B	B	n/a	C	C	C	n/a	C	C
Interchange LOS																	
Western Beltway	F	D	D														
U.S. 192				F	D	D	D	D	D	D							
S.R. 535											F	E	D	E			
Lake Avenue											n/a	C	C	D			
Central Florida Parkway															F	E	E
Cross Street Flow																	
U.S. 192				D	A	A	B	B	B	B							
S.R. 535											F	F	F	F			
Lake Avenue											n/a	C	C	C			
Central Florida Parkway															F	C	E
Project Costs ($ Millions)																	
Construction[2]	$0	$95.9	$89.2	$0	$146.7	$130.3	$146.8	$138.2	$139.0	$133.2	$0	$68.5	$67.5	$66.8	$0	$23.4	$17.4
Right-of-Way	$0	$14.3	$14.1	$0	$33.8	$29.3	$30.1	$25.6	$29.7	$25.2	$0	$24.1	$59.5	$36.8	$0	$11.0	$11.0
Relocations																	
Residential	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Business	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Environmental Impacts																	
Archeological Sites	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Contamination Sites																	
(by Risk potential)[3]																	
number HIGH risk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
number MEDIUM risk	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0
number LOW risk	0	2	2	0	1	1	1	1	1	1	0	2	2	2	0	1	1
Historical Structures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Floodplains (acres)	0.0	28.1	27.5	0.0	8.7	8.4	6.6	5.8	6.7	6.7	0.0	3.4	3.4	3.4	0.0	0.0	0.0
Wetlands (acres)	0.0	31.8	31.4	0.0	36.4	36.2	34.4	34.4	32.9	32.7	0.0	4.2	5.5	4.2	0.0	1.1	1.1

[1] n/a = not applicable

[2] Construction costs include roadway, structures, drainage improvements, traffic engineering, maintenance of traffic, etc.

[3] Contamination site risk potential: HIGH = potential exists for contamination based on review of available information / further assessment required to determine actual presence or level of contamination; MEDIUM = available information indicates some contamination, either not requiring remediation, under remediation, and/or requiring further remediation; LOW = hazardous materials are associated with the site use but there is no evidence of contamination.

Table 8-2

COMPARATIVE EVALUATION MATRIX FOR WESTERN BELTWAY INTERCHANGE

Criteria	Western Beltway Interchange			
	No-Build	Option 1	Option 2	Option 3
Travel Characteristics				
I-4 Mainline LOS				
Eastbound	F	E	E	E
Westbound	F	F	F	F
HOV LOS				
Eastbound	n/a[1]	C	C	C
Westbound	n/a	C	C	C
Interchange LOS				
Western Beltway Ramps				
I-4 EB Exit Ramp	n/a	D	D	D
I-4 EB Entrance Ramp	n/a	C	B	B
I-4 WB Exit Ramp	n/a	E	C	D
I-4 WB Entrance Ramp	n/a	D	D	A
Project Costs ($ Millions)				
Construction[2]	$0	$11.6	$12.5	$13.0
Right-of-Way	$0	$31.2	$18.8	$17.4
Relocations				
Residential	0	0	0	0
Business	0	0	1	0
Environmental Impacts				
Archeological Sites	0	0	0	0
Contamination Sites				
(by Risk potential)[3]				
number HIGH risk	0	0	0	0
number MEDIUM risk	0	0	0	0
number LOW risk	0	1	1	1
Historical Structures	0	0	0	0
Floodplains (acres)	0.0	1.37	1.15	3.63
Wetlands (acres)	0.0	1.10	3.03	6.48

[1] n/a = not applicable

[2] Construction costs include roadway, structures, drainage improvements, traffic engineering, maintenance of traffic, etc.

[3] Contamination site risk potential: HIGH = potential exists for contamination based on review of available information / further assessment required to determine actual presence or level of contamination; MEDIUM = available information indicates some contamination, either not requiring remediation, under remediation, and/or requiring further remediation; LOW = hazardous materials are associated with the site use but there is no evidence of contamination.

service is improved with the aerial CD system. Otherwise, the travel characteristics of each alternative are about the same.

- For segment 3, option B provides the best travel service, but at the highest total (construction and right-of-way) cost. This option has a higher impact on wetlands than the other options within segment 3. Option A provides the lowest total cost of the three options, with the same environmental impact as option C.
- For segment 4, option A is more costly to construct but provides better travel service than option B. Otherwise, there are no differences, in terms of the evaluation criteria, between the two options.

8.4.3 Comparative Evaluation for Western Beltway Alternatives

The evaluation measures described in section 8.4.1 were used to compare the Western Beltway alternatives. As previously stated, Table 8-2 provides a summary of evaluation criteria for these alternatives.

The evaluation matrix (Table 8-2) for the Western Beltway alternatives shows the following:

- Option 1, the trumpet-type interchange, has the highest total (construction and right-of-way) cost. This option impacts the O.U.C. easement, but does not impact the Paradise RV Park. This option also has the lowest wetland impact of any of the options, but impacts more floodplains than option 2. The travel characteristics do not vary substantially between the options.
- Option 2, a fully-directional interchange, has a lower total (construction and right-of-way) cost than option 1, but is higher than the total cost of option 3. This option impacts both the O.U.C. easement and the Paradise RV Park. This option also has the lowest impact on floodplains of any of the options, but impacts wetlands more than option 1. Option 2 is only option involving a relocation.
- Option 3, also a fully-directional interchange, consumes less right-of-way on the south side of I-4 than option 2. This results in a lower impact of the Paradise RV Park and no impact on the O.U.C. easement. This option has the highest impact on floodplains and wetlands of the three options, but has the lowest total cost.

8.5 Preferred Build Alternative

On April 28, 1998, a design review meeting was held with FDOT District Five personnel to discuss design alternatives for the four segments described and evaluated in sections

8.3 through 8.4 above. Based on a review of the comparative evaluation, the following options were selected for each segment described below.

For segment 1, option 1B was selected as the preferred alternative. The reasons for selecting this alternative were as follows:

1. This alternative provides better operations into the special use lanes for westbound traffic. This is because the traffic is allowed to split between two entrance points between World Drive and the Polk/Osceola County line. The first entry point will be immediately west of the World Drive overpass structures and will handle traffic that enters I-4 from U.S. 192 eastward. This will also be the point at which the additional lane in the westbound direction is added and the transition is made to special use lanes. The second entrance point will be located west of the Western Beltway interchange. This will allow traffic from the Western Beltway, the Southern Connector Extension (S.R. 417), and World Drive to enter at this location. By having these two entrances, it provides for a better distribution of traffic entering the special use lanes. Further, it facilitates a better signing plan for I-4 in the westbound direction and eliminates a weaving problem on the westbound CD system caused by option 1A.

2. The cost of this alternative was the lower cost alternative.

3. This alternative has less floodplain and wetland impacts to Reedy Creek, especially on the more pristine north side of I-4.

For segment 2, option 2E was selected as the preferred alternative. The reasons for selecting this alternative were as follows:

1. Based upon the traffic analysis provided in the Design Traffic Technical Memorandum, it appears that the LOS provided by each of the interchange alternatives is essentially the same. It was noted that Alternative 2E provides for the opportunity to have motorists make a U-turn, which is a good feature, given the tourist nature of this area.

2. The maintenance of traffic for constructing Alternative 2E was the simplest due to the configuration of the interchange.

3. The interchange configuration had the lowest construction cost and required the least amount of right-of-way.

4. The alternative had the least amount of floodplain and wetland impacts.

5. The provision of the aerial CD provided a better LOS for I-4 eastbound, between U.S. 192 and Osceola Parkway by eliminating a mainline weave. Also, providing the

aerial CD allowed for the opportunity to provide for direct connection into Osceola Parkway eastbound without having to make left turn from the loop ramp.

Option 3B was selected as the preferred alternative for segment 3. This alternative was selected for the following reasons:

1. The proposed Lake Avenue interchange alternatives include the I-4 MMMP concept (Alternative 3A) which provides for partial access to the I-4 general use lanes. It is generally accepted practice that in providing new access to interstate highways that all traffic movements be provided. In the area to be serviced by the Lake Avenue interchange, this is important due to the high percentage of tourist traffic. The driver expectation is to be able to access all directions at an interstate interchange. Since alternative 3A does not provide this service and does not meet driver expectation, it was dropped from further consideration.

2. It has been agreed that any new interchange alternative considered must provide for LOS D or better for all ramp movements to and from the interchange. Alternative 3C contains ramps to and from the west at the Lake Avenue interchange which result in LOS E and F on I-4 due to the weave with the SR 535 ramps and high mainline volumes. This alternative will impact the operation of the mainline and effect ramp operations with the SR 535 interchange ramp. In evaluating Alternatives 3B and 3C, only 3B is able to meet this LOS criteria.

3. Despite the fact that Alternative 3B has a higher construction cost and a considerably higher right-of-way cost, it is the only alternative which meets this criteria and was selected as the preferred alternative.

For segment 4, the preferred alternative is A. The reason for this alternative being selected was the operational characteristics of the two interchange alternatives. In Alternative 4B, the left turn movement serving westbound Central Florida Parkway to westbound I-4 would cause significant operational concerns during the peak hour. The traffic volume served by this movement would also enter the intersection at the eastbound ramps. Due to the increase in traffic at this intersection, the analysis shows that the eastbound exit ramp could have queues spilling back onto the mainline. The TRAF-NETSIM analysis performed as part of the Design Traffic Technical Memorandum indicated these operational concerns show the interchange area operating at a LOS E/F. By replacing the flyover as is presently provided, these operations substantially improve. Despite the fact that this alternative is several million dollars higher than Alternative 4B, Alternative 4A is the preferred option.

Based on the results of the engineering and environmental analyses, as well as public input and discussions with FDOT District Five personnel, the following options were selected to represent the Preferred Build Alternative:

- Segment one – Option B,
- Segment two – Option E,
- Segment three – Option B, and
- Segment four – Option A.

This Preferred Build Alternative will be further refined to include the development of detailed stormwater management concepts and minor modifications to minimize impacts and maximize user benefits. Details of the design concepts and potential environmental impacts are presented in Section 9 of this Preliminary Engineering Report.

8.5.1 Western Beltway Preferred Build Alternative

Based on a review of the comparative evaluation and discussions with FDOT District Five personnel, option 3 was selected as the Preferred Build Alternative for the Western Beltway interchange. This option was selected because it:

- maintains an 80 km/hr (50 mph) design speed for all ramps, which provides better system to system interchange operations;
- minimizes impact to Paradise RV Park;
- minimizes impact to the O.U.C. 230 kV power line easement; and
- meets LOS standards.

However, option 3 has the most floodplain and wetland impacts of the three options. This Preferred Build Alternative will be further refined which includes detailed stormwater management concepts and maximize user benefits. Details of the design concepts are presented in Section 9 of this report.

9.0 PRELIMINARY DESIGN ANALYSIS

One build alternative has been identified as a possible improvement to meet the need of I-4 Section 1. This section of the Preliminary Engineering Report (PER) presents a detailed description of this alternative in regard to design concepts and potential environmental impacts. This build alternative is shown in the appendix of this report.

9.1 Design Traffic Volumes

Exhibits showing the year 2020 directional design hour volumes (DDHV) and level of service (LOS) for the Preferred Build Alternative are provided in the appendix. The DDHVs for the general use lanes vary from a low of 3,870 vehicles per hour (vph) in the eastbound direction east of World Drive to a high of 9,410 vph in either direction east of S.R. 536. The DDHVs for the special use lanes west of World Drive are approximately 2,000 vph. HOV demand varies from 670 vph east of World Drive to 1,890 vph between Lake Avenue and the BeeLine Expressway (S.R. 528).

The general use lanes are expected to operate predominately at LOS E from C.R. 532 to Osceola Parkway and LOS F from S.R. 536 to the BeeLine Expressway (S.R. 528). LOS C or better is expected in the special use/HOV lanes throughout the project limits. Since the minimum acceptable LOS C is maintained in the HOV lanes, which provide an additional mobility option, the LOS for the general use lanes is acceptable. The addition of HOV lanes to I-4, as well as expanded transit service in the future such as express bus and light rail transit (LRT) within the area, provide enhanced mobility options.

With the proposed improvements, there are several locations which are shown to operate at a poor LOS. Critical locations include the westbound CD road between S.R. 536 and U.S. 192 and the CD roads between S.R. 535 and Lake Avenue. Several ramp merge/diverge locations along the general use lanes east of World Drive are expected to operate at LOS E or F. This is primarily due to the expected saturated conditions within the general use lanes.

LOS D or better is expected for all at-grade ramp terminal intersections, except ramp-terminal intersections at S.R. 535. However, the proposed full interchange at Lake Avenue diverts traffic from the S.R. 535 interchange, which helps to improve conditions at S.R. 535. Complete details of the projected traffic volumes and analyses are provided in Section 6.0 of this document and/or the Design Traffic Technical Memorandum which is available for review at the FDOT District Five office in DeLand, Florida.

9.2 Typical Sections

Two mainline typical sections have been identified for I-4 Section 1. These typical sections, previously shown as Exhibit 8-1, provide for six general use lanes and two or four special use/HOV lanes. These typical sections are described as follows:

Typical Section #1: This mainline typical section will provide six general use lanes and four special use/HOV lanes within a minimum of 129.2 m (424 ft.) of right-of-way with open drainage or a minimum of 88.0 m (290 ft.) with closed drainage. This typical section will be used from the Polk/Osceola County line to west of World Drive. The special use lanes along this segment continue the treatment proposed in District One which allows long distance through trips. This typical section is also used from east of Lake Avenue to the BeeLine Expressway (S.R. 528). Along that segment, the four HOV lanes are restricted to HOV3+ (vehicles with three or more occupants) in the design year.

Typical Section #2: This mainline typical section will provide six general use lanes and two HOV lanes within a minimum of 122.0 m (400 ft.) of right-of-way with open drainage or a minimum of 81.0 m (266 ft.) with closed drainage. This typical section will be used from west of World Drive to east of Lake Avenue. The two HOV lanes are restricted to HOV3+ (vehicles with three or more occupants) in the design year.

Both typical sections provide a design speed of 110 km/hr (70 mph). Other common features of both typical sections include:

- 3.6 m (12 ft.) outside and inside (median) shoulders;
- 3.0 m (10 ft.) paved outside and inside (median) shoulders;
- 3.6 m (12 ft.) paved shoulders on the inside of the general use lanes and on the outside (right) of the special use/HOV lanes;
- A 0.6 (1.2 m) barrier wall between the general use and special use/HOV lanes; and
- A 13.4 m (44 ft.) wide future transit corridor.

9.3 Interchange, Intersection, and Lighting Concepts

Intersections and Interchanges

By design year 2020, signalized intersections will likely be warranted at all ramp-terminal intersections involving left turns. These include:

- I-4 eastbound ramps/C.R. 532,
- I-4 westbound ramps/C.R. 532,
- I-4 westbound on-ramp/World Drive southbound,
- I-4 HOV T-ramp/Road B,
- I-4 eastbound off-ramp/U.S. 192,

- I-4 eastbound on-ramp/U.S. 192,
- I-4 westbound off-ramp/U.S. 192,
- I-4 westbound on-ramp/U.S. 192,
- I-4 eastbound ramps/S.R. 535 (existing signalized intersection),
- I-4 westbound ramps/S.R. 535 (existing signalized intersection),
- I-4 eastbound ramps/Lake Avenue,
- I-4 westbound ramps/Lake Avenue,
- Lake Avenue/Palm Parkway – Turkey Lake Road,
- I-4 eastbound ramps/Central Florida Parkway,
- I-4 westbound ramps/Central Florida Parkway, and
- Central Florida Parkway/Turkey Lake Road.

Intersection turning movements were evaluated as part of the Design Traffic Technical Memorandum. The preferred intersection and interchange configurations are shown on the conceptual design plans in the appendix and discussed below.

I-4/C.R. 532 – This interchange will continue to be a full diamond configuration. Dual left turn lanes are planned for the westbound off-ramp approach to C.R. 532 and for the eastbound C.R. 532 to eastbound I-4 turning movement.

I-4/Western Beltway – Due to the limited access nature of both I-4 and the Western Beltway, no at-grade ramp terminal intersections will be provided at this interchange. The Preferred Build Alternative is a fully directional interchange, with all ramps having a design speed of 80 km/hr (50 mph).

I-4/World Drive – The existing interchange configuration will not be modified as part of this project. Minor modifications to the collector-distributor (CD) roads will be required on the southwest side of the interchange to accommodate the eastbound direct connect ramp and the mainline widening. Minor modifications to the westbound on-ramp is required to accommodate the modifications to the westbound CD road.

I-4/Southern Connector (S.R. 417) – The existing interchange configuration will not be modified as part of this project.

I-4/U.S. 192 (S.R. 530) – The Preferred Build Alternative replaces the existing interchange with a three-level diamond. With the new interchange, the I-4 general use and HOV lanes and CD roads are at-grade. The ramp movements are provided on the second level and the U.S. 192 through movements are provided on the third level. This allows the U.S. 192 through movements to maintain a free-flow operation. The eastbound U.S. 192 to eastbound I-4 movement will be accommodated by a flyover ramp. Most of the other traffic movements entering and exiting I-4 at this interchange will have to go through at-grade intersections. However, three of the right turning movements will be free-flow. The lane geometry at this interchange is shown on the Preferred Build Alternative drawing in the appendix.

I-4/Osceola Parkway – Osceola Parkway currently crosses over I-4 without access. However, another project will construct a full interchange at this location which will be completed prior to the improvements within this study. Traffic from eastbound I-4 to eastbound and westbound Osceola Parkway will be accommodated by a single-lane exit from I-4 and a loop ramp. Traffic desiring access to eastbound Osceola Parkway will be required to make a left turn at an at-grade intersection. A diamond ramp was considered in the previous study, which would provide a direct connection to eastbound Osceola Parkway and allow traffic to merge rather than make a left turn. The addition of the diamond ramp would require the Osceola Parkway exit gore be shifted further upstream along I-4. The resulting distance between the entrance ramp from U.S. 192 and the exit ramp to Osceola Parkway would be approximately half of what is recommended by the American Association of State Highway and Transportation Officials (AASHTO) publication A Policy on Geometric Design of Highways and Streets (1994). As a result, the diamond ramp was eliminated in the previous study.

In the Preferred Build Alternative for I-4 Section 1, an aerial CD road is provided for the eastbound exit to Osceola Parkway, which is grade-separated from the U.S. 192 eastbound entrance ramp. This eliminates a weaving section between the U.S. 192 and Osceola Parkway interchanges and allows the diamond ramp to be added as part of the aerial CD. With the addition of this ramp, no at-grade left turn movements will exist at this interchange.

I-4/U.S. 192 to S.R. 536 Braided Ramps and CD System – The Preferred Build Alternative includes an eastbound aerial CD roadway between U.S. 192 and Osceola Parkway, as described above. A continuous westbound CD roadway is provided from S.R. 536 to U.S. 192.

I-4/S.R. 536 – The existing interchange configuration is similar to a full cloverleaf interchange, with the exception that the eastbound S.R. 536 to eastbound I-4 movement is accommodated by a flyover ramp. The improved interchange will have essentially the same configuration, but will provide an eastbound CD road and direct connect ramps to and from the HOV lanes northeast of the interchange. The westbound CD road will be reconstructed and extended. The flyover ramp and the eastbound I-4 to westbound S.R. 536 loop ramp will also be reconstructed. Most of the other ramps will not be reconstructed except as necessary to tie into the general use lanes or CD system.

I-4/S.R. 535 – The existing interchange configuration will be maintained. However, the loop ramp will be reconstructed to accommodate the eastbound CD road. The ramp-terminal intersections along S.R. 535 are expected to operate at LOS F by design year 2020. The traffic analysis showed the need for dual left turn lanes on the northbound approach to the S.R. 535/westbound ramps intersection.

I-4/S.R. 535 to Lake Avenue CD System – The eastbound entrance loop and diamond ramps from S.R. 535 begin a CD system which extends to Lake Avenue. A slip ramp is provided from the general use lanes to the CD road for eastbound traffic exiting at Lake

Avenue. A CD system is also provided in the westbound direction between Lake Avenue and S.R. 535. Westbound traffic exiting at S.R. 535 will use a slip ramp which connects to the CD road.

I-4/Lake Avenue – The Preferred Build Alternative provides a full access interchange at Lake Avenue. Diamond ramps are provided for the eastbound exit and entrance ramps and the westbound exit ramp from the general use lanes. A loop ramp provides access for all movements from Lake Avenue to westbound I-4. This interchange also provides direct connect ramps to and from the HOV lanes to the northeast.

I-4/Central Florida Parkway – The Preferred Build Alternative modifies this interchange to include ramp movements to and from the northeast along I-4. A flyover ramp for the westbound Central Florida Parkway to westbound I-4 movement will remain as part of the interchange, but the existing structure will be replaced to accommodate the I-4 mainline widening.

HOV Access

Access to the HOV lanes is provided at several locations throughout Section 1. A mix of direct connect, slip, and T-ramps are used.

For eastbound traffic between the Polk/Osceola County line and World Drive, a slip ramp is provided just east of the Polk/Osceola County line to allow traffic from U.S. 27 to weave across the general use lanes to access the special use lanes. Another slip ramp is provided near the Western Beltway interchange which allows traffic from C.R. 532 to weave across the general use lanes to access the special use lanes. Further east, a direct connect ramp is provided at the I-4/World Drive interchange to allow traffic to access World Drive or the Southern Connector/Central Florida Greeneway (S.R. 417) without having to weave across congested general use lanes. Just west of the I-4/World Drive interchange, a slip ramp is provided which allows non-HOV traffic to exit to the general use lanes and for access to U.S. 192 (S.R. 530), Osceola Parkway, and S.R. 536. For westbound traffic, a slip ramp is provided within the I-4/World Drive interchange to allow traffic to enter the special use lanes. This slip ramp represents the change in classification from "HOV" to "special use" lanes. Another slip ramp is provided west of the Western Beltway to allow traffic from the Southern Connector, World Drive, and Western Beltway to weave across the general use lanes to access the special use lanes.

East of the I-4/World Drive interchange, HOV access locations are relatively symmetrical with regard to direction along I-4. T-ramps are provided at Road B to allow traffic to enter the eastbound HOV lanes and exit the westbound HOV lanes. Slip ramps are provided east of Osceola Parkway. The eastbound ramp allows eastbound traffic to exit the HOV lanes and weave across general use lanes to access S.R. 535 and Lake Avenue. Westbound traffic from Lake Avenue and S.R. 535 can weave across the general use lanes and access the westbound slip ramp to the HOV lanes. Direct connect ramps are provided from both the S.R. 536 and Lake Avenue interchanges. These represent

entrance ramps to HOV lanes for the eastbound direction and exit ramps from the HOV lanes for the westbound direction. The ramps to/from Lake Avenue begin the change in typical section from 6+2 to 6+4. Direct connect ramps are also provided at the BeeLine Expressway to allow eastbound traffic to exit the HOV lanes and westbound traffic to enter the HOV lanes. This represents the change in typical section from 6+4 to 6+2.

Lighting Concepts

As explained in section 4.1.11, I-4 Section 1 currently provides a mix of high mast and conventional lighting and areas without overhead lighting. The locations where lighting exists and type of lighting is summarized in Table 4-8. Some of the unlighted segments are relatively short, which has the potential to create problems for nighttime driving.

It is recommended that conventional lighting be extended from the World Drive CD roads to the BeeLine Expressway (S.R. 528). The lighting should be continuous between those points and high mast lights should be removed. Conventional lighting should be also installed on all roadways which interchange with I-4 from World Drive to the BeeLine Expressway. High mast lighting is recommended for the C.R. 532 and Western Beltway interchanges. More detailed study should be conducted during the final design portion of this project to determine the justification for lighting, which should include a benefit cost analysis.

The design phase of this project will include additional analyses for the verification and/or determination of signal timing and phasing, intersection/interchange performance, potential for signal coordination, and the determination of appropriate lighting.

9.4 Alignment and Right-of-Way Needs

The Preferred Build Alternative follows the existing horizontal alignment throughout the project limits. The horizontal alignment and vertical profile near Central Florida Parkway would be improved by the Preferred Build Alternative to current design standards, which will also improve stopping sight distance to current standards.

Only one of the existing vertical curves meets current design standards. There are a number of curves that had adequate K values but did not meet the minimum length requirement for a 110 km/hr (70 mph) design speed. Some of these curves are not required for the small change in grade. Section 4.1.6 of this report provides a summary of the existing vertical geometry and deficiencies.

Since many of these short vertical curves with adequate K values were believed to not present a safety problem, a request for a design variance was considered. However, drainage requirements for the project required that the vertical profile be raised above design and seasonal high water. As a result, all deficient vertical curves would be improved to current design standards by the Preferred Build Alternative.

Right-of-way requirements for the proposed I-4 Section 1 improvements include land areas for mainline (general use lane and special use/HOV lane) improvements, the transit envelope, interchange improvements, crossroad improvements including minor realignments, and stormwater management. This project minimizes right-of-way acquisition since the project follows the existing alignment. Where additional right-of-way is required, attempts have been made to keep acquisition to a minimum. A 4.5 m (15 ft.) border width is used with a barrier wall to minimize right-of-way acquisition. Between U.S. 192 (S.R. 530) and Osceola Parkway, the aerial CD in the eastbound direction with the Preferred Build Alternative is used to minimize impacts to the Hyatt Hotel. The piers for the aerial CD will be located between the mainline auxiliary lane and shoulder, with the CD roadway cantilevered over the shoulder.

Project Transition Details

Transition details were developed showing how the Preferred Build Alternative could operate independently of any future improvements on I-4 beyond the project limits. The transition details for the eastern and western limits of the project are included in Appendix D and are briefly discussed below.

At the western end, the Preferred Build Alternative would transition from the proposed mainline typical section, consisting of six general use lanes and four special use lanes, to a future six general use lane typical section. It is assumed that this future typical section will be in place prior to this project, since the widening of I-4 to six lanes from U.S. 27 to U.S. 192 is currently funded and under design. In the eastbound direction, a fourth lane will be added on the inside prior to the C.R. 532 exit ramp, which will transition into an "exit only" entrance into the special use lanes. The third general use lane will divide just west of the C.R. 532 overpass to allow motorists to either enter the special use lanes or continue on in the outside through lane; thereby creating the (6+4) typical section. In the westbound direction, the two special use lanes will merge with the three general use lanes to form a five-lane section. This section will then be merged to four lanes prior to the C.R. 532 exit ramp and further merged to three lanes prior to the C.R. 532 entrance ramp to match the proposed typical section beyond the limits of this project. No additional right-of-way will be required to accommodate this transition beyond what is required by the Preferred Build Alternative. Further, the costs and impacts developed in this study consider the effect of implementing the full (6+4) typical section to meet with the ultimate (6+4) typical section developed in Section 1. Therefore, the costs and impacts for the full width section are somewhat conservative and are discussed in subsequent sections of this report.

The I-4 Section 2 PD&E Study begins near the BeeLine Expressway interchange and extends to the north side of the Orlando metropolitan area. At this time, it is not certain whether Section 1 or Section 2 will be constructed first. In the event Section 1 is constructed prior to Section 2, the Preferred Build Alternative would transition from the proposed mainline typical section, consisting of six general use lanes and two HOV lanes, to the existing six general use lane typical section. In the westbound direction, a fourth lane will be added which will tie into the long acceleration lane created from the Sand

Lake Road entrance ramps. This fourth lane will divide just north of the BeeLine Expressway exit ramp to allow motorists to either enter the HOV lane or continue on in the outside through lane. In the eastbound direction, the on-ramp from the Central Florida Parkway merges with the three general use lanes to form a four-lane section, which carries beyond the on-ramp from the BeeLine Expressway. The HOV lane will merge with the four-lane section to form a five-lane section, which drops to four lanes starting at Sta. 245+00. The fourth lane continues as an auxiliary lane to the Sand Lake Road interchange eastbound exit ramp where it is dropped. The existing three-lane section is matched at this exit ramp. The additional costs and impacts associated with this transition are described in subsequent sections.

9.5 Relocation

A Conceptual Stage Relocation Plan (CSRP) was prepared for the proposed improvements to I-4 Section 1 in accordance with Florida Statute 339.09 (2) and 421.55, the Uniform Relocation Assistance and Real Property Acquisition Act of 1970 (Public Law 91-646), and the FDOT PD&E Manual. A copy of this plan is available at the FDOT District Five office in DeLand, Florida.

Only one alternative, Western Beltway Option 2, involved relocations. As stated in the CSRP, three residential and no business relocations were anticipated for this alternative. Since Option 3 was selected for the Western Beltway interchange, there are no residential or business relocations required as part of the Preferred Build Alternative. However, if Section 1 is constructed prior to Section 2, two additional relocations become necessary. The Sea World Sales & Promotion Office building near the BeeLine Expressway interchange will be impacted and involves approximately 5 percent of the total property. Also, the proposed location of Pond B-2 west of the Sand Lake Road interchange will take an existing single-family residence.

9.6 Right-of-Way Costs

The right-of-way cost for the proposed I-4 Section 1 improvements are estimated to be $113.0 million. This cost includes right-of-way acquisition for the mainline, cross road, and stormwater improvements, as well as relocation costs, severance and business damages, administrative and support costs, and accountant and attorney fees. A summary of these costs by segment are presented below:

Segment One (C.R. 532 to Southwest of U.S. 192): $9.6 million
Segment Two (Southwest of U.S. 192 to S.R. 536): $29.7 million
Segment Three (S.R. 536 to Northeast of Lake Avenue): $62.9 million
Segment Four (Northeast of Lake Avenue to S.R. 528): $10.8 million

Total: $113.0 million

The total $113.0 million represents the overall right-of-way costs for Section 1. If Section 1 is constructed prior to Section 2, an additional right-of-way cost of $24.1 million will be required. The additional right-of-way is required for the construction of the additional I-4 mainline improvements from the end of Section 1 to east of the BeeLine Expressway (S.R. 528) and the improvements to the BeeLine Expressway (S.R. 528) interchange. As previously stated, a detail for transitioning Section 1 into the existing roadway is provided in the appendix.

The right-of-way costs shown in segment one do not include $17.4 million for the Western Beltway interchange. It is anticipated that construction of this interchange will be done by others in advance of the I-4 improvements. Detailed information regarding these right-of-way costs is available at the FDOT District Five office in DeLand, Florida.

9.7 Construction Costs

The estimated total construction and Construction Engineering Inspection (CEI) costs for the proposed I-4 Section 1 improvements is $328.2 million. The construction cost and CEI costs are summarized by segment below.

Segment One (C.R. 532 to Southwest of U.S. 192): $109.5 million
Segment Two (Southwest of U.S. 192 to S.R. 536): $132.5 million
Segment Three (S.R. 536 to Northeast of Lake Avenue): $61.0 million
Segment Four (Northeast of Lake Avenue to S.R. 528): $25.2 million

Total: $328.2 million

The total $328.2 million represents the overall construction cost for Section 1. If Section 1 is constructed prior to Section 2, there will be an additional construction cost of $115.4 million. This additional construction cost is required to construct the improvements to the BeeLine Expressway (S.R. 528) interchange and to extend the I-4 mainline improvements to east of the BeeLine Expressway (S.R. 528). Further, the additional cost includes construction of a transition to the existing roadway section.

If Section 1 is constructed prior to the ultimate improvements proposed in District One, the transition shown in the appendix would be constructed. The cost to build this transition would be less than the cost associated with the full improvements to meet with the ultimate improvements in District One. In that case, the above cost is somewhat conservative.

The construction costs shown in segment one do not include $13.0 million for the Western Beltway interchange. It is anticipated that construction of the interchange will be done by others in advance of the I-4 improvements.

Direct construction costs include:

- Roadway, interchanges, and cross road improvements. These costs were developed based on a cost per meter for each typical section which was projected throughout the length of the project.
- Bridges and retaining walls. These costs were calculated using the horizontal and vertical geometry for each alternative at bridge locations.
- Embankment volumes were also based on the horizontal and vertical geometry of each alternative and the width of the typical sections.
- Mitigation costs were derived from impact wetlands.
- Utility relocation costs were estimated for each alternative.

Drainage, mobilization, maintenance of traffic, contingency and miscellaneous item costs are various percentages of the direct construction cost that make up the total construction costs. Appendix F contains a detailed breakdown of the total construction cost for the Preferred Build Alternative.

Contamination clean-up cost estimates were not included as part of the construction cost estimates. To provide clean-up cost estimates, Level II contamination screenings must be performed. However, Level II screenings are not required on PD&E projects unless right-of-way acquisition is in the FDOT 5 year Work Program. Right-of-way acquisition for this project is not within the current FDOT 5 year Work Program.

9.8 Preliminary Engineering Costs

Preliminary engineering costs (including design plans and engineering for construction) are estimated to be 10 percent of the construction cost. The estimated preliminary engineering cost for the Preferred Build Alternative is estimated to be $32.8 million.

9.9 Recycling of Salvageable Material

The nature of the proposed I-4 Section 1 improvements (i.e. construction on an existing alignment) significantly enhances the potential for recycling of salvageable material since there is currently an existing roadway available for reuse along the alignment. Although certain segments of the proposed improvements will utilize short sections of the existing alignment, the proposed typical roadway sections are different from the existing typical sections. However, pavement materials from the existing roadway may be recycled as new sections of roadway are opened. Additionally, the possibility of salvaging materials should be re-evaluated during the design phase.

Also, consideration should be given to the recycling of any other physical appurtenances (i.e. signs, roadway lighting, and traffic signals) that may become available. These items could possibly be recycled through refurbishing and reuse by the maintaining agencies.

9.10 User Benefits

Construction of the proposed I-4 Section 1 improvements would benefit roadway users by providing enhanced alternative transportation modes and some additional capacity. The provision of special use/HOV lanes would provide an efficient route for those who choose to ride together, ride express bus, or use some other form of transit other than to use the congested general use lanes. As part of the Preferred Build Alternative, a 1.5 acre park and ride lot is proposed adjacent to the I-4/Lake Avenue interchange to serve the HOV travel demand from future residential developments planned near this interchange. The special use lanes between the Polk/Osceola County line to World Drive would provide a continuation of the improved service to tourists traveling from the southwest heading to Walt Disney World. The extension of the special use lanes into Osceola County is an additional user benefit of this PD&E study, since this extension was a modification of the I-4 Multi-Modal Master Plan (MMMP) recommendations.

Other user benefits include improved access for residents and businesses in the area due to improved interchanges, auxiliary lane treatments which allow for smoother weaving operations, CD roadway systems which remove some of the turbulence from the mainline, and the direct connect HOV ramps at several locations. These direct connect HOV ramps are strategically located at World Drive, Road B, S.R. 536, Lake Avenue, and the BeeLine Expressway (S.R. 528). By eliminating the need to weave across the congested general use lanes, smoother entry and exit maneuvers to the HOV lanes is provided at these locations.

It should be noted that by the design year, traffic operations in the general use lanes will be poor during peak periods and are expected to be somewhat worse than current operations. However, the improvements will make the general use lanes flow smoother than under the no-build condition given the increase in traffic. The addition of special use/HOV lanes as well as increased alternative transportation modes by the design year will provide alternative transportation choices for users.

9.11 Pedestrian and Bicycle Facilities

A review of existing pedestrian and bicycle facilities is covered in Section 4.1.3. Pedestrian features typically include sidewalks, pedestrian signals, marked crosswalks, school zone markings, and pedestrian overpasses. Pedestrians and bicyclists are currently prohibited from using I-4, and this prohibition is expected to continue in the future. There are no bike routes or paths outside of any roadway right-of-way within the study area nor are there any school zone signs or markings or pedestrian overpasses.

Pedestrian and bicycle facilities were considered for the non-limited access cross streets. Pedestrian crosswalks and signals should be provided at signalized ramp terminal intersections, where sufficient pedestrian and bicycle volumes are expected. In these cases, sidewalks should also be considered. Depending upon the level of future development on both sides of the interchange at C.R. 532, these treatments may be

appropriate for C.R. 532. A future Development of Regional Impact (DRI) is planned on the north side of this interchange; however, limited development is anticipated to the southeast. Further consideration of pedestrian and bicycle needs along this roadway will have to be assessed during final design.

No modifications to the World Drive interchange are planned within this project. The ultimate typical section of World Drive does not accommodate pedestrian and bicycle facilities. This decision was made by others. However, it is anticipated that pedestrian and bicycle features should be incorporated into the design of Road B.

East of I-4, U.S. 192 (S.R. 530) and S.R. 536 currently provide wide outside paved shoulders, which can accommodate pedestrians, bicycles, and disabled vehicles. The limited access nature of these two roadways west of I-4 precludes the consideration of such features. While Osceola Parkway provides only partial control of access, pedestrian and bicycle features are considered inappropriate along this roadway due to the level of restricted access. The roadway functions at the upper end of the "Expressway" category.

S.R. 535 currently features sidewalks and crosswalks and pedestrian signals at signalized intersections; however, it does not have wide paved shoulders or (designated or undesignated) bike lanes. When I-4 is reconstructed, the bridge over S.R. 535 will be lengthened to accommodate sidewalks and bike lanes on both sides of S.R. 535 through the interchange area.

It is anticipated that pedestrian signals and crosswalks would be added to the signalized intersections along Lake Avenue and Central Florida Parkway, as well as continuous sidewalks along both sides of the two roadways. A 1.2 m (4 ft.) paved area between curb and outer travel lane should also be provided along those two roadways as undesignated bike lanes. Further consideration of these issues needs to be accommodated during the design phase of this project or during the development of those roadways.

9.12 Safety

Section 4.1.9 presents a summary of historical crash data for major existing roadways within the project area. Based on this data, I-4 as well as most state roadways crossing I-4 within the project area are reasonably safe as compared to similar state roadways.

However, S.R. 535 near I-4 is a high crash location. This roadway was under reconstruction during the period from September 1993 and October 1995. Based on a review of the crash data, the crash trend appears to be decreasing on this roadway, but further data is necessary to verify the trend. Detailed crash data is available for review at the FDOT District Five office in DeLand, Florida.

Traffic safety along I-4 and at interchanges will be enhanced by adherence to the most current roadway design and access management standards. The eastbound CD system

between S.R. 535 and Lake Avenue will enhance mainline operations, by providing additional capacity and eliminate a mainline weave section, and improve safety.

9.13 Economic and Community Development

The Preferred Build Alternative for improvements to I-4 Section 1 will not displace any residents or businesses. The improved access and capacity which will be provided by the improved roadway facility should enhance the potential for economic growth in the area and is consistent with the Orange County and Osceola County Comprehensive Plans.

In addition, the proposed roadway improvements is expected to improve all modes of local access to community facilities (i.e. parks, schools, and churches) and enhance the delivery of community services (i.e. police, fire, and rescue services). Extensive coordination with Community Traffic Safety Teams of Orange and Osceola Counties plus the Tri-County Emergency Management Team have been done throughout this project. These improvements are expected to improve the quality of life for residents in the project area.

9.14 Environmental Impacts

Potential environmental impacts were evaluated for the Preferred Build Alternative; however, no significant impacts were identified. There are no Aquatic Preserves, Outstanding Florida Waters, or Wild and Scenic Rivers located within the study area. The project is not located on, nor does it lead directly to, a designated coastal barrier island, and has been determined consistent with coastal zone criteria. The following sections address additional environmental issues evaluated during the PD&E Study, including a summary of unavoidable impacts.

Cultural Resources:

Potential impacts to cultural resources were evaluated for the Preferred Build Alternative under consideration for I-4 Section 1. The results of this evaluation indicate that there are no Section 4(f) properties (public parks, public recreation areas, historic sites, and/or wildlife or waterfowl refuges of national, state, or local significance) which will be adversely affected.

A cultural resource assessment survey was conducted for the project in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended by Public Law (P.L.) 89-655; the Archaeological and Historic Preservation Act, as amended by P.L. 93-291; Executive Order 11593; and Chapter 267, Florida Statutes (F.S.). All work was carried out in conformity with Part 2, Chapter 12 of the FDOT PD&E Manual. No historical resources were identified which would be affected by construction of the Preferred Build Alternative.

There are four archaeological sites within the project area. Continued investigation at these sites is not believed to have the potential to yield additional data of significance to regional or state prehistory. None of these archaeological resources is considered eligible for listing on the *National Register of Historic Places*. A copy of the Cultural Resource Assessment Survey is available for review at the FDOT District Five office in DeLand, Florida. If Section 1 is constructed prior to Section 2, there will not be any additional historical or archaeological impacts.

There are no designated wildlife or waterfowl refuges within the study area.

Wetlands:

Potential wetland impacts associated with the Preferred Build Alternative were evaluated in accordance with Executive Order 11990 as detailed in the Wetlands Evaluation Report. A copy of the Wetlands Evaluation Report is available for review at the FDOT District Five office in DeLand, Florida.

A total of 210 wetlands, representing a variety of community types, exist within the I-4 corridor. They range from extensive and undisturbed areas, such as Reedy and Davenport Creeks and isolated cypress domes, to highly disturbed sites such as utility easements and ditches.

There are 84 forested, 65 non-forested, and 61 open water wetland communities in the I-4 corridor. The forested wetlands are primarily comprised of hardwood swamp, cypress swamp, and mixed forest swamp. Non-forested wetlands primarily consist of emergent marshes and shrub marshes. More than half of the open water wetlands are drainage ponds, although there are a fair number of natural waterways and borrow pits. The Wetland Evaluation Report presents a discussion of these wetland types in greater detail and the types that are few in number which have not been discussed in this report.

The use of the current I-4 alignment substantially reduces the degree of wetlands that would have been impacted if a new alignment was chosen. Impacts to wetlands have been minimized by avoiding these areas during the development and refinement of possible alignments for the proposed roadway facility. The Preferred Build Alternative minimizes impacts to the main area of the Reedy Creek system, where it is intersected by I-4, and at the I-4/U.S. 192 interchange. Total impacts associated with the Preferred Build Alternative involve 28.9 ha (71.7 ac.) of wetlands.

Mitigation for unavoidable wetland impacts will be accomplished in accordance with Senate Bill (S.B.) 1986 at a cost of $75,000 per acre of impact. These mitigation costs are included in the estimate of construction costs discussed above. A letter has been received from SFWMD confirming the use of SB 1986. Final determination of jurisdictional wetland areas and mitigation requirements will occur during the permitting phase of project development.

Unavoidable impacts to wetlands will require the issuance of an Environmental Resource Permit from South Florida Water Management District (SFWMD). Early and active coordination with the appropriate agencies during the design phase should minimize both environmental impacts and permitting schedules.

Wetland avoidance and impact minimization alternatives were considered as part of the project development. The avoidance alternative (No Build Alternative) will not satisfy the purpose and need for the project in terms of providing alternative transportation modes and some capacity relief to existing I-4. The Preferred Build Alternative would involve 28.4 ha (71.0 ac.) of wetland impact. The adherence to FDOT's *Standard Specifications for Road and Bridge Construction* and "Best Management Practices" for erosion control and water quality will insure that no significant long term wetland impacts result from the construction of this project. Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands, and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.

The impacts described above represent the overall impacts for Section 1. If Section 1 is constructed prior to Section 2, an additional 4.6 ha (11.5 ac.) will be impacted. These impacts primarily involve man-made and disturbed wetlands, such as ditches and utility easements.

Floodplains and Floodways:

Potential floodplain impacts associated with the Preferred Build Alternative have been evaluated in accordance with Executive Order 11988 "Floodplain Management" and 23 CFR 650. The alignments under consideration for I-4 Section 1 traverse 18 floodplain areas as detailed in Section 9.19.2. The volume of floodplain encroachment is anticipated to be insignificant at each of these locations; therefore, no significant floodplain impacts are anticipated.

Based on this analysis, the following floodplain determination has been made for the proposed roadway improvements: "The proposed structures will perform hydraulically in a manner equal to or greater than the existing structures, and the backwater surface elevations are not expected to increase. As a result, there will be no significant adverse impacts on natural and beneficial floodplain values. There will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that the encroachment is not significant." Should Section 1 be constructed prior to Section 2, there would be no additional floodplain impacts.

Farmland:

Potential farmland impacts associated with the Preferred Build Alternative have been coordinated with the Natural Resources Conservation Service (NRCS) (formerly the Soil

Conservation Service). The Farmland Conversion Impact Rating (Form AD1006) was sent to the NRCS and sign-off of the form was received on February 2, 1998. Since this project involves improvements to an existing roadway alignment, there are no significant impacts to farmland.

Protected Species:

Potential impacts to protected species were evaluated for the Preferred Build Alternative as detailed in the Wildlife and Habitat Assessment Report. A copy of this report is available for review at the FDOT District Five Office in DeLand, Florida.

The project is not located within or adjacent to a Critical habitat designated by the U.S. Fish & Wildlife Service (USFWS). However, there are 16 animal and eight plant species listed as Threatened or Endangered by the USFWS with the potential to occur in Orange and Osceola Counties. In addition, there is a potential for 11 species listed as Species of Special Concern by the Florida Game and Fresh Water Fish Commission (FGFWFC) to occur.

The assessment of wildlife habitats and species occurrences within the study corridor revealed the presence of eight protected (five animal and three plant) species as well as several important habitats. The proposed improvements to I-4 and strategic stormwater facility placement have been incorporated by avoiding and minimizing effects to wildlife. Further coordination with both federal and state agencies will be required prior to construction, specifically in the case of active gopher tortoise burrows. Based on the evaluation conducted in the Wildlife and Habitat Assessment Report, FDOT has determined on behalf of the Federal Highway Administration (FHWA) that this project will have 'no effect' on threatened or endangered species along the project corridor. If Section 1 is constructed prior to Section 2, additional impacts to wildlife and habitat are unlikely and unexpected.

Noise:

Potential traffic noise impacts and abatement measures associated with the Preferred Build Alternative were evaluated in accordance with 23 CFR 772 "Procedures for Abatement of Highway Traffic Noise and Construction Noise", and FDOT Project Development & Environmental Guidelines. The results of this study are detailed in the Noise Study Report. A copy is available for review at the FDOT District Five office in DeLand, Florida.

Noise sensitive sites include areas of frequent use, residences, parks, schools, hospitals, churches, and other places where quiet is important for normal activity. Noise sensitive sites within the study area were identified by field surveillance and aerial photographs. Seven receptor sites were identified within approximately 150 m (500 ft.) of the existing I-4 roadway, which are shown on Exhibit 9-1 and described in Table 9-1.

LEGEND

▲R1 RECEPTOR SITE

– – – – 65 dBA CRITICAL NOISE CONTOUR

HNTB ARCHITECTS ENGINEERS PLANNERS

I-4 PD&E STUDY

NOISE CONTOURS / RECEPTORS

EXHIBIT 9-1

28-JUL-1998
e:\2443\Adot\dwr\noisestudy.dgn
\\orlwkOO\rana\24435\pen\UnitTpl.pen
NONE

Table 9-1
NOISE SENSITIVE SITES

Receptor ID	Site Description	Approximate Station Number
1	Single Family Residence (SFR) and Oakhill Baptist Church on C.R. 532	3
2	Paradise RV Park I-4/C.R. 545	37
3	Multi-Family (MF) Walt Disney World Vista Way Apartments I-4/S.R. 535	162
4	Little Lake Bryan Resort Area	179
5	Mary Queen Of The Universe Catholic Church on I-4	181
6	Lake Willis Residences	200
7	Multi-Family (MF) Monterey Lake Apartments on I-4	220

Noise measurements and simultaneous traffic classification counts were taken along the project corridor to determine existing noise levels and to provide data for field checks. Comparing the modeled noise levels to the measured noise levels allows for adjustments to specific site variables within the model and confirms the applicability of the computer model to the specific project. Measured and modeled noise levels were within the acceptable 3 decibel range which validates the model in this study area.

The FHWA's STAMINA 2.0/OPTIMA noise model and the STAM2VU1/OPTIMVU1 highway traffic noise prediction computer program (with the FDOT reference energy mean emission levels), were used to model existing and design year 2020 peak hour traffic noise levels at 105 kph (65 mph), to determine the worst-case hourly LAeq1h noise levels in the project area. The future noise levels from the proposed improvements are presented in Table 9-2. Based on the 2020 design hourly volumes, residential properties abutting I-4 would be exposed to design hour noise levels that approach or exceed the Noise Abatement Criteria (NAC).

The 65 dBA LAeq1h setback distance varies depending upon volume and roadway cross sections. The specific setback distances between each interchange is presented in the Noise Study Report and shown on Exhibit 9-1. Noise levels between the roadway and the line representing the setback shown on Exhibit 9-1 is 65 dBA or greater. The setback distance was developed to assist local planning authorities in developing land use control over the remaining undeveloped lands along the proposed project in order to prevent further development of incompatible land use.

Noise abatement measures are to considered when the predicted noise levels approach or exceed those values shown for the appropriate activity category in the NAC, or when the predicted traffic noise levels substantially exceed the existing noise levels. Approach values are defined as being 2 dBA less than the noise levels shown in the NAC. The FDOT has defined an increase over existing noise levels of 15 decibels or more as being substantial.

Table 9-2
EXISTING AND FUTURE LAeq1h NOISE LEVELS, dBA

Receiver I.D.[1]	Noise Abatement Criteria (NAC)[2]		Land Use[3]	Existing Noise Levels, dBA	2020 Design Hour Noise Levels					
					Build			No Build		
	Activity Category	dBA, LAeq1h			dBA LAeq1h	Increase	Impact[4]	dBA LAeq1h	Increase	Impact[4]
R1	B	65	SFR (1)and Church	62	64	2	N	63	1	N
R2	B	65	SFR (18)	73	76	3	I	75	2	I
R3	B	65	MFR (45)	76	80	4	I	78	2	I
R4	B	65	MFR (28)	71	74	3	I	73	2	I
R5	B	65	Church (1)	71	74	3	I	73	2	I
R6	B	65	SFR(3)	69	72	3	I	71	2	I
R7	B	65	MFR(4)	76	78	2	I	77	1	I

1) Receptor locations shown on Exhibit 9-1.
2) Activity category corresponds to CFR, Title 23, Part 772, Revised August, 1982. FDOT has defined approach as within 2 decibels of the appropriate abatement criteria.
3) SFR - Single family residential, MFR - Multi-family residential.
4) I-Impact; N-No Impact

The analysis indicates that there are six noise sensitive sites adjacent to the project that warrants a mitigation analysis as determined by the FDOT Project Development and Environmental Manual. Several mitigation measures are typically considered when determining reasonable and feasible means of implementing noise abatement. These have been prioritized by FDOT as follows:

- Traffic management,
- Alignment modifications,
- Construction of noise barriers within the highway project's right-of-way,
- Acquiring property for the construction of noise barriers,
- Acquiring right-of-way for landscaping adjacent to noise barriers and for buffer zones, and
- Acquiring remaining parcels of noise-sensitive property from which there has been a taking for the project.

Traffic management includes prohibition of, or restrictions on truck traffic, reduction of speed limits, etc. These measures are contrary to the transportation goals of the I-4 corridor. Sufficient changes in the horizontal or vertical alignment of I-4, within the I-4 project corridor, would not provide significant changes in the acoustical environment. The reasonableness and feasibility of constructing noise barriers will be addressed for each noise sensitive site. Given the available right-of-way, there is no need to consider, nor would there be any acoustical or economical advantages in, acquiring more property for landscaping of barriers and buffer zones or for acquiring remaining parcels from partial takings.

Abatement is recommended only when a feasible level of barrier effectiveness can be obtained, a minimum of 5 decibels but preferably 10 or more decibels, along with a reasonable cost, $30,000, per dwelling unit benefitted. The FDOT defines benefitted receiver as a noise sensitive receiver that will obtain a minimum of 5 dBA of noise reduction as a result of the use of a specific noise abatement activity regardless of whether or not they are identified as impacted.

Noise barriers were analyzed using STAM2VU1/OPTIMVU1 with TrafficNoiseCAD. The results of the barrier analysis, including barrier location, future LAeq1h noise levels without and with a barrier, barrier length and height, estimated cost based on the height of the barrier, the number of residential units benefited, the noise reduction provided by the barrier and the cost per residential unit are presented in Table 9-3.

As shown in Table 9-3, two of the noise barriers analyzed meet FDOT's preliminary requirements for reasonableness and feasibility. During the final design phase of this project, all six sites should be reviewed for the need for mitigation based on regular outdoor activities and owners desire for mitigation. If it subsequently develops during final design that these conditions have substantially changed, the abatement measures should be reviewed. A final decision on the applicability of noise mitigation should be made upon completion of the project design and the public involvement process.

Table 9-3
BARRIER ANALYSIS SUMMARY

Receptor/ Barrier	Barrier starts Sta.	Barrier ends Sta.	Range of Future Noise Levels, Leq dBA		Insertion Loss dBA	Barrier Characteristics						Barrier Cost[1]	Number of units Attenuated	Cost per Unit	Feasible
						Length		Height		Total Area					
			w/o Barrier	w/ Barrier		m	(ft)	m	(ft)	m^2	(ft^2)				
Paradise RV Park	36+00	39+00	70-76	64-66	5-12	300	984	4.9	16	1470	15744	$279,132	18	$15,507	Yes
Vista Way Apartments	153+00	165+75	71-80	65-68	6-12	1350	4429	5.5	18	7425	79722	$1,409,902	45	$31,331	No
Little Lake Bryan Resort Area	170+00	179+00	71-74	66-67	5-7	900	2953	5.5	18	4950	53154	$939,935	28	$33,569	No
Mary Queen Of The Universe Catholic Church	179+00	183+00	74	67	7	400	1312	5.5	18	2200	23616	$417,749	1	$417,749	No
Lake Willis Single Family Residences	198+00	203+00	67-71	62-64	5-7	500	1640	6.4	21	3200	34440	$607,634	4	$151,909	No
Monterey Lake Apartments	219+15	220+60	78	67	11	145	476	5	16	725	7616	$137,667	8	$17,208	Yes

1) Barrier cost based on $190.00/square meter ($17.65/square foot)

The major construction elements of this project are expected to be earth removal, hauling, grading, paving, and bridge construction. General construction noise impacts, such as temporary speech interference for passersby and those individuals living or working near the project, can be expected particularly from paving operations and from the earth moving equipment during grading operations. Considering the relatively short term nature of construction noise, impacts are not expected to be substantial. The transmission loss characteristic of nearby structures are believed to be sufficient to moderate the effects of intrusive construction noise.

The construction of the proposed project would result in increases in traffic generated noise ranging from 2 to 4 decibels. There would be 22 single family residences, 81 first floor apartments, and 1 church exposed to peak hour noise levels ranging from 65 to 80 dBA LAeq1h.

These impacts represent the overall impacts for Section 1. Should Section 1 be constructed prior to Section 2, five additional noise sensitive areas, all apartment and hotel complexes, will be impacted. None of these sites meet FDOT's criteria of reasonableness and feasibility. However, additional impacts are expected at the Monterey Lake Apartments, which can be abated through the use of a noise barrier.

Air Quality:

An air quality screening test was conducted to identify potential air quality impacts associated with the Preferred Build Alternative, as detailed in the Air Quality Report. A copy of this report is available for review at the FDOT District Five office in DeLand, Florida.

The Preferred Build Alternative were subjected to a graphical screening test which uses various worst-case assumptions about the meteorology, traffic and site conditions to determine the "critical" distance. This is the closest distance a receptor can be located to a given intersection/roadway segment without incurring significant air quality impacts. The Rural Area Screening Test was used for this project.

The interchange of I-4 and S.R. 535 was selected as the worst case intersection. In addition, the roadway segment of I-4 from S.R. 535 and Lake Avenue was also studied. The closest reasonable receptor to the interchange and roadway segment is located approximately 38.5 m (165 ft) east of the right-of-way. The closest reasonable air quality receptors include the WDW Vista Way Apartments and the Little Lake Bryan residential area.

The results of the air quality screening test indicate that since the closest reasonable air receptors for the intersection/roadway segment studied is farther away than the critical distance, this project passes the screening test and will not have a significant impact on air quality.

Construction activities will cause minor short-term air quality impacts in the form of dust from earthwork and unpaved roads and smoke from opening burning. These impacts should be minimized by adherence to all State and local regulations as well as the FDOT Standard Specifications for Road and Bridge Construction.

The project is in an area which has been designated as an attainment area for the ozone standards under the criteria provided in the Clean Air Act Amendments of 1990. This project is in conformance with the State Implementation Plan because it will not cause violations of the national Ambient Air Quality Standards.

Contamination:

A contamination screening evaluation was conducted, in accordance with the FDOT PD&E Manual, Chapter 22 guidelines, to identify potential hazardous materials and petroleum contamination sites along the Preferred Build Alternative. The results of this study are detailed in the Contamination Screening Evaluation Report, a copy of which is available for review at the FDOT District Five office in DeLand, Florida.

Information from the Orange County Environmental Protection Department, Osceola County Public Safety Department, Florida Department of Environmental Protection, and the United States Environmental Protection Agency was obtained and reviewed to identify known or potential contamination sites within the study area. The study area was defined as the corridor approximately 91.0 m (300 ft.) each side of the proposed right-of-way. Additionally, historical aerial photographs, previous environmental reports, and other published information were reviewed. A site reconnaissance and windshield survey inspection of the study area provided additional information regarding known or potential contamination sites, and their potential impact on this project.

This preliminary contamination survey identified 11 sites, within the study area as described above, which are either listed with the regulatory agencies or otherwise may be of concern. These sites were assigned a Potential Contamination Rating of Low, Medium, or High, in accordance with the guidelines outlined in Part 2, Chapter 22 of the FDOT PD&E Manual. For the Preferred Build Alternative, there are six low risk sites, one medium risk site, and no high risk sites.

All 11 sites have some risk of soil or groundwater contamination resulting from activity on these sites, and there is a significant potential liability associated with acquisition of property which is contaminated. Additionally, contamination can have significant impact on construction, particularly underground utility construction and dewatering. Any contaminated groundwater which may be encountered would require treatment prior to disposal and special permitting. Excessively contaminated soil excavated would also require special treatment and disposal and would not be useful to backfill utility excavations. For this reason, additional studies should be performed prior to actual design and property acquisition. The Contamination Screening Evaluation Report

prepared for this project provides specific details as to the types of additional studies depending on the level of risk assigned to a particular site.

The impacts described above represent the overall impacts for Section 1. If Section 1 is constructed prior to Section 2, an additional contamination site, the Orange County Civic Center, rated as a Low contamination risk, will need to be considered.

Construction Activities:

Construction activities are expected to result in temporary air, noise, water quality, traffic flow, and visual impacts for those residents and travelers within the immediate project vicinity. No long-term construction impacts are anticipated.

Secondary and Cumulative Impacts:

This project involves widening an existing corridor which is planned for extensive development. As described in section 4.3.1, future planned development along the I-4 corridor consists of commercial, hotel, office, entertainment/recreation and some residential. Most of these developments have already received approval, which indicates that the area will experience tremendous growth in the future. The expansion of I-4 will help support this growth. Several parcels of land on the north side of I-4 will remain agricultural or conservation in the future, which include the area around Reedy Creek and between the Osceola/Orange County line and S.R. 536.

The improvements to I-4 as well as the future planned developments are consistent with the local comprehensive plans. By using the existing corridor, the project will result in no secondary and cumulative impacts. Drainage improvements proposed by the project, including stormwater retention ponds, will improve water quality.

9.15 Utility Impacts

Utilities which may be impacted by the Preferred Build Alternative include various electric, cable television, telephone, natural gas, liquid petroleum gas pipeline, sanitary sewer and water transmission lines. These utilities are described in Section 4.1.12.

A Utility Assessment Table, see Table 9-4, was prepared as part of the FDOT Utility Assessment Package for the Preferred Build Alternative. Information in this table includes the utility agency, description of utilities, and the utility's estimate of relocation costs. These cost estimates, with minor modifications, were included as utility adjustment costs in the LRE Cost Estimate for Preferred Build Alternative (Appendix F). The modifications included: 1) the Preferred Build Alternative will not impact the Tampa Electric Company Substation, therefore the $20 million relocation cost has been eliminated, 2) relocation cost estimates were developed for utilities of the Orange County Utilities Division and City of Kissimmee, Water Resources, in the amounts of $200,000

Table 9-4

UTILITY ASSESSMENT TABLE

Utility Agency / Contact	Description of Utilities	Permitted in Public Right-of-way or Private Easement?	Utility's Estimated Relocation Cost (1998)	Is Better-ment or Install-ation planned within 5 years?
Florida Power Corporation-Transmission Ronald Worley, Liaison Specialist 2600 Lake Lucien Drive, Suite 400 Maitland, FL 32751-7234 ATTN: Keith Keller (407) 475-2247	69 kV aerial power transmission and 8.30 kV aerial power transmission Includes seven (7) total aerial crossings over Interstate 4 .	Public right-of-way of S.R. 545. Private easement parallel to Interstate 4.	±$875,000.00	No
Orlando Utilities Commission (Power) Peggy Tatum, Coord. Development 500 S. Orange Avenue Orlando, FL 32801 (407) 236-9651	230 kV aerial power transmission line and structures: Sta. ±28+00 RT. to 34+00 RT. and Sta. ±50+00 RT. to ±60+00	FDOT proposed R/W encroaches ±1 mile of private easement. (5 construction days for relocation)	±$900,000.00	None known
Orlando Utilities Commission (Water) Edward Upchurch	No Facilities	N/A	N/A	N/A
Tampa Electric Company Arlene Brown, Construction Coord. & Serv. and FDOT Liaison Coordinator 702 N. Franklin Street Tampa, FL 33602 (813) 228-4674 Bill Barton, Transmission Eng. (813) 228-4442 Jack Sewart, Substation Eng. (813) 228-4435	230 kV Switching Station and 230 kV/69kV Substation with two 230 kV transmission aerial lines, one 69 kV underground. Substation located NW intersection of I-4 and World Drive ±62+00, LT.	Substation is on fee-owned land. Transmission lines are within private easements that are co-owned with others.	±$20 million Substation ±$1 million UG electric/conduit	Yes Possibly install additional facilities within private easement & at substation.
Reedy Creek Energy Services, Inc. Judy Moorehead (407) 824-4123	No Facilities	N/A	N/A	N/A

Table 9-4 Continued

UTILITY ASSESSMENT TABLE

Utility Agency / Contact	Description of Utilities	Permitted in Public Right-of-way or Private Easement?	Utility's Estimated Relocation Cost (1998)	Is Better-ment or Install-ation planned within 5 years?
Orange County Utilities Division Steve Beasley, Sr. Engineer 109 E. Church Street Orlando, FL 32801 (407) 836-7211	Water, Wastewater, and Reuse facilities: S.R. 535, Lake Ave., Palm Parkway, Little Lake Bryan Rd., Central Florida Parkway, Turkey Lake Rd., Westwood Blvd., Sea Harbor Dr., Academic Dr., metered service to Rest Area	Permitted within public right-of-way	Estimate Not Given	Yes
City of Kissimmee, Water Resources Brian Wheeler, Director 1100 N. Main Street Suite A Kissimmee, FL 34744 ATTN: Todd Petrie, P.E. (407)518-2160, ext 232	36" effluent transmission main (recently relocated to avoid conflict with I-4 interchange improvement project.) new 16" water main for future use new 12" force main for future use Located perpendicular to I-4 at C.R. 532.	Permitted within I-4 and C.R. 532 public rights-of-way.	Estimate Not Given	None. The City's recent relocation and installations were done to avoid conflict with the I-4 improvement project.
Osceola County Public Works Howard Russell, Director (407) 932-5306	No Utility Facilities	N/A	N/A	N/A
Sprint-Florida, Inc. J.T. Kilpatrick, Mngr. Engin./Construction 33 N. Main Street Winter Garden, FL 34777 ATTN: R.M. (Mike) Shell, Sr. Network Engineer phone (407) 814-5344, fax (407) 814-5320	C.R. 532, Fiber optic Cable C.R. 545, Fiber optic & copper 4-Way duct bank U.S. 192, Fiber optic & copper 20-Way duct bank, with transite (asbestos) S.R. 535, Fiber optic cable, 4-way duct bank in steel casing. Sprint also provides service to Rest Area north of Lake Avenue	Permitted within public right-of-way	±$1 million	Yes Possible installations in the Lake Avenue area.

Table 9-4 Continued

UTILITY ASSESSMENT TABLE

Utility Agency / Contact	Description of Utilities	Permitted in Public Right-of-way or Private Easement?	Utility's Estimated Relocation Cost (1998)	Is Better-ment or Install-ation planned within 5 years?
Time Warner Communications P.J. King, Construction Manager 844 Maguire Road Ocoee, FL 34761 ATTN: Marvin L. Usry, Jr., Construction Super. phone (407) 654-0657, fax 656-1162	Underground and Aerial Fiber Optic and Coaxial Cable: U.S. 192, S.R. 535, Vineland Avenue, parallel to I-4, Lake Avenue, Palm Parkway, Central Florida Parkway, Westwood Blvd., and Turkey Lake Road	Permitted within public right-of-way	Minimum ±$30,000 Maximum ±$150,000	Yes
Vista-United Telecommunications Robert Merrick, Engineering Manager 3100 Bonnett Creek Road Lake Buena Vista, FL 32830 (407) 827-2124 or John Coussoule (407) 827-2141	Buried fiber optic cable along U.S. 192, crosses over I-4	Permitted within public right-of-way (share duct bank with Sprint-Florida)	$10 per linear foot to relocate	Yes
BellSouth Telecommunications Consultant: Fluor Daniel Telecom Rick Capman, OSP Engineer 500 N. Orange Avenue, Room 385 Orlando, FL 32801 (407) 418-1291	Fiber optic cable on east side Turkey Lake Road crossing under I-4	Permitted within public right-of-way	±$30,000	None known
Adelphia Cable Bill Nimmons, District Manager 4305 Vineland Road, Suite G-2 Orlando, FL 32811 ATTN: Ted Johnson, Proj. Coordinator (ext. 407) phone (407) 422-3961, fax (407) 843-6419	Buried .750 (3/4") coaxial cable along S.R. 545 which crosses I-4	Permitted within public right-of-way (east side of SR 545)	±$18,000	No

Table 9-4 Continued

UTILITY ASSESSMENT TABLE

Utility Agency / Contact	Description of Utilities	Permitted in Public Right-of-way or Private Easement?	Utility's Estimated Relocation Cost (1998)	Is Better-ment or Install-ation planned within 5 years?
Florida Gas Transmission Steve Keith, P.E., Lead Engineer 601 S. Lake Destiny Drive, Suite 450 Maitland, FL 32751 (407) 875-5841 For Meetings (407) 295-4341, ext. 10	18" Mainline and Measurement and Regulator Station	Private Easement	±$1 million (worst case, based on current dollars)	None known
Central Florida Pipeline Corporation Rick Lien, Pipeline Manager 2101 Gatx Drive Tampa, FL 33605 (813) 241-1128 or office (813) 248-2148	16" UG steel gas pipeline. Encased 24" steel under pavement, directional bores at Reedy Creek and Shingle Creek. Relocations would include extending casings, adjusting vent pipes, and performing directional gas main bores.	Primarily located within private easement.	$300-$400 per foot	None known
TECO/Peoples Gas Mike Hannweber, Regional Operations Mgr. 600 W. Robinson Street Orlando, FL 32802 ATTN: Lawree Washington 425-4661	Buried 4" SCW gas main with 8" steel casing along north side of U.S. 192 Buried 6" gas main with 16" casing crossing I-4 along north side of S.R. 535 Buried 4" gas main on north side of Central Florida Parkway, crosses I-4, turns north situated on west side of I-4	Permitted within public right-of-way	±$3 million (worst case, based on current dollars for the three areas adjacent to I-4)	None known

and $30,000, respectively, 3) lengths of relocations were developed for utilities of Vista-United Telecommunications and the Central Florida Pipeline Corporation, resulting in estimated costs of $30,000 and $200,000, respectively. The resulting total estimated cost of utility relocation within Section 1 under the Preferred Build Alternative is approximately $8.5 million.

9.16 Traffic Control Plan

As previously stated, I-4 has four lanes from the Polk/Osceola County line to U.S. 192 (S.R. 530) and six lanes from U.S. 192 (S.R. 530) to beyond the east project limits. A PD&E study was recently completed for the widening of I-4 to six lanes from U.S. 27 west of Polk/Osceola County line to U.S. 192. This project is expected to be constructed prior to the improvements recommended in this study. Therefore, the maintenance of traffic and constructability reviews were performed assuming I-4 as a six-lane facility throughout Section 1. These reviews have also considered the change in vertical profile along the alignment.

From the Polk/Osceola County line to west of C.R. 545, the six-lane widening project will add one lane in each direction to the inside of the existing lanes, which will reduce the median width to 23.2 m (76 ft.). From west of C.R. 545 to U.S. 192 (S.R. 530), the six-lane widening project will add one 3.6 m (12 ft.) lane in each direction to the outside of the existing lanes, retaining the 19.5 m (64 ft.) median. East of U.S. 192, I-4 currently has a 19.5 m (64 ft.) median.

The proposed typical sections for I-4 Section 1 are:

- Six general use and four special use lanes (6+4) from C.R. 532 to southwest of World Drive;
- Six general use and two HOV lanes (6+2) from southwest of World Drive to northeast of Lake Avenue; and
- Six general use and four HOV lanes (6+4) from northeast of Lake Avenue to the BeeLine Expressway.

The proposed typical sections include a 13.4 m (44 ft.) transit envelope and 3.0 m (10 ft.) paved shoulders within the median, which results in a median width of 19.4 m (64 ft.).

Typically, the proposed typical sections and the existing typical sections create three typical section combinations for the Traffic Control Plan (TCP):

1. Proposed 6+4 typical section with an interim 6+0 typical section with a 23.2 m (76 ft.) median: Using the interim inside shoulder for maintaining traffic, this combination allows for approximately 6 m (20 ft.) between the outside edge of maintained traffic lane and the inside edge of the new general use lanes. This would

allow for the construction of the full inside general use lane shoulder. This combination occurs from the Polk County line at C.R. 532 to west of C.R. 545.

2. Proposed 6+4 typical section with an interim 6+0 typical section with a 19.5 m (64 ft.) median: Using the interim inside shoulder for maintaining traffic, this combination allows for approximately 8 m (26 ft.) between the outside edge of maintained traffic lane and the inside edge of the new general use lanes. This would allow for the construction of the full inside general use lane shoulder. This combination occurs from west of C.R. 545 to west of World Drive and from east of Lake Avenue to the BeeLine Expressway.

3. Proposed 6+2 typical section with an interim 6+0 typical section with a 19.5 m (64 ft.) median: Using the interim inside shoulder for maintaining traffic, this combination allows for approximately 4.2 m (14 ft.) between the outside edge of maintained traffic lane and the inside edge of the new general use lanes. Depending on the grade differential, this may not allow for the construction of the full inside general use lane shoulder. This combination occurs from west of World Drive to east of Lake Avenue.

All three of these typical section combinations facilitate the phasing of construction by allowing the traffic to use the existing lanes and inside shoulder while the proposed general use lanes and CD roadways are constructed. To allow for the proposed general use lane inside shoulder to be constructed at the same time as the general use travel lanes, the inside shoulder of the interim lanes would be paved, the outside interim travel lane would be closed and traffic shifted to the inside two interim lanes and the paved shoulder. Once the proposed general use lanes and CD roads are complete, traffic would be switched to the new general use lanes and the HOV lanes can be constructed. A minimum of three lanes of traffic in each direction will be maintained at all times. Exhibit 9-2 shows each of the mainline phases.

The following is a brief discussion of the phasing for the I-4 mainline:

Phase I: This phase consists of paving the inside shoulder and striping it for use as a temporary travel lane. Traffic would be shifted to the temporary inside lane (paved shoulder) and the two inner lanes.

Phase II: In this phase, a temporary barrier wall would be installed along the outer travel lane. For typical section combinations 1 and 2, the general use lanes and full shoulders (inside and outside) would be constructed. For combination 3, only a portion of the inside general use lane shoulder would be constructed. All drainage piping, exfiltration boxes, ponds, and box culverts needed for the function of the general use lanes and CD roads would be constructed. The CD roadways, interchange ramps, and ramp flyovers would be constructed during this phase. At the conclusion of Phase II, a temporary barrier wall would be installed along the inside shoulder of the new general use lanes.

PHASE 1

PHASE 2

PHASE 3

PHASE 4

IPKRM-
12 JAN 1998 11:01
e:\245-94\dan\typnstrl4.dgn

TYPICAL TRAFFIC CONTROL PLAN
(MAINLINE I-4)

I-4 PRELIMINARY
ENGINEERING REPORT
STATE PROJECT NO. 92130-1425
& 75280-1497

4

EXHIBIT
9-2

Phase III: Mainline traffic would be shifted onto the new general use lanes. Traffic would enter and exit the facility via the new ramps and CD roadways. The remaining inside shoulder of the general use lanes (for combination 3) and the HOV lanes would be constructed. The permanent barrier wall between the general use lanes and the HOV would be installed during this phase.

Phase IV: In this phase, temporary barrier wall would be removed and all lanes opened to traffic.

TCP for Segment 1

In this segment, the transition between the I-4 segment through Polk County and Segment 1 is essential for maintenance of traffic. It is anticipated that construction on the Polk County segment would not proceed this segment. Consequently, maintaining traffic at the beginning of this project would consist of routing the existing three lanes into the open three lanes for each given phase. Some temporary pavement would be required.

TCP for Segment 2

In this segment, the TCP phasing is primarily dependent on the completion of construction for the complex, multi-level U.S. 192 (S.R. 530) interchange. In conjunction with that interchange, the S.R. 536 and Osceola Parkway interchanges would be affected. The U.S. 192 interchange is currently programmed to be completed prior to the beginning of the improvements proposed in this document. Given that the proposed interchange is already completed, the TCP for construction of the mainline I-4 roadway at this interchange consists of two main phases. Phase I for the U.S. 192 interchange would coincide with the Phase III for the remainder of the mainline I-4 maintenance of traffic since the general use lanes will have been built as part of the U.S. 192 interchange. Traffic will be shifted out onto the existing outside shoulder; construction of temporary ramps would be required. In Phases II of the interchange, the HOV lanes along I-4 are constructed.

The improvements to the Osceola Parkway interchange would be conducted in four phases. During Phase I, temporary ramps for westbound traffic entering I-4 from the Osceola Parkway and temporary ramps in other quadrants of the interchange would be constructed. In this phase, the construction of a cantilever bridge for the CD roadway along the east side of I-4 would begin. Construction of a portion of the CD roadways would have been completed during the U.S. 192 interchange construction. In Phase II this bridge and the remaining CD roadways along with the permanent ramps would be completed. In Phase III, the I-4 general use lanes would be constructed. The construction of the I-4 HOV lanes would occur during Phase IV.

At S.R. 536, the construction of the braided ramps accessing the HOV lanes is the critical element in the construction sequence. In Phase I, temporary pavement will be constructed in the median and a temporary barrier wall will be places between opposing traffic. Traffic will be shifted into the median at the location of the braided ramp overpasses. This will facilitate the complete construction of the overpasses, ramps and northbound flyover ramp

from eastbound S.R. 536 during Phase II. In Phase III, the newly constructed HOV braided ramps are used to convey traffic to the existing through lanes on I-4 allowing the construction of the general use lanes away from traffic. In Phase IV, traffic is shifted to the new general use lanes, the HOV ramps are temporarily closed, and the HOV lanes are constructed.

Constructability of the U.S. 192 (S.R. 530), S.R. 536, and Osceola Parkway Interchanges
Since the U.S. 192 interchange will be constructed to facilitate the widening of I-4 prior to the construction of the mainline improvements, constructability will not be an issue at this location. Consideration should be given to construction of the temporary ramps so that pavement and embankment removal will not impact traffic on general use lanes.

Bonnet Creek Canal (C-1) flows directly through the intersection of I-4 and Osceola Parkway, making the structural crossings tri-level. Providing the standard pier placement at the dividers between the HOV lanes and the general use lanes, and between the general use lanes and the CD road will position some of the Osceola Parkway bridge piers over the I-4 structures. Such piers will have to extend down through the I-4 bridges into the canal bottom.

The construction of the I-4 bridges will have to be done in the "shadow" of the existing Osceola Parkway bridge, which will prohibit normal crane erection. Because of the clearance restrictions, a special launching rig will be required to position beams and other structural members. Pile driving operations cannot be performed under existing structures and will require alternative foundation designs. The westbound CD road structure should be constructed wide enough to handle an I-4 lane shift.

A possible sequence of construction/demolition would then be:

At Bonnet Creek Canal (C-1), construct westbound CD structure wide enough for an I-4 shift. Construct foundation on the east side of the I-4 westbound structure with I-4 westbound traffic on CD Road. Build the westbound I-4 bridge and shift I-4 eastbound traffic to this structure. Build the eastbound I-4 structure.

Shifting traffic along I-4 to temporary pavement in the median at the S.R. 536 interchange will facilitate the construction of the braided HOV ramps and embankment. Adequate room is required at this location to facilitate the bridge construction, as well as the retaining walls and embankment.

TCP for Segment 3
The phasing of the S.R. 535 interchange is critical for maintenance of traffic. At S.R. 535, Phase I would consist of the construction of temporary ramps for I-4 entrance and exit. Construction of the permanent loop ramp in southeast quadrant of the interchange would be done during this phase. Construction of the permanent CD roads north of S.R. 535 and temporary pavement to maintain traffic for Vineland Road would be completed. During Phases II and III the general use lanes east and west of the interchange, the permanent

ramps, and the S.R. 535 overpass would be constructed. Construction of Vineland Road would be performed during which Vineland Road traffic would be maintained on temporary roadways and the permanent CD road along the east side of I-4. Phase IV would consist of the construction of the I-4 HOV lanes.

Constructability of the S.R. 535 Interchange

The profile shows the proposed grade line at approximately the same elevation as the existing ground in the overpass area. The width of the proposed typical section may make vertical clearances a critical consideration for construction.

Possible sequencing of this overpass could be to first construct south span, shifting S.R. 535 to two-way traffic on one side of a central pier if required. Second, shift I-4 eastbound traffic to the new south span and shift I-4 westbound traffic to the old existing eastbound span. Construct north span, shifting S.R. 535 as required and demolishing existing structure. Third, shift I-4 westbound traffic to the new north span, construct center span shifting S.R. 535 as required and demolish existing structure.

Constructability of the Lake Avenue Interchange

Since Lake Avenue presently does not cross or interchange with I-4, the construction of this element does not represent any difficult or unusual constructability issues. The 500 mm (20 in.) force main crossing and 69KV overhead electric lines will have to be relocated in advance of any bridge or roadway construction. Construction of the ponds within the ramp infield areas should be delayed until the latter stages of construction, as these areas will be needed for staging as well as the erection of cranes.

TCP for Segment 4

Phasing of the Central Florida Parkway interchange is the main aspect of the maintenance of traffic for this segment. In Phase I, temporary ramps for the northbound exit from I-4 to the Central Florida Parkway would be constructed. Construction of a temporary ramp for the Central Florida Parkway to function as a bypass for the existing westbound flyover would need to occur during this phase. In Phase II, the existing westbound flyover would be removed from service and demolished. This is required since a major portion of the new flyover is constructed in the same location as the existing flyover. Construction of the northbound I-4 general use lanes and the eastbound exit ramp onto the Central Florida Parkway would occur during this phase. The mainline bridge crossing of the Central Florida Parkway over I-4 would be constructed in stages during Phases II and III. During Phase III, the new westbound flyover would be constructed and the remaining ramps and I-4 general use lanes. In Phase IV, construction of the I-4 HOV lanes would occur.

Constructability of the Central Florida Parkway Interchange

Single column piers, such as hammerhead piers, could be used on the third level flyover without vertical clearance problems if the profile is high enough. This would avoid large plans show a 600 mm (24 in.) water main through the west side abutment of the flyover. Relocation of this utility in front of or behind the abutment would be preferred.

The quadruple 1200 mm (48 in.) culverts must be designed to avoid construction conflicts with structure foundations. Maintaining existing drainage patterns during construction will also have to be considered in design.

Construction Sequence

Given the length of the study area, construction of the entire project at one time is not feasible. Since a significant element of the interchanges in segment two are the HOV ramps, the construction sequence should facilitate the construction of adequate portions of the HOV lanes to encourage use by the public. Segment 3 should be constructed first. However since this is a short segment, the HOV lanes would not be practical to use for this segment alone. Also, a potential weaving problem could result at the temporary end of the HOV lanes between Central Florida Parkway and the BeeLine Expressway (S.R. 528). To avoid the weaving problem and encourage HOV use, segments 3 and 4 should be constructed first, along with the BeeLine Expressway interchange. The second segment that should be constructed is segment 2, since a major destination for the HOV lane users is the S.R. 536 interchange. This would leave segment 1 to be constructed last.

It is also anticipated that several of the interchanges within this study, and in particular in segment 2, will be constructed during prior to the mainline improvements. Construction sequencing of the U.S. 192 interchange should include the improvements to the ramps and overpass at Osceola Parkway. Construction of the general use and CD roadways to avoid causing a weaving problem between these two interchanges would also be desirable and would be preferred from a constructability standpoint. Construction of the elevated CD road between the two interchanges will require considerable room for staging of cranes and materials and needs to be done with traffic shifted to the inside of the mainline I-4 roadway. All the remaining interchanges can be built separately without significant impact to adjoining interchanges.

9.17 Results of Public Involvement Program

Public involvement and agency coordination activities undertaken as part of the I-4 Section 1 study include the processing of an Advance Notification Package and implementation of a comprehensive public involvement program.

Advance Notification

FDOT, through the Advance Notification (AN) Process, informed a number of Federal, State, and local agencies of the existence of this project and its scope. The AN package was distributed on May 30, 1996 to the Office of Planning and Budgeting. A single comment was received in response to the AN, from SFWMD. The comment and response are provided below.

Comment: The following, relative to SFWMD's permitting criteria, should be considered on the design, construction and permitting of this project:

1) The proposed roadway improvements will require an Environmental Resource Permit for construction and operation of the proposed surface water management system and for any proposed wetland impacts or dredge and fill activities, pursuant to Rules 40E-1, 40E-4, 40E-40, 40E-41 and 40E-400, FAC.

2) The proposed roadway improvement must meet SFWMD's water quality and water quantity criteria as specified in the Basis of Review for Environmental Resource Permit Applications within SFWMD. Since this project involves the widening of the existing roadway, water quality treatment must be provided for the new portions of the road at a minimum. In order to provide the required water quality treatment, additional right-of-way beyond that currently anticipated may be required.

3) To the extent possible, wetland impacts due to location, design and construction techniques should be minimized. Where wetland impacts cannot be prevented, mitigation proposals must be included with the permit application that meet current SFWMD criteria, as contained in Appendix 7 of the Basis for Review for Environmental Resource Permit Applications. Please note that information which documents that any proposed wetland impacts are unavoidable will be required at the time of permit application, as well as information on the alternatives considered to reduce the proposed impacts.

4) A water use permit may be required for any dewatering activities associated with the proposed roadway improvements, pursuant to Rule 40E-2, FAC. Please contact the Water Use Division of our Regulation Department at (561) 687-6926, prior to the initiation of any dewatering activities and subsequent to the completion of the Contamination Screening Evaluation Report, to schedule a pre-application conference to discuss the details of the proposed dewatering activities. Please note that if the proposed roadway improvements include dewatering activities within contamination areas or if the dewatering activities have the potential to result in the induced movement of the contamination plume, a pre-application meeting involving SFWMD Water Use staff and the appropriate staff from the Florida Department of Environmental Protection should be scheduled to discuss management of dewatering effluent, including the design of appropriate containment/treatment methods.

Response: All of the comments offered by SFWMD will be taken into consideration throughout the project development for the proposed I-4 improvements.

Public Involvement Program

The purpose of this program was to establish and maintain communication with the public at-large and with individuals and agencies concerned with the project and its potential impacts. A Public Involvement Consulting firm was chosen to oversee and coordinate the Public Involvement Program (PIP) for all of the I-4 PD&E Study sections and the HSR project. The establishment of a common PIP was implemented to create an interactive team unit and produce a unified product for the entire I-4 development project. The PIP has coordinated all meetings, established a project 800 hotline and internet web page to enhance public communication, and attended a wide variety of public gatherings for project exposure. Also, a Public Involvement Van has been created specifically for the I-4 expansion project which is taken to public events as an extra effort to generate interest and inform the community regarding the proposed I-4 activities. A summary of PIP activities as related to I-4 Section 1 is provided below.

Environmental Advisory Committee: An I-4 Environmental Advisory Committee (EAC) was formed during the I-4 MMMP to work directly with FDOT and the technical consultants to address community and environmental planning issues. Participants of the EAC included staff from governmental agencies, citizens, and grass roots organizations. This type of public involvement group fostered comprehensive regional planning initiatives due to the diversity and scope of the participants and provided the opportunity to collectively review and discuss linkages between transportation, community, and environmental planning issues. Based on the significant contribution of the EAC to the I-4 MMMP, EAC participation was continued throughout the PD&E process. An initial meeting was held with the EAC participants in November 1996 to introduce the technical consultants and provide a preliminary overview of the PD&E study process. In addition to the interactive meetings, FDOT has also solicited and responded to written comments from the EAC.

Public Workshop: A public workshop was held on April 14, 1998 to present project information and solicit public comments prior to the submittal of the FHWA documents. Approximately 35 people attended the workshop with most representing property or business owners interested in potential impacts to their property. Those attending the workshop appeared to have a prior understanding of the project and their attitudes were inquisitive, not upset or demanding. Specific comments generally addressed concerns regarding access, HOV lanes, pond site utilization and property acquisition. Overall, those attending expressed support for the project without favoring any specific alternative. Several attendees expressed dismay at the time frame for completing the proposed improvements; the general view being that improvements are needed at this time. A court reporter was present throughout the duration of the workshop.

Public Hearing: A formal public hearing was held on May 4, 1999 at the Shivers Pavilion in Sea World, Orlando, Florida. Approximately 89 residents, property owners, and business owners attended the hearing. Twenty-nine participants

submitted formal public testimony either through comments spoken into the record or as written comments. In addition to this input, a petition signed by 24 residents and citizens was submitted to express concern about project elements proposed in the vicinity of Lake Willis.

Project documents were made available for public inspection prior to the hearing. Specifically, Public Notice advertisements were published in area newspapers 21 days prior to the hearing and again 5 to 12 days prior, depending on their publication schedules. Documents were available for review at the FDOT District Office in DeLand and several public locations.

A review of the public testimony and written comments received during the Public Hearing period indicates the concerns were drainage, location and design of stormwater facilities, the water quality of Lake Willis, noise in the vicinity of Lake Willis, and the design of HOV lanes. Statements of project support accompanied seven of the written comments and were included in six spoken statements as recorded in the Public Hearing transcript. The entire Public Hearing transcript including the formal presentation, public comments, FDOT responses at the hearing and written responses to each written comment are included in the Environmental Assessment.

9.18 Value Engineering

Value Engineering (VE) for the proposed I-4 Section 1 improvements was conducted during three meetings/workshops. Participants in the VE teams included representatives from FDOT District Five, Florida Turnpike, and Central Office in the areas of Traffic Operations, Roadway Design, Structures, Right-of-way administration, Environmental Management, Maintenance, and Construction. The participants for each subject area varied for each VE team meeting and FDOT office. The consultant firms of Ventry Engineering, Tampa Bay Engineering, PMA Consultants were also represented in the VE teams. The issues raised during the meetings/workshops were provided in separate VE reports for each meeting/workshop. A summary of major issues follows.

The VE team recommended buffer separated HOV lanes over barrier separated HOV lanes, because barrier separated HOV lanes cost more to construct, provide less flexibility for incident management, and require less enforcement for equal or greater compliance with the HOV occupancy requirements. The project study team and FDOT disagreed with the change to buffer separation for the following reasons. The logic behind the VE team's preference for buffer separation for incident management flexibility is that the buffered HOV lanes are HOV lanes as long as I-4 operates without accidents. The buffered HOV allows the lanes to be used by accident diversion traffic and invites opportunity by the public to bypass the accident area or a vehicle stopped on the shoulder. Also, a police officer could overrule the HOV designation on the buffered lane when trying to clear a minor accident. Barrier separated HOV lane may be used for routing

traffic around accident areas. Limiting this use to only major accidents, the perception will be maintained that the HOV lane is a *premium* facility where travel times are almost always *guaranteed.* Lesser flexibility for small accident routing is actually a good thing for HOV ridership and shows a *commitment* to HOV facilities.

Mainline enforcement areas and ramp enforcement pads are planned where grade separated access points are used. This will make enforcement for the barrier HOV simpler than the buffer HOV. Comments received from local law enforcement has been favorable toward this treatment. Barriers have other advantages such as the ability to have control of volumes and violations and the ability to use the lane for a potentially large number of uses. Barrier separation better satisfies the intent of the "special use" lane designation in the Interstate Highway Policy.

The VE Team recommended an alternative transition between the District One and Five typical sections, described as follows. At the Polk/Osceola County line, the District One 6+4 typical section would be transitioned to five general use lanes. A lane would be dropped at World Drive as a HOV 2+ exit only. Four general use lanes would be continued east of World Drive. At the end of the World Drive CD system, HOV traffic would be separated from general use traffic. Two alternatives were given for separating the HOV traffic from general use traffic. The first alternative uses the existing inside two lanes to develop one buffer separated HOV lane and widens to the outside. The second alternative develops one barrier separated HOV lane in the median. Both of these alternatives only address a single HOV lane in each direction throughout the remainder of the project. This is inconsistent with the I-4 MMMP, where two HOV lanes are recommended in each direction between Lake Avenue and the BeeLine Expressway. Also, the year 2020 forecast substantiates the need for two HOV lanes in each direction along this segment.

This VE concept was rejected because it recommended five general use lanes in both directions between the Polk/Osceola County line and World Drive and four general use lanes between World Drive and U.S. 192, which violates Florida's Interstate Highway Policy. The distance between those points are too great to consider the additional general use lanes as auxiliary lanes. The mixing of traffic between the Polk/Osceola County line and World Drive would not necessarily guarantee compliance of the HOV treatment further downstream. Unauthorized vehicles could still enter the HOV facility. Even with adequate signing, a driver could potentially become trapped in the HOV facility in any alternative, if the signs are ignored.

The direct connection from the special use lanes to the World Drive CD system serves through trips better by allowing direct access to the Southern Connector (S.R. 417) for bypassing the Orlando CBD. Essentially, the Central Florida Greeneway replaces the long distance single occupant vehicles (SOV) in the I-4 special use lanes with the Orlando Beltway system. The direct connect ramp and the slip ramp to the east provide a structured way to transition from SOV and HOV2+ to HOV3+, which is more appropriate given the percentage of unfamiliar drivers in the area, than the "free-for-all" concept as

proposed by the VE team. The VE team alternatives were also rejected because they did not provide sufficient HOV capacity between Lake Avenue and the BeeLine Expressway.

Another major issue by the VE team is an alternative interchange concept for Central Florida Parkway. This concept is a full diamond interchange with the existing flyover ramp eliminated. This concept was worthy of further evaluation and was evaluated as study alternative 4B. However, the traffic analysis showed that the diamond interchange concept would not accommodate the design year traffic at an acceptable LOS.

Another VE recommendation suggested a shift of the mainline roadway alignment approximately 17.9 m (59 ft.) to the northwest to eliminate right-of-way impacts along the southeastern side of I-4. The study team did not agree with this recommendation because:

- it would require reconstruction of the Osceola Parkway bridges and the Southern Connector flyover bridge,
- the ramp bridges and some of the drainage ponds initially constructed for the Osceola Parkway interchange would require reconstruction,
- it would be extremely disruptive to existing interchange operations,
- it would require significant maintenance of traffic costs,
- it require right-of-way acquisition in areas where no further right-of-way acquisition would have been necessary, and
- HSR operations would be hampered by the use of reverse curves.

The costs associated with these items are anticipated to be greater than the cost of right-of-way needs for the HNTB concepts in that area.

Some other issues raised by the VE team included reducing design standards such as restricting border width for CD roads to arterial standards, reducing HOV corridor width (shoulders), and the use of barrier wall to reduce horizontal clearances. The use of full border width should be maintained due to the varying design speeds of the ramps and the CD roads. District Five concurs with these border widths. Border width has been reduced by use of barrier wall, where necessary to minimize impacts to existing development or avoid impacts to environmentally-sensitive areas. Reducing HOV corridor width would be acceptable if this lane remain as a single lane operation forever. However, the design is flexible enough to accommodate two lanes in each direction, if necessary in the future. The use of barrier walls to reduce horizontal clearances could lead to significant cost savings. However by using the maximum desirable clearances, the maximum potential impact can be evaluated. Desirable clearances have been used where practical.

Other issues raised by the VE team included elimination of the braided ramps in the eastbound direction between Osceola Parkway and S.R. 536 interchanges and the use of a continuous CD road with a single exit point for westbound traffic exiting to S.R. 536, Osceola Parkway, and U.S. 192. Due to large forecasted volumes, significant operational

problems are anticipated by these recommendations. The VE team recommended some modifications to the alternative A/B concept for the U.S. 192 interchange. The recommendation to reduce the flyover ramp to a single lane ramp was accepted by FDOT.

9.19 Drainage

The recommended Preferred Build Alternative for the I-4 Section 1 improvements was evaluated to determine impacts on existing hydraulic conditions in accordance with 23 CFR 650. This evaluation is detailed in the Location Hydraulics Report which was prepared for the project. A copy of this report is available for review at the FDOT District Five office in DeLand, Florida.

Transportation projects are grouped into seven categories as outlined in the FDOT PD&E Manual based upon the type of the proposed improvement and estimated floodplain impact. The proposed I-4 improvements have been classified as Category 4: Projects on Existing Alignment Involving Replacement of Existing Drainage Structures with No Record of Drainage Problems. Projects within this category require a Level 2 Evaluation. Since the modifications included in this level result in minimal increases in flood heights and flood limits, minimal design computations are generally appropriate.

The following sections provide preliminary design information on the proposed cross drain structures, potential floodplain impacts, and stormwater management facilities.

9.19.1 Cross Drains

Within the project limits, there are 24 existing cross drains that range in size from 450 mm (18 in.) diameter reinforced concrete pipe to four - 3.65 m by 2.40 m (12 ft. by 8 ft.) reinforced concrete box culverts. In addition, there are bridge crossings of Reedy Creek and Bonnet Creek (C-1 Canal). Table 9-5 lists the existing cross drain structures, and Table 9-6 outlines the recommended structure improvements. Additional information is provided in the Location Hydraulics Report.

The proposed project area lies within four major drainage basins, which are the Davenport Creek, Reedy Creek, Cypress Creek, and the Shingle Creek Basins. Typically, runoff volumes from each basin travel transverse in a southeasterly direction and are conveyed through the I-4 corridor.

There are two governmental agencies that specify criteria for drainage design in the project area, which include the South Florida Water Management District (SFWMD) and FDOT. In accordance with these criteria, the proposed cross drain structures for the I-4 improvements have been designed for the 50-year design storm and evaluated for the 100-year design storm. An evaluation of the 500-year and overtopping event has also been prepared, and is included in the Location Hydraulics Report.

Table 9-5

FLOOD DATA BLOCK - EXISTING CROSS DRAINS

Structure No.	Structure Type	Station	Design Flood		Base Flood		Overtopping Flood				Greatest Flood			
			2% Prob. Discharge	50 yr. Freq. Stage	1% Prob. Discharge	100 yr. Freq Stage	Discharge	Stage	% Prob.	Freq. Yr.	Discharge	Stage	% Prob.	Freq. Yr.
1	2 - 48" RCP	11+28	181	109.01	211.1	109.7	328.6	113.43	0.24	410				
2	2 - 9' X 7' CBC	16+06	907	100.83	1058.4	101.28	1781.8	106.21	0.22	460				
3	36" RCP	19+84	50.9	94.77	59.4	95.62	84.8	98.93	0.24	420				
4	4 - 12' X 8' CBC	21+56	236	93.31	329.5	93.32					462	93.34	0.2	500
5	2 - 7' X 4' CBC	32+15	403.2	96.93	470.4	97.55	605.2	99.43	0.40	250				
6	3 - 7' X 4' CBC	33+00	605	114.22	706	114.81					1200	120.19	0.2	500
7	42" RCP	40+85	69.3	89.84	80.8	90.5	107	92.41	0.40	248				
8	2 - 42" RCP	48+17	138.5	79.97	161.7	80.68	179.4	82	0.45	220				
9	2 - 7' X 3' CBC	71+95	302.4	81.53	352.8	82.63	368	83.01	0.83	120				
10	2 - 7' X 4' CBC	87+50	403.2	84.68	470.4	85.45	611.4	87.43	0.36	275				
11	2 - 7' X 6' CBC	108+00	604.8	88.83	705.6	89.32	1112.4	93.25	0.24	420				
12	2 - 7' X 6' CBC	108+10	604.8	89.28	705.6	89.84	1096.2	93.3	0.24	410				
13	2 - 7' X 5' CBC	108+40	504	88.8	588	89.34					1000	94.44	0.2	500
14	2 - 7' X 5' CBC	108+84	504	88.76	588	89.31	845	92.36	0.30	335				
15	2 - 7' X 5' CBC	108+90	504	89.47	588	90.02	813.4	92.65	0.32	310				
16	2 - 7' X 5' CBC	108+94	504	89.87	588	90.37	863.2	93.18	0.28	360				
17	2 - 36" RCP	139+00	101.8	89.05	118.8	89.65	160.7	91.72	0.36	280				
18	2 - 48" RCP	139+01	181	87.71	211.1	88.25	297.7	90.61	0.29	340				
19	2 - 36" RCP	139+02	101.8	88.5	118.8	89.37	142.3	90.7	0.56	180				
20	2 - 30" RCP	155+79	70.7	100.67	82.5	102.4	95.9	103.56	0.51	195				
21	48" RCP	175+30	90.5	105.44	105.6	106.11	133.1	107.73	0.43	230				
22	30" RCP	207+17	35.3	109.05	41.2	110.12	84.7	111.75	0.50	200				
23	2 - 48" RCP	215+16	181	102.48	211.2	103.39					358.9	109.82	0.2	500
24	2 - 48" RCP	215+46	181	101.58	211.2	102.08	335.4	105.95	0.23	440				

Table 9-6

RECOMMENDED STRUCTURE IMPROVEMENTS

Structure No.	Station	Structure Type	Remarks
1	11+28	2 - 48" RCP	Replace
2	16+06	2 - 9' X 7' CBC	Extend
3	19+84	36" RCP	Replace
4	21+56	4 - 12' X 8' CBC	Extend
5	32+15	2 - 7' X 4' CBC	Replace
6	33+00	3 - 7' X 4' CBC	No Extension Required; Along Ramp of Western Beltway
7	40+85	42" RCP	Replace
8	48+17	2 - 42" RCP	Replace
9	71+95	2 - 7' X 3' CBC	No Extension Required; Structure at World Drive Extension
10	87+50	2 - 7' X 4' CBC	Replace
11	108+00	2 - 7' X 6' CBC	Replace S-11 through S-16 with Single Structure
12	108+10	2 - 7' X 6' CBC	Replace S-11 through S-16 with Single Structure
13	108+40	2 - 7' X 5' CBC	Replace S-11 through S-16 with Single Structure
14	108+84	2 - 7' X 5' CBC	Replace S-11 through S-16 with Single Structure
15	108+90	2 - 7' X 5' CBC	Replace S-11 through S-16 with Single Structure
16	108+94	2 - 7' X 5' CBC	Replace S-11 through S-16 with Single Structure
17	139+00	2 - 36" RCP	Replace S-17 through S-19 with Single Structure
18	139+01	2 - 48" RCP	Replace S-17 through S-19 with Single Structure
19	139+02	2 - 36" RCP	Replace S-17 through S-19 with Single Structure
20	155+79	2 - 30" RCP	Replace
21	175+30	48" RCP	Replace
22	207+17	30" RCP	Replace
23	215+16	2 - 48" RCP	Replace S-23 and S-24 with Single Structure
24	215+46	2 - 48" RCP	Replace S-23 and S-24 with Single Structure

9.19.2 Floodplains

Potential floodplain encroachments were determined by delineating the proposed alignments on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for Osceola and Orange counties. Along the project corridor, approximately 259 ha (639 ac.) lie within the FEMA 100-year floodplain. Encroachments associated with the proposed improvements along Section 1 of I-4 will range from 24.9 to 26.3 ha (61.5 to 65.0 ac.), with effectively all of these impacts occurring in Segments 1 and 2. Table 9-7 lists the floodplain impacts in each segment which may be expected for the Preferred Build Alternative. Minimal impacts (1.4 ha/3.4 ac.) are associated with segment 3, with no difference among the alternatives, and segment 4 will not encroach into any floodplains.

Encroachments into the 100-year floodplain are both transverse and longitudinal. The type and amount of impact are quantified for each segment, and are summarized on Table 9-7. The total volume of encroachments into the 100-year floodplains will be 6.1 ha-m (49.1 acre-ft.) for Section 1, with the following breakdown per segment:

Segment 1: 2.1 ha-m (17.3 acre-ft.)
Segment 2: 2.5 ha-m (20.4 acre-ft.)
Segment 3: 1.4 ha-m (11.4 acre-ft.)
Segment 4: No Impacts

This is based on multiplying the area of encroachment by the average depth of fill. Average fill depths were assumed to be the difference between the 100-year floodplain elevation and the existing ground elevation. These encroachments will require compensation for any fill placed below the floodplain elevation. Floodplain compensation will mitigate any adverse impacts to the floodplain, complying with water management district regulations and avoiding impacts to local comprehensive plans and/or adjacent watershed management programs.

Compensating storage may be provided in the proposed ponds between the design high water elevation and the 100-year floodplain elevation. By using the volume available in the ponds adjacent to the floodplains, compensating storage may be provided, which will reduce the required right-of-way. As outlined on Table 9-8, the ponds may provide all the required compensating storage for Segment 1, 8.8 ac-ft of the required 20.4 ac-ft for Segment 2, and 4.1 ac-ft of the required 11.4 ac-ft for Segment 3. Additional compensating storage ponds will be required to provide 11.6 ac-ft of floodplain storage for Segment 2 and 7.3 ac-ft for Segment 3.

9.19.3 Stormwater Management Facilities

The proposed project lies within the jurisdiction of the SFWMD. If the pond is located within a basin with a positive outfall, it may be designed for the 25-year/72-hour design

Table 9-7
PROPOSED FILL VOLUMES IN 100-YEAR FLOODPLAIN

Floodplain No.	Segment No.	Type of Encroachment	Area of Encroachment (acres)	Average Existing Ground (ft, NGVD)	Floodplain Elevation (ft, NGVD)*	Incremental Fill/Segment (ac-ft)	Total Floodplain Encroachment (ac-ft)	Remark
1	1		0.00	114.0	114.5	0.0		
2	1		0.00	114.0	114.5	0.0		
3	1	Transverse	20.65	114.0	114.5	10.3		Davenport Swamp
4	1	Transverse	1.21	93.0	95.0	2.4		Davenport Creek
5	1	Longitudinal	0.06	75.2	76.1	0.1		
6	1	Transverse	7.45	75.7	76.3	4.5		Reedy Creek
7	1		0.00	74.5	77.8	0.0		
8	1		0.00	74.5	78.1	0.0	17.3	
9	2	Transverse	4.28	89.0	92.1	13.1		
10	2	Longitudinal	2.38	89.0	92.1	7.3		
11	2		0.00~	84.0	85.0	0.0	20.4	Osceola Parkway
12	3	Longitudinal	3.36	104.5	107.9	11.4	11.4	Lake Willis
13	4		0.00	90.0	101.4	0.0		
14	4		0.00	90.0	101.4	0.0		
15	4		0.00	90.0	101.4	0.0		
16	4		0.00	98.0	101.4	0.0		
17	4		0.00	98.0	101.4	0.0		
18	4		0.00	98.0	101.4	0.0	0.0	
TOTAL							49.1	

* Estimated floodplain elevations and areas provided by Dames & Moore.

~ Floodplain impacts occur with the construction of the Osceola Parkway interchange prior to construction of the proposed I-4 improvements.
Average existing ground elevations based on USGS topographic maps and SFWMD aerial contour maps.

Stage data for Lake Willis and Big Sand Lake provided by Orange County Lake Index.
NHW for Lake Willis is 104.5 ft., NGVD
NHW for Big Sand Lake is 90.0 ft., NGVD

Reedy Creek and Bonnet Creek 100-Year flood data provided by:
"REEDY CREEK IMPROVEMENT DISTRICT, MASTER DRAINAGE PLAN UPDATE, 1995"

Table 9-8
COMPENSATING STORAGE AVAILABLE WITHIN THE RECOMMENDED POND SITES

Segment	Pond	Location	Pond Size (ac)	SHW (m, NGVD)	SHW (ft, NGVD)	Storage Depth (ft)	DHW (ft, NGVD)	100 Yr. (ft, NGVD)	Compensating Storage (ac-ft)	Cumulative Storage (ac-ft)
1	57.6	1+00 LT	0.8	33.2	108.9	3.8	112.7	114.5	1.4	1.4
1	57.8	2+50 LT	0.8	32.6	107.0	3.8	110.8	114.5	3.0	4.4
1	58.1	8+50 RT	2.5	32.6	107.0	3.7	110.7	114.5	9.6	14.0
1	58.3 ALT	11+50 RT	1.5	31.4	103.0	3.6	106.6	114.5	11.8	25.8
1	58.9 ALT	16+00 RT	2.0	30.2	99.1	3.9	103.0	114.5	23.0	48.8
1	59.2 ALT	22+00 LT	2.5	29.8	97.8	3.6	101.4	114.5	32.8	81.7
1	59.5	26+00 RT	1.0	29.5	96.8	3.9	100.7	NA		
1	59.6 & 59.8	32+00 LT	5.6	28.5	93.5	2.4	95.9	95	0.0	
1	59.7	31+00 RT	1.5	28.5	93.5	3.8	97.3	95	0.0	
1	60.9	50+50 RT	7.7	22.9	75.1	2.7	77.8	76.1	0.0	
1	61.0	58+50 LT	2.2	22.9	75.1	3.2	78.3	76.3	0.0	
1	61.1	61+00 RT	2.2	24.1	79.1	4.2	83.3	76.3	0.0	
1	62.8	84+50 LT	11.0	24.7	81.0	4.1	85.1	NA		
1	63.8C	97+50 LT	1.9	25.0	82.0	3.6	85.6	NA		81.7
2	64.3	105+00 RT	6.2	26.0	85.3	2.1	87.4	NA		
2	64.4	107+00 LT	5.3	26.8	87.9	2.5	90.4	92.1	8.8	
2	66.4 & 66.6	142+00 LT	8.6	28.7	94.2	1.4	95.6	85	0.0	
2	66.5	143+00 RT	9.2	28.7	94.2	3.9	98.1	85	0.0	8.8
2	66.6 & 66.7	145+00 LT	9.1	28.7	94.2	1.9	96.1	85	0.0	
2	66.8 & 66.9	147+00 RT	7.5 *	28.7	94.2	2.8	97.0	85	0.0	
3	69.4	189+50 LT	1.9	36.0	118.1	2.0	120.1	NA		
3	69.4A	192+00 LT	5.3	36.9	121.1	2.0	123.1	NA		
3	70.1A	201+00 RT	1.9	32.9	104.5	3.7	108.2	107.9	0.0	
3	70.1B ALT	200+00 LT	1.8	35.0	114.8	3.9	118.7	NA		
3	70.5 ALT	207+50 RT	3.0	31.4	103.0	3.5	106.5	107.9	4.1	4.1
4	70.8	214+00 LT	5.5	31.3	102.7	3.5	106.2	NA		

SUMMARY

	Required Volume		Provided Volume
Segment 1:	2.1 ha-m	17.3 ac-ft	81.7 ac-ft
Segment 2:	2.5 ha-m	20.4 ac-ft	8.8 ac-ft
Segment 3:	1.4 ha-m	11.4 ac-ft	4.1 ac-ft
Segment 4:	No Impacts	No Impacts	0.0

* Pond sizes revised per design modifications to loop ramp serving I-4 eastbound to S.R. 536 westbound traffic.

storm with attenuation of the peak discharge rate. The post-development peak discharge rate may not exceed the pre-development discharge rate. If the pond is located in a landlocked basin, with no positive outfall, it must be designed to retain the stormwater runoff from the 100-year/24-hour storm event.

SFWMD Criteria

The stormwater management facilities associated with the proposed I-4 improvements must be designed in accordance with the performance criteria as set forth in Chapters 40E-4, 40E-40, 40E-41 of the SFWMD's Management and Storage of Surface Waters Permit Information Manual, Volume IV (4/96) and the Florida Administrative Code, Chapter 14-86, Critical Duration criteria. Other applicable criteria that shall govern drainage design on the project is contained in the FDOT Drainage Manual. This criteria is summarized in section 5 of this report.

Methodology for Retention/Detention Ponds

The SCS Runoff Curve Number method was utilized to determine approximate retention/detention pond sizes and right-of-way requirements. During the final design, other methodologies may be used to design the ponds and the control structures. The ponds were sized to accommodate the runoff from the entire right-of-way, assuming runoff volumes from offsite areas are being conveyed through the project, and are not included in the pond volumes. Pond sizes and locations were determined based on USGS topographic maps, the alignment profile, the SCS Soil Surveys for Osceola and Orange Counties, 100-year floodplain limits, wetland locations, intersecting roadway alignments (existing and proposed), potential soil contamination sites, locations of endangered species, existing utilities, archeological sites, and right-of-way cost.

In developing the contributory basins, the proposed systems were evaluated with consideration to the profile, outfall locations, available pond size, right-of-way cost and potential adverse impacts. Basin limits were selected to maximize the available pond size while minimizing the impacts on adjacent properties by reducing the right-of-way requirements. This was accomplished by utilizing existing right-of-way areas within interchange infields as much as practical, and locating pond sites outside of the right-of-way in upland areas with minimal impacts to floodplains, wetlands, endangered species, utilities, hazardous materials sites and archeological sites as much as possible. The retention volumes were calculated using the SCS Runoff Curve Number method for the right-of-way using the ultimate build-out condition. Pond areas included 1:4 inside side slopes, a 6.0 m (20 ft.) maintenance berm and 1:2 outside side slopes to existing ground. The normal water elevation at the ponds and storage depths have been determined based on field conditions utilizing the SCS Soil Surveys and roadside boring information. As more exact data is obtained in the final design stage, the normal high water elevation and available storage depths for each pond may be adjusted.

In determining preliminary pond volumes for the proposed improvements, the project was divided into 20 basins. The basin divides were determined by either high points in the roadway profile, alignment terminals, hydraulic considerations or available pond

locations and capacity. Each basin may require one or more ponds. Alternate pond sites were evaluated within each basin and sites were recommended which best met the selection criteria. The selection criteria include economics, environmental impacts, floodplain encroachment, hydraulics, hydrology, social impacts, utility conflicts, and archaeological and historical impacts. Table 9-9 summarizes the selection criteria and the recommended pond site within each basin. In some basins, right-of-way costs were prohibitive, and an exfiltration box culvert is recommended as an alternative to the more conventional pond site. All pond right-of-way areas are preliminary and reflect the approximate pond sizes required for right-of-way purposes only. The actual size, location and configuration of the ponds will be determined in the final design phase.

The Interstate 4 Pond Siting Report summarizes the design process and the alternate basin limits and combination of pond sites evaluated for each basin. Recommended sites are listed in Table 9-10.

9.20 Structures

The engineering analysis identified a number of locations where bridge crossings are needed in order to maintain the quality of the travel. Preliminary bridge type studies have been done for each crossing and are summarized below. Exhibits 9-3 through 9-32 show the structures for the Preferred Build Alternative. In addition, the proposed vertical profile has been coordinated with existing bridges which overpass I-4 and will not be reconstructed. Adequate vertical clearance has been provided where overpass structures such as World Drive, Southern Connector and Osceola Parkway cross over I-4.

9.20.1 I-4 W. B. & E. B. over C.R. 532

The Preferred Build Alternative under consideration would utilize one span twin bridge to carry I-4 over C.R. 532 (in the vicinity of Station 660+00.00± along I-4). The westbound bridge is proposed to carry three 3.600 m (12 ft.) general use travel lanes, two 3.600 m (12 ft.) special use lanes, 0.610 m (2 ft.) median, 3.600 m (12 ft.) inside shoulders, and 3.000 m (10 ft.) & 1.800 m (6 ft.) outside shoulders. The eastbound bridge is proposed to carry three 3.600 m (12 ft.) and one 4.500 m (15 ft.) general use travel lanes, two 3.600 m (12 ft.) special use lanes, 0.610 m (2 ft.) median, a varied gore area, 3.600 m ±(12 ft. ±) inside shoulders, and 3.000 m (10 ft.) & 1.800 m (6 ft.) outside shoulders. The I-4 alignment over this crossing follows a tangent line with End Bent Numbers 1 and 2 having the same skew angle. The proposed bridge length is 48.200 m (158.1 ft.) with a vertical clearance of 5.050 m (16.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders. The total bridge surface area is 3,350 square meters (36,059 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $2,713,500. Exhibit 9-3 illustrates the plan and elevation for this structure.

Table 9-9

ALTERNATE POND LOCATIONS FOR INTERSTATE 4 - SECTION 1

BASIN NO.	POND NO.	STATION / SIDE	EXISTING LAND USE	SOIL NO. TYPE "GROUP"	PERMEABILITY (IN/HR)	AVE. GROUND ELEV. (m, NGVD)	DEPTH TO SHW (m, NGVD)	SHW ELEV. (m, NGVD)	LOWEST GUTTER ELEVATION IN BASIN (m, NGVD)	WITHIN 100 YEAR FLOODPLAIN	UTILITIES IMPACTED	HAZARDOUS MATERIALS RATING	WETLAND IMPACTS	ARCHEOLOGICAL POTENTIAL	THREATENED/ ENDANGERED SPECIES	POND SIZE (ac)	LAND COST ($)
1 *	57.6	1+00 LT	Open, grassed	7, Candler, A	6.0 - 20.0	35.0	> 1.83	33.2	37.1	Yes	None	No Risk	Yes	Moderate	None	0.8	Exist R/W
2	57.7A	1+50 RT	Brush	7, Candler, A	6.0 - 20.0	39.6	> 1.83	33.2	37.1	Yes	None	No Risk	No	Moderate	None	0.2	Exist RW
2	57.7B	1+50 RT	Open, grassed	7, Candler, A	6.0 - 20.0	39.6	> 1.83	33.2	37.1	No	None	No Risk	No	Moderate	None	0.5	$10,000
2 *	57.8	2+50 LT	Wetland/Infield	32, Placid, A/D	6.0 - 20.0	34.7	+0.6 - 0.3	32.6	37.1	No	None	No Risk	Yes	Moderate	None	0.8	Exist R/W
3 *	58.1	8+50 RT	Pasture	7, Candler, A	6.0 - 20.0	34.7	> 1.83	32.6*	33.8	No	OUC Easement	No Risk	No	High	None	2.5	$45,000
3	58.1 ALT	8+50 RT	Pasture	7, Candler, A	6.0 - 20.0	34.7	> 1.83	32.6*	33.8	No	None	No Risk	No	High	None	2.0	$137,000
4	58.3	11+00 RT	Pasture	34, Pomello, C	6.0 - 20.0	32.3	0.6 - 1.0	31.4*	32.9	No	None	No Risk	No	High	Gopher Tortoise	0.5	$68,000
4 *	58.3 ALT	11+50 RT	Pasture	34, Pomello, C	6.0 - 20.0	32.3	0.6 - 1.0	31.4*	32.9	Yes	None	No Risk	Yes	High	Gopher Tortoise	1.5	$111,000
4	58.5	12+50 RT	Pasture	44, Tavares, A	> 20.0	34.1	1.0 - 1.83	32.1*	32.9	Yes	None	No Risk	No	High	Gopher Tortoise	0.4	$50,000
5	58.7	14+50 RT	Pasture	44, Tavares, A	> 20.0	33.5	1.0 - 1.83	31.5*	31.3	Yes	None	No Risk	No	High	Gopher Tortoise	0.7	$506,000
5	58.7 ALT	14+50 RT	Pasture	44, Tavares, A	> 20.0	33.5	1.0 - 1.83	31.5*	31.3	Yes	None	No Risk	No	High	Gopher Tortoise	0.7	$514,000
5	58.8	14+50 LT	Pasture	37, Pompano, A/D	> 20.0	28.6	+0.6 - 0.3	26.8*	31.3	No	None	No Risk	No	High	Gopher Tortoise	0.7	$91,000
5	58.8 ALT	14+50 LT	Pasture	37, Pompano, A/D	> 20.0	28.6	+0.6 - 0.3	26.8*	31.3	No	None	No Risk	No	High	Gopher Tortoise	0.8	$177,000
5	58.9	17+00 RT	Pasture	7, Candler, A	6.0 - 20.0	32.6	> 1.83	30.2*	31.3	Yes	None	No Risk	No	High	Gopher Tortoise	1.6	$168,000
5 *	58.9 ALT	16+00 RT	Pasture	7, Candler, A	6.0 - 20.0	32.6	> 1.83	30.2*	31.3	Yes	None	No Risk	No	High	Gopher Tortoise	2.0	$155,000
6	59.1	21+00 RT	Pasture	8, Candler, A	6.0 - 20.0	30.8	> 1.83	27.4*	30.8	Yes	None	No Risk	No	High	Gopher Tortoise	1.6	$157,000
6	59.1 ALT	21+50 RT	Pasture	8, Candler, A	6.0 - 20.0	30.8	> 1.83	27.4*	30.8	Yes	None	No Risk	No	High	Gopher Tortoise	1.6	$105,000
6	59.2	23+00 LT	Pasture	8, Candler, A	6.0 - 20.0	33.5	> 1.83	30.5*	30.8	No	None	No Risk	No	High	Gopher Tortoise	0.9	$80,000
6 *	59.2 ALT	22+00 LT	Pasture	8, Candler, A	6.0 - 20.0	30.5	> 1.83	29.8*	30.8	Yes	None	No Risk	No	High	Gopher Tortoise	2.5	$174,000
6	59.3	23+00 RT	Pasture	8, Candler, A	6.0 - 20.0	33.5	> 1.83	30.3*	30.8	No	None	No Risk	No	High	Gopher Tortoise	0.9	$97,000
7 *	59.5	26+00 RT	Pasture	7, Candler, A	6.0 - 20.0	33.5	> 1.83	29.5*	30.6	No	None	No Risk	No	Moderate	None	1.0	$104,000
7	59.5 ALT	29+00 LT	Pasture	8, Candler, A	6.0 - 20.0	32.0	> 1.83	29.0*	29.8	No	None	No Risk	No	Low	None	1.2	$97,000
7	59.6 ALT	32+00 LT	Pasture	7, Candler, A	6.0 - 20.0	30.8	> 1.83	28.5*	29.7	Yes	None	No Risk	No	High	None	1.4	$173,000
7	59.7 ALT	33+00 RT	Pasture	7, Candler, A	6.0 - 20.0	31.0	> 1.83	27.9*	29.7	No	OUC Easement	HIGH (2)	No	High	Briiton's beargrass	2.3	$106,000
7	59.9	33+50 RT	Pasture	7, Candler, A	6.0 - 20.0	30.5	> 1.83	28.1*	29.7	Yes	None	HIGH (2)	No	High	Britton's beargrass	0.8	$111,000
7	59.9 ALT	33+50 RT	Pasture	7, Candler, A	6.0 - 20.0	30.5	> 1.83	28.1*	29.7	Yes	OUC Easement	HIGH (2)	No	High	Britton's beargrass	1.0	$132,000
7 *	59.7	31+00 RT	Pasture	8, Candler, A	6.0 - 20.0	31.0	> 1.83	28.5	29.7	No	None	HIGH (1)	No	High	Britton's beargrass	1.5	Exist R/W
7	59.7A	31+00 LT	Pasture	8, Candler, A	6.0 - 20.0	31.0	> 1.83	28.5	29.7	No	None	No Risk	Yes	High	Britton's beargrass	0.8	Exist R/W
8 *	59.6	32+00 LT	Pasture	7, Candler, A	6.0 - 20.0	30.8	> 1.83	28.5*	29.7	Yes	None	No Risk	No	High	None	4.9	Exist R/W

* RECOMMENDED SITE

Table 9-9 Continued

ALTERNATE POND LOCATIONS FOR INTERSTATE 4 - SECTION 1

BASIN NO.	POND NO.	STATION / SIDE	EXISTING LAND USE	SOIL NO. TYPE "GROUP"	PERMEABILITY (IN/HR)	AVE. GROUND ELEV. (m, NGVD)	DEPTH TO SHW (m, NGVD)	SHW ELEV. (m, NGVD)	LOWEST GUTTER ELEVATION IN BASIN (m, NGVD)	WITHIN 100 YEAR FLOODPLAIN	UTILITIES IMPACTED	HAZARDOUS MATERIALS RATING	WETLAND IMPACTS	ARCHEOLOGICAL POTENTIAL	THREATENED/ ENDANGERED SPECIES	POND SIZE (ac)	LAND COST ($)
8 *	59.8	33+50 LT	Wooded Infield	7, Candler, A	6.0 - 20.0	30.8	> 1.83	28.5	29.7	No	None	No Risk	No	High	None	0.7	Exist R/W
8	60.2	39+50 LT	Pasture	7, Candler, A	6.0 - 20.0	30.5	> 1.83	28.3*	28.5	No	None	No Risk	No	Moderate	None	2.2	$737,000
8	60.2 ALT	40+50 LT	Pasture	7, Candler, A	6.0 - 20.0	30.5	> 1.83	28.3*	28.5	No	None	No Risk	No	Moderate	None	4.6	$949,000
8	60.4	42+50 LT	Pasture	7, Candler, A	6.0 - 20.0	30.5	> 1.83	27.3*	28.5	No	None	No Risk	No	Moderate	None	2.3	$264,000
9 *	60.9	50+50 RT	Borrow Pit	22, Myakka, A/D	6.0 - 20.0	22.9	0 - 0.3	22.9	23.6	Yes	None	No Risk	No	Low	None	7.7	$681,000
10 *	61	58+50 LT	Wetlands	45, Vero, B/D	< 0.2	23.2	0 - 0.3	22.9*	24.6	Yes	None	No Risk	Yes	Low	None	2.2	$286,000
10 *	61.1	61+00 RT	Borrow Pit	16, Immokalee, A/D	6.0 - 20.0	24.1	0 - 0.3	24.1	24.6	Yes	FI Power Easement	No Risk	No	Low	None	2.2	$449,000
				38, Riveria, B/D	0.6 - 6.0												
11	62.3	75+00 RT	Pasture	22, Myakka, A/D	6.0 - 20.0	24.7	0 - 0.3	24.5*	27.2	No	None	No Risk	No	Low	None	2.1	$494,000
11	62.3 ALT	71+50 RT	Pasture, Woods	45, Vero, B/D	< 0.2	24.4	0 - 0.3	24.4	27.2	No	None	No Risk	No	Low	None	2.0	$344,000
11 *	62.8	84+50 LT	Wooded	22, Myakka, A/D	6.0 - 20.0	26.5	0 - 0.3	24.7**	27.2	No	FI Power Easement	No Risk	Yes	Low	None	11.0	$1,716,000
12	62.8 ALT	92+00 RT	Commercial	16, Immokalee, A/D	6.0 - 20.0	26.2	0 - 0.3	26.2	27.3	No	None	No Risk	No	Low	None	4.2	$1,002,000
12	63.8 ALT	95+50 RT	Palmetto	16, Immokalee, A/D	6.0 - 20.0	26.5	0 - 0.3	26.5	27.3	No	None	LOW (3)	No	Low	Scrub lupine	1.0	$1,264,000
12	63.8 B	99+50 RT	Palmetto	34, Pomello, C	6.0 - 20.0	27.4	0.6 - 1.0	26.5	27.3	No	None	No Risk	No	Low	None	0.5	$775,000
12 *	63.8 C	97+50 LT	Wetlands	32, Placid, A/D	6.0 - 20.0	25.3	+0.6 - 0.3	25.0*	27.3	No	None	No Risk	Yes	Low	None	1.9	$83,000
12 *	64.3	105+00 RT	Wooded Infield	Arents	--	27.4	1.4	26.0	27.5	No	None	No Risk	No	Low	None	6.2	Exist R/W
12 *	64.4	107+00 LT	Wooded Infield	Arents	--	27.4	0.6	26.8	27.5	No	None	No Risk	Yes	Low	None	5.3	Exist R/W
13	64.6	113+00 LT	Wooded	42, Smyrna, A/D	6.0 - 20.0	28.0	0 - 0.3	27.3*	27.5	Yes	None	No Risk	No	Low	None	4.0	$6,773,000
13	64.8	118+00 LT	Wooded	42, Smyrna, A/D	6.0 - 20.0	28.0	0 - 0.3	27.6*	27.6	Yes	None	No Risk	No	Low	Gopher Tortoise	7.0	$14,080,000
13	65.3 ALT (W)	122+00 LT	Wooded	22, Myakka, A/D	6.0 - 20.0	26.7	0 - 0.3	26.7	27.6	No	None	No Risk	No	Low	None	1.7	Exist R/W
13	65.3 ALT (E)	123+00 RT	Wooded	22, Myakka, A/D	6.0 - 20.0	25.6	0 - 0.3	25.6	27.6	Yes	None	No Risk	Yes	Low	None	1.4	$7,132,000
14	65.3	125+50 RT	Exist Wet Pond	22, Myakka, A/D	6.0 - 20.0	26.7	0 - 0.3	26.7	27.6	No	None	No Risk	No	Low	None	9.4	$10,765,000
14	65.5 ALT	128+50 RT	Pasture	22, Myakka, A/D	6.0 - 20.0	27.7	0 - 0.3	27.4	28.5	Yes	None	No Risk	Yes	Low	None	2.7	Exist R/W
14	66.3	137+00 RT	Borrow Pit	44, Smyrna, B/D	6.0 - 20.0	26.4	0 - 0.3	26.4	27.5	Yes	None	No Risk	No	Low	None	2.6	$6,007,000
15 *	66.4	142+00 LT	Wooded	44, Smyrna, B/D	6.0 - 20.0	28.5	0 - 0.3	27.5*	29.6	No	None	No Risk	Yes	Low	None	4.7	Exist R/W

* RECOMMENDED SITE

Table 9-9 Continued

ALTERNATE POND LOCATIONS FOR INTERSTATE 4 - SECTION 1

BASIN NO.	POND NO.	STATION / SIDE	EXISTING LAND USE	SOIL NO. TYPE "GROUP"	PERMEABILITY (IN/HR)	AVE. GROUND ELEV. (m, NGVD)	DEPTH TO SHW (m, NGVD)	SHW ELEV. (m, NGVD)	LOWEST GUTTER ELEVATION IN BASIN (m, NGVD)	WITHIN 100 YEAR FLOODPLAIN	UTILITIES IMPACTED	HAZARDOUS MATERIALS RATING	WETLAND IMPACTS	ARCHEOLOGICAL POTENTIAL	THREATENED/ ENDANGERED SPECIES	POND SIZE (ac)	LAND COST ($)
15 *	66.5	143+00 RT	Wooded Infield	3, Basinger, D	6.0 - 20.0	29.0	+0.6 - 0.3	28.7*	29.6	No	None	No Risk	Yes	Moderate	None	9.2	Exist R/W
15 *	66.6	143+00 LT	Wooded Infield	44, Smyrna, B/D	6.0 - 20.0	29.0	0 - 0.3	28.7*	29.6	No	None	No Risk	Yes	Moderate	None	3.9	Exist R/W
15 *	66.6	145+00 LT	Wooded Infield	44, Smyrna, B/D	6.0 - 20.0	28.0	0 - 0.3	27.7	29.3	No	None	No Risk	No	Low	None	5.0	Exist R/W
15 *	66.7	145+00 LT	Wooded Infield	44, Smyrna, B/D	6.0 - 20.0	28.0	0 - 0.3	27.7	29.3	No	None	No Risk	No	Low	None	4.1	Exist R/W
15 *	66.8	147+00 RT	Wooded Infield	44, Smyrna, B/D	6.0 - 20.0	29.0	0 - 0.3	28.7	29.3	No	None	No Risk	No	Low	Gopher Tortoise	4.9 **	Exist R/W
15 *	66.9	147+00 RT	Wooded Infield	44, Smyrna, B/D	6.0 - 20.0	29.0	0 - 0.3	28.7	29.3	No	None	No Risk	No	Moderate	Gopher Tortoise	2.6 **	Exist R/W
16	67.9	164+50 RT	Wooded Infield	34, Pomello, C	6.0 - 20.0	36.0	1.0 - 1.83	33.9*	33.2	No	None	No Risk	No	Moderate	None	1.3	Exist R/W
16	68.1	167+00 RT	Wooded Infield	34, Pomello, C	6.0 - 20.0	35.9	1.0 - 1.83	34.2	33.2	No	None	No Risk	Yes	Low	None	3.3	Exist R/W
16	68.5	171+00 RT	Wooded	34, Pomello, C	6.0 - 20.0	34.4	1.0 - 1.83	32.0	33.2	No	None	No Risk	No	Low	None	6.6	$14,337,000
17	69.1	182+50 RT	Wooded	34, Pomello, C	6.0 - 20.0	35.0	1.0 - 1.83	34.4*	35.0	No	None	No Risk	No	Low	None	10.5	$10,596,000
				44, Smyrna, B/D	6.0 - 20.0		0 - 0.3										
17	69.1 C	189+00 RT	Pasture	34, Pomello, C	6.0 - 20.0	37.2	1.0 - 1.83	36.6	37.3	No	None	No Risk	No	Moderate / Low	None	4.9	$76,500
				54, Zolfo, C	0.6 - 2.0		0.6 - 1.0										
17	69.2	189+00 RT	Pasture	34, Pomello, C	6.0 - 20.0	37.8	1.0 - 1.83	37.2	37.3	No	None	No Risk	No	Moderate / Low	None	0.6	$3,704,100
				54, Zolfo, C	0.6 - 2.0		0.6 - 1.0										
17	69.3	191+50 RT	Wooded	38, St. Lucie, A	> 20.0	37.5	> 1.83	36.8*	37.3	No	None	No Risk	No	Low	None	0.9	$826,000
17 *	69.4	189+50 LT	Wooded	54, Zolfo, C	0.6 - 2.0	37.2	0.6 - 1.0	36.0*	37.3	No	None	No Risk	No	Low	None	1.9	Exist R/W
17 *	69.4 A	192+00 LT	Wooded	54, Zolfo, C	0.6 - 2.0	38.1	0.6 - 1.0	36.9*	37.3	No	None	No Risk	No	Low	None	5.3	Exist R/W
18	70.1	200+50 RT	Wooded	3, Basinger, D	6.0 - 20.0	35.0	+0.6 - 0.3	32.9*	36.0	No	None	No Risk	No	High	None	0.9	$876,000
				34, Pomello, C	6.0 - 20.0		0.6 - 1.0										
18 *	70.1 A	201+00 RT	Wooded	3, Basinger, D	6.0 - 20.0	35.0	+0.6 - 0.3	32.9*	36.0	Yes	None	No Risk	No	High	None	1.9	$1,486,000
				34, Pomello, C	6.0 - 20.0		0.6 - 1.0										
18	70.1 B	200+00 LT	Wooded	38, St. Lucie, A	> 20.0	38.0	> 1.83	35.0	36.0	No	None	No Risk	No	Moderate / Low	None	1.8	$1,273,000
18 *	70.1B ALT	198+00 LT	Rest Area	Arents	--	41.1	> 1.83	36.0	36.0	No	None	No Risk	No	Moderate / Low	None	1.8	Exist R/W
19	70.4	207+00 LT	Pasture	34, Pomello, C	6.0 - 20.0	32.8	0.6 - 1.0	31.8*	32.9	No	None	No Risk	No	High	None	1.4	$1,382,000
				54, Zolfo, C	0.6 - 2.0		0.6 - 1.0										
19	70.5	208+00 RT	Farmland	26, Ona, B/D	6.0 - 20.0	33.5	0 - 0.3	31.4*	32.9	No	None	No Risk	No	High	None	2.8	$2,379,000
				54, Zolfo, C	0.6 - 2.0		0.6 - 1.0										
19 *	70.5 ALT	207+50 RT	Farmland	20, Immokalee, B/D	6.0 - 20.0	33.5	0 - 0.3	31.4*	32.9	No	None	No Risk	No	High	None	3.0	$2,184,000
				26, Ona, B/D	6.0 - 20.0		0 - 0.3										
20 *	70.8	214+00 LT	Farmland	26, Ona, B/D	6.0 - 20.0	34.3	0 - 0.3	31.3*	32.9	No	None	No Risk	No	Moderate	None	5.5	$3,219,904

* RECOMMENDED SITE

** Pond sizes revised per design modifications to loop ramp serving I-4 eastbound to S.R. 536 westbound traffic.

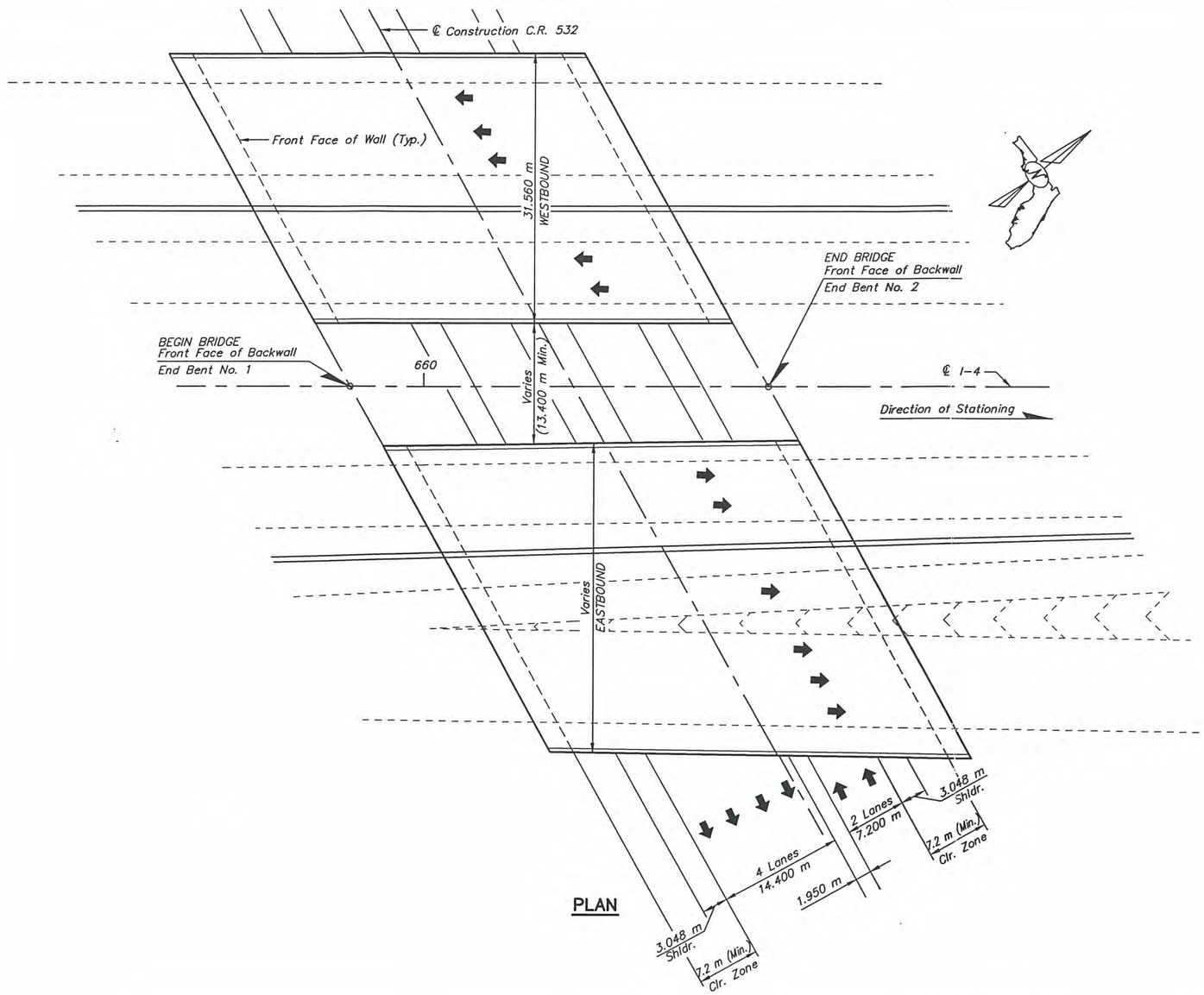
Table 9-10

RECOMMENDED POND SITES

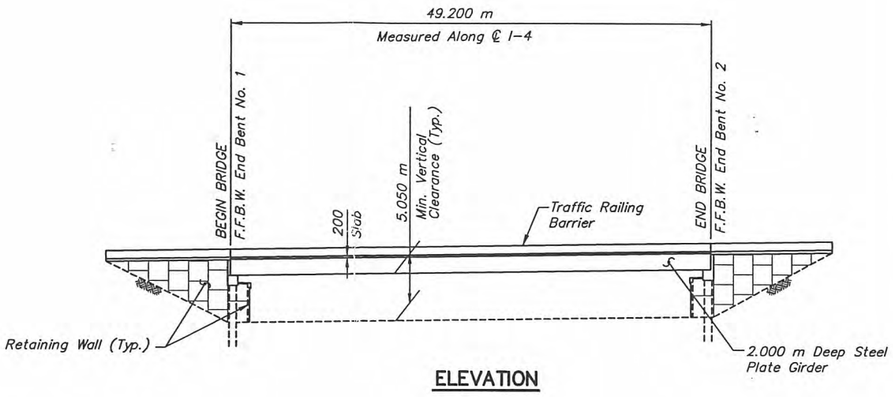
Basin No.	Pond No.	Station/Side	Basin Limits	Pond Size (ac)
1	57.6	1+00 LT	656+00 - 2+13 LT	0.8
2	57.8	2+50 LT	656+00 - 2+13 RT	0.8
3	58.1	8+50 RT	2+13 - 9+00 RT & LT	2.5
4	58.3 ALT	11+50 RT	9+00 - 13+00 RT & LT	1.5
5	58.9 ALT	16+00 RT	13+00 - 18+80 RT & LT	2.0
6	59.2 ALT	22+00 LT	18+80 - 25+50 RT & LT	2.5
7	59.5	26+00 RT	25+50 - 28+40 RT & LT	1.0
7	59.7	31+00 RT	28+40 - 31+00 RT & LT	1.5
8	59.6 & 59.8	32+00 LT	31+00 - 41+00 RT & LT	4.9 , 0.7
9	60.9	50+50 RT	41+00 - 56+50 RT & LT	7.7
10	61.0	58+50 LT	56+50 - 67+00 LT	2.2
10	61.1	61+00 RT	56+50 - 67+00 RT	2.2
11	62.8	84+50 LT	67+00 - 91+50 RT & LT	11.0
12			91+50 - 100+00 RT (Exfiltration box culvert)	
12	63.8C	97+50 LT	90+50 - 100+00 RT	1.9
12	64.3	105+00 RT	100+00 - 117+00 RT	6.2
12	64.4	107+00 LT	100+00 - 117+00 LT	5.3
			117+00 - 129+00 RT & LT (Osceola Parkway Interchange ponds)	
15	66.4 & 66.6	142+00 LT	129+00 - 144+50 LT	4.7, 3.9
15	66.5	143+00 RT	129+00 - 144+50 RT	9.2
15	66.6 & 66.7	145+00 LT	144+50 - 167+00 LT	5.0, 4.1
15	66.8 & 66.9	147+00 RT	145+50 - 167+00 RT	4.9* , 2.6*
16			167+00 - 187+00 RT & LT (Exfiltration box culvert)	
17	69.4	189+50 LT	187+00 - 195+00 RT & LT	1.9
17	69.4A	192+00 LT	187+00 - 195+00 RT & LT	5.3
18	70.1 A	201+00 RT	195+00 - 203+00 RT	1.9
18	70.1 B ALT	198+00 LT	195+00 - 203+00 LT	1.8
19	70.5 ALT	207+50 RT	203+00 - 209+00 RT & LT	3.0
20	70.8	214+00 LT	209+00 - 220+00 RT & LT	5.5

* Pond sizes revised per design modifications to loop ramp serving I-4 eastbound to S.R. 536 westbound traffic.

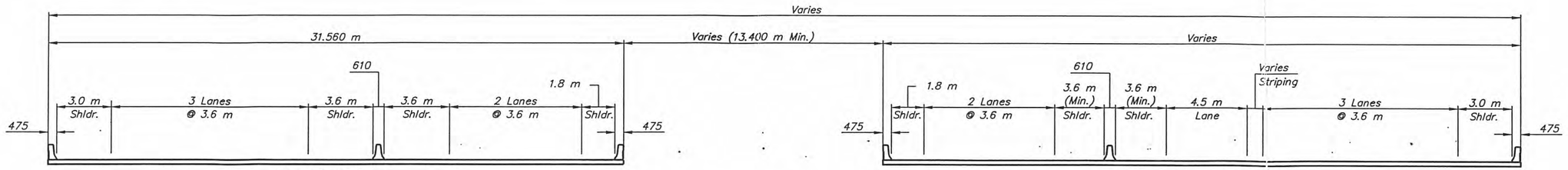
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

EXHIBIT 9-3

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

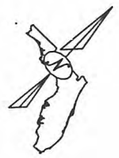
HNTB ARCHITECTS ENGINEERS PLANNERS

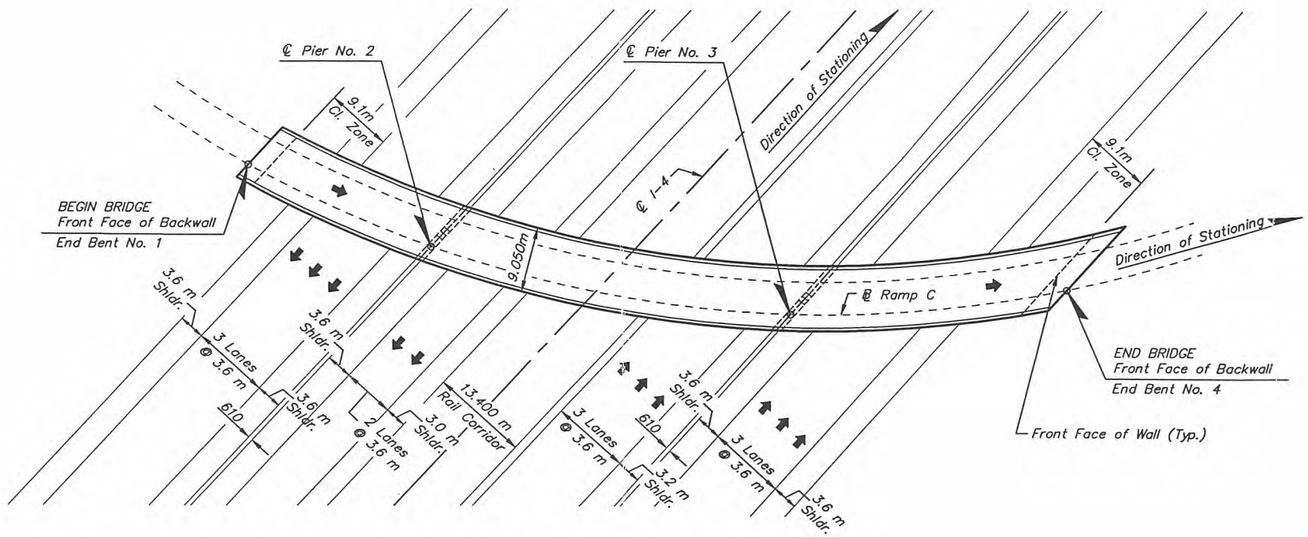
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4/C.R. 532
W.B. & E.B. I-4 OVER C.R. 532

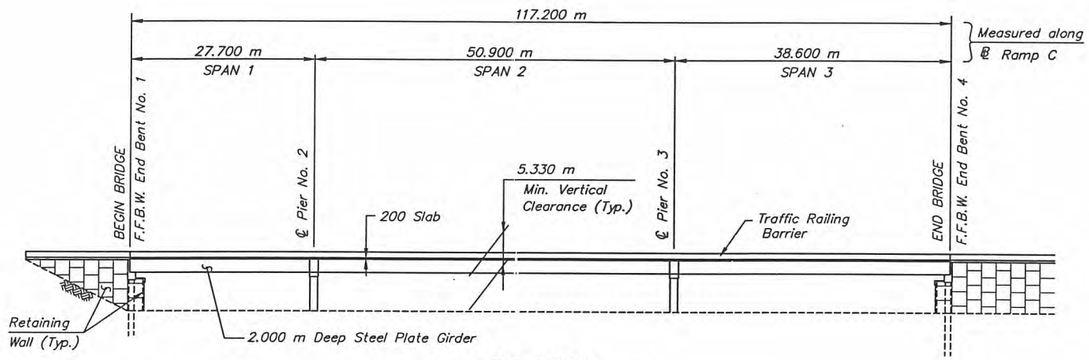
XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 1-01.DWG.DWG DATE: APR 05, 1999 TIME: 6:14 AM REV. BY: RLG

STATE PROJ. NO.	SHEET NO.

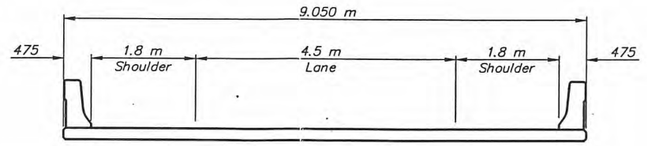




PLAN



ELEVATION



SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: WESTBW2.DWG DATE: JUN 08, 1998 TIME: 7:48 PM REV. BY: SCG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

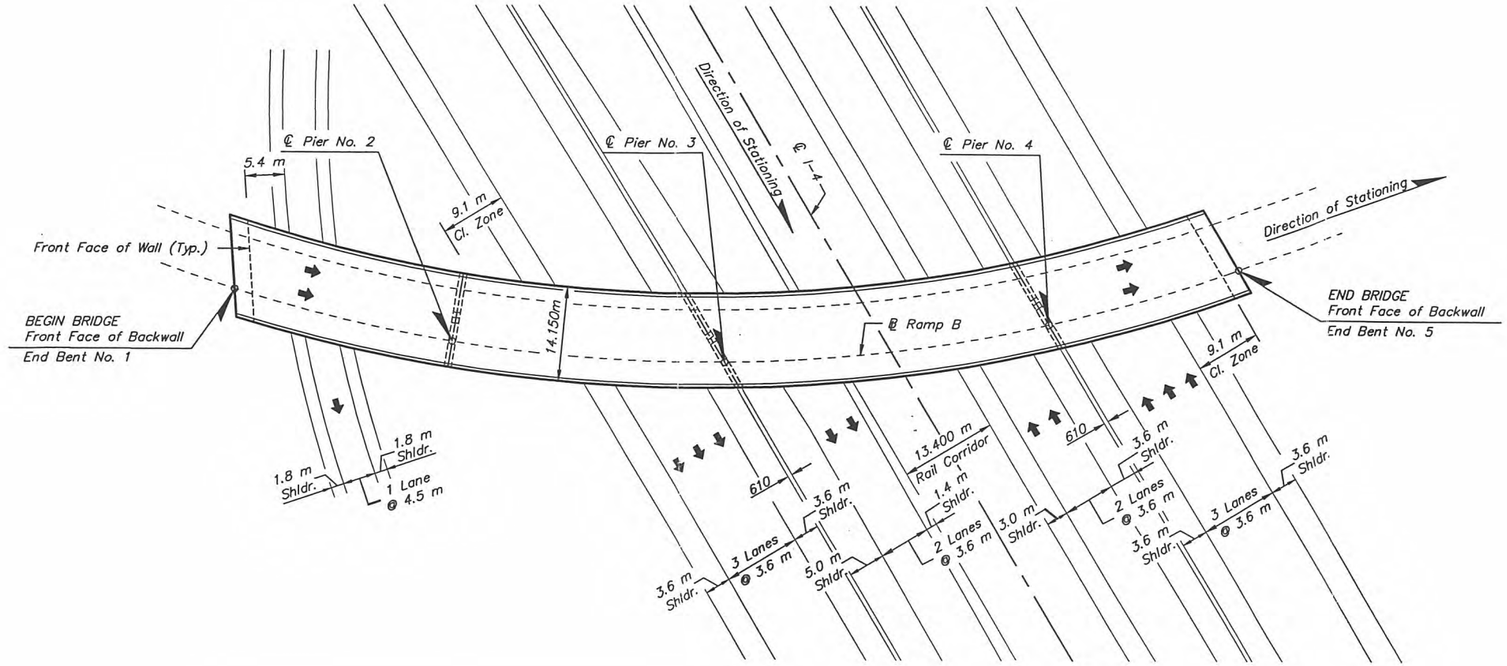
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

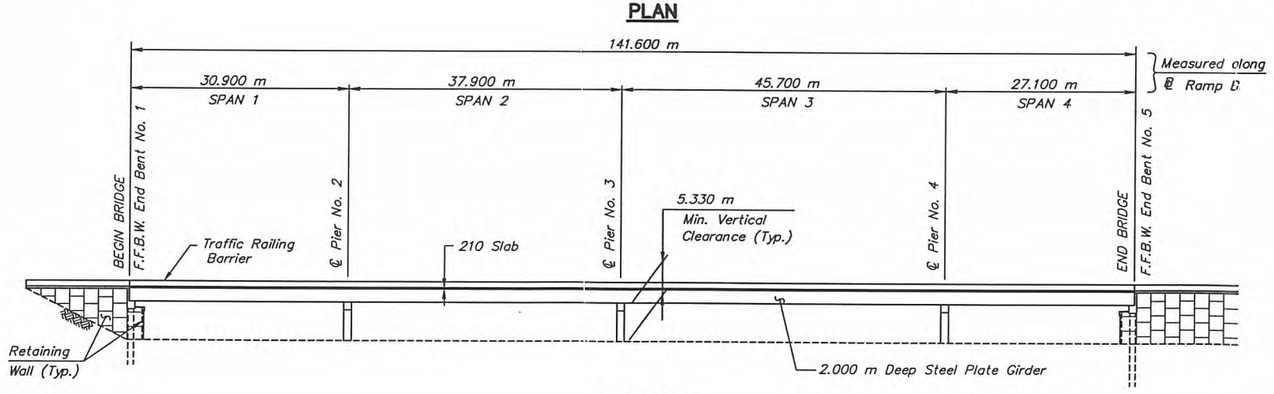
EXHIBIT 9-4

WESTERN BELTWAY
RAMP C OVER I-4

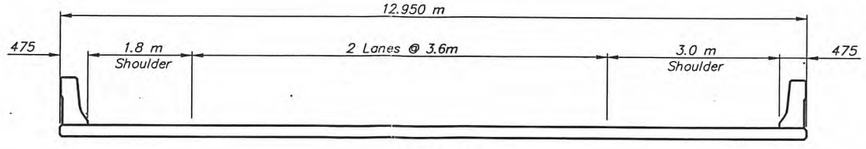
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: WESTBWI.DWG DATE: JUL 14, 1998 TIME: 9:04 AM REV. BY: RLG

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

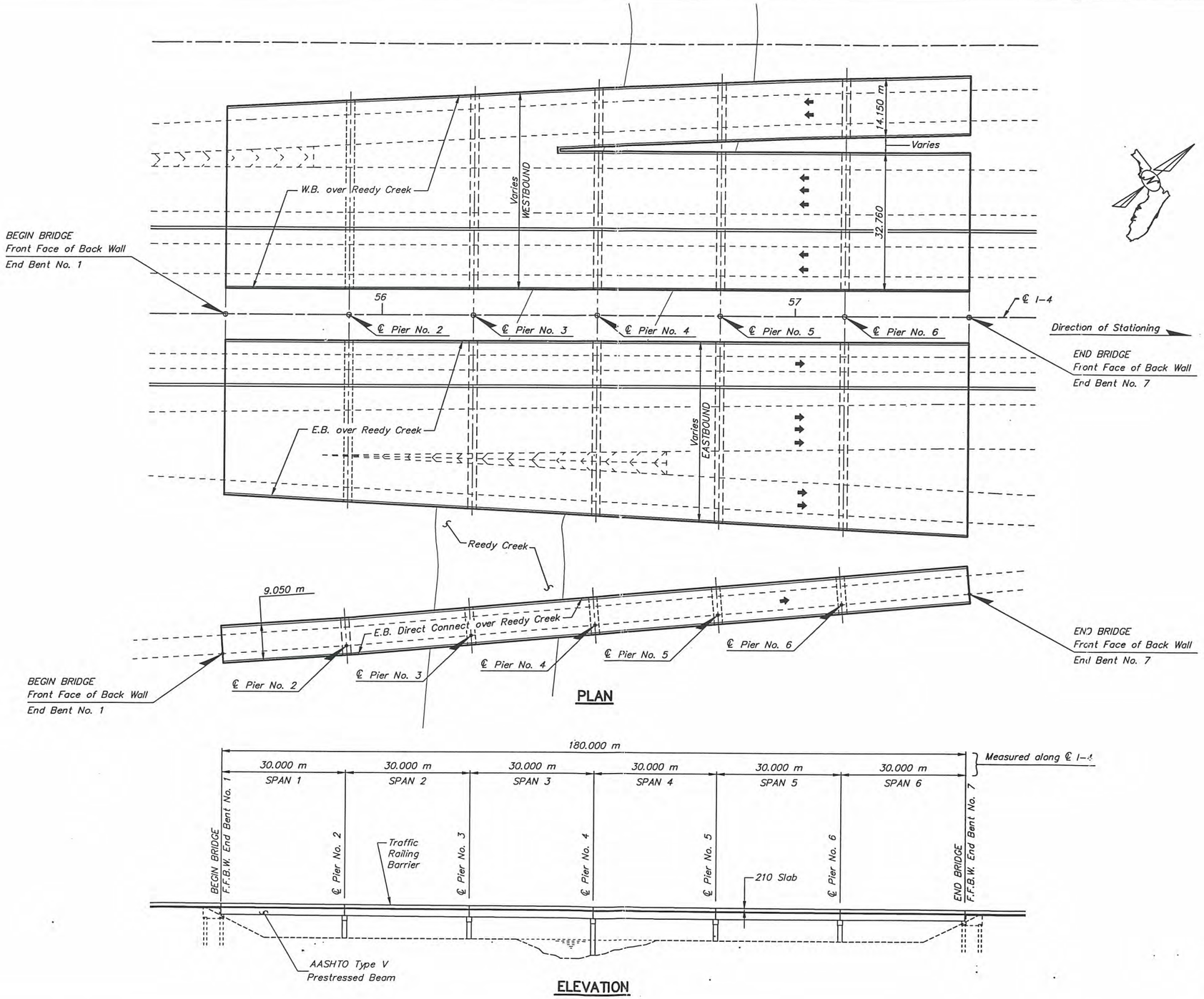
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

EXHIBIT 9-5

WESTERN BELTWAY
RAMP B OVER I-4

STATE PROJ. NO.	SHEET NO.



PLAN

ELEVATION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 4B-02A.DWG DATE: MAY 29, 1998 TIME: 1:29 PM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

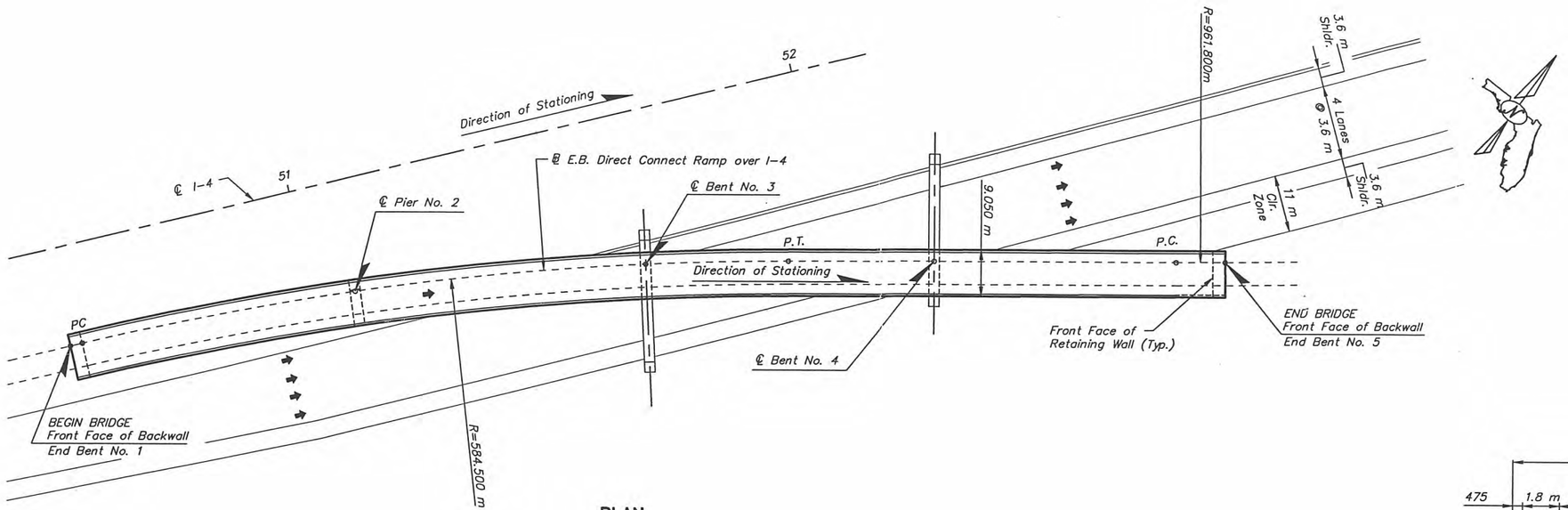
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

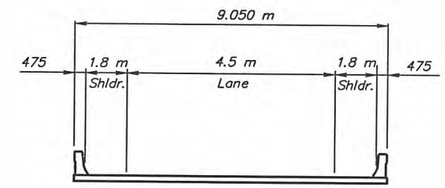
EXHIBIT 9-7

I-4 OVER REEDY CREEK

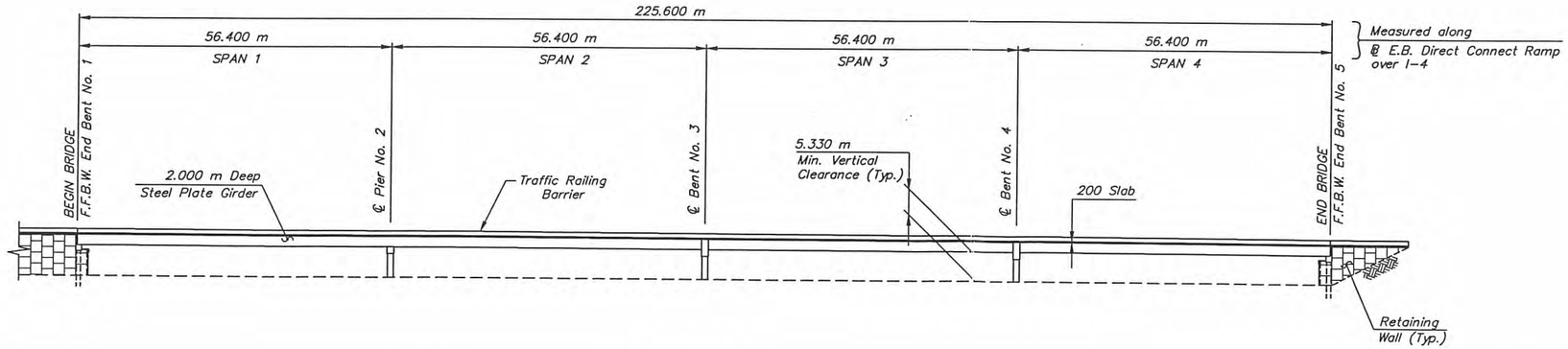
STATE PROJ. NO.	SHEET NO.



PLAN



SECTION



ELEVATION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 4B-01.DWG DATE: MAY 29, 1998 TIME: 1:28 PM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

EXHIBIT 9-6

E.B. HOV DIRECT CONNECT RAMP

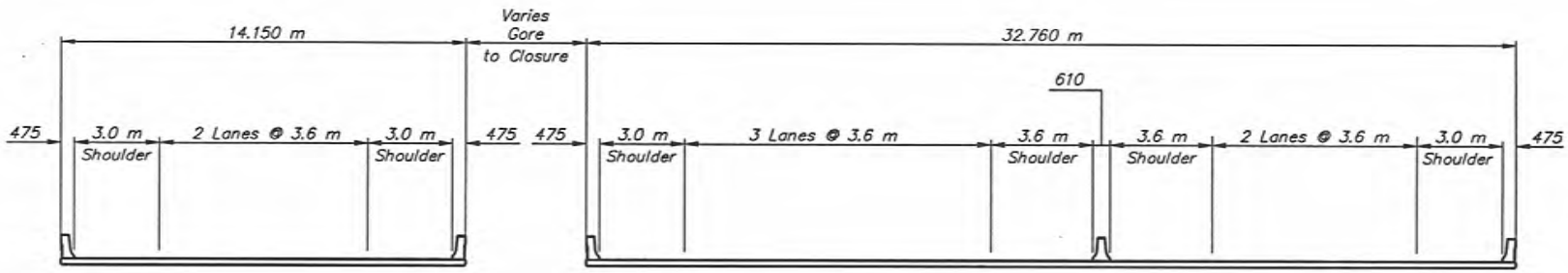
XREF: M:\24434\BORDER\BOR-02.DWG
NAME: M:\24434\DRAWINGS
NAME: 4B-02B.DWG DATE: MAY 29, 1998 TIME: 1:31 PM REV. BY: RLG

HNTB ARCHITECTS ENGINEERS PLANNERS

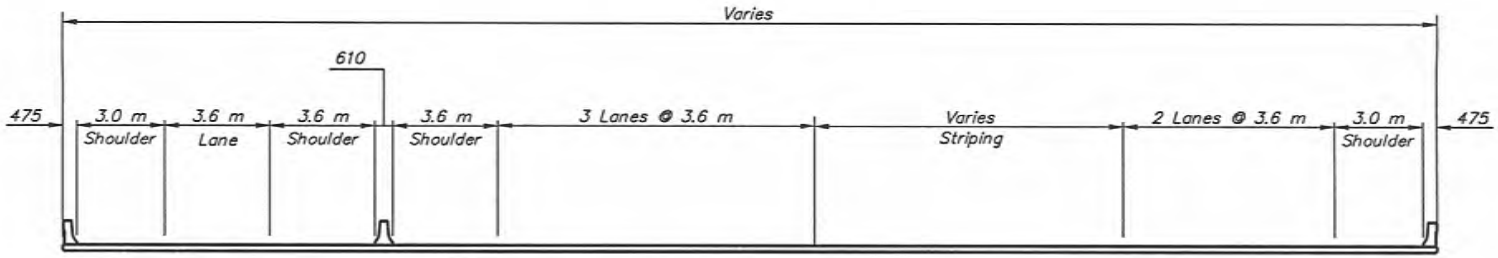
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 OVER REEDY CREEK

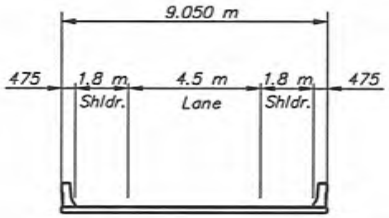
EXHIBIT 9-8



WESTBOUND



EASTBOUND



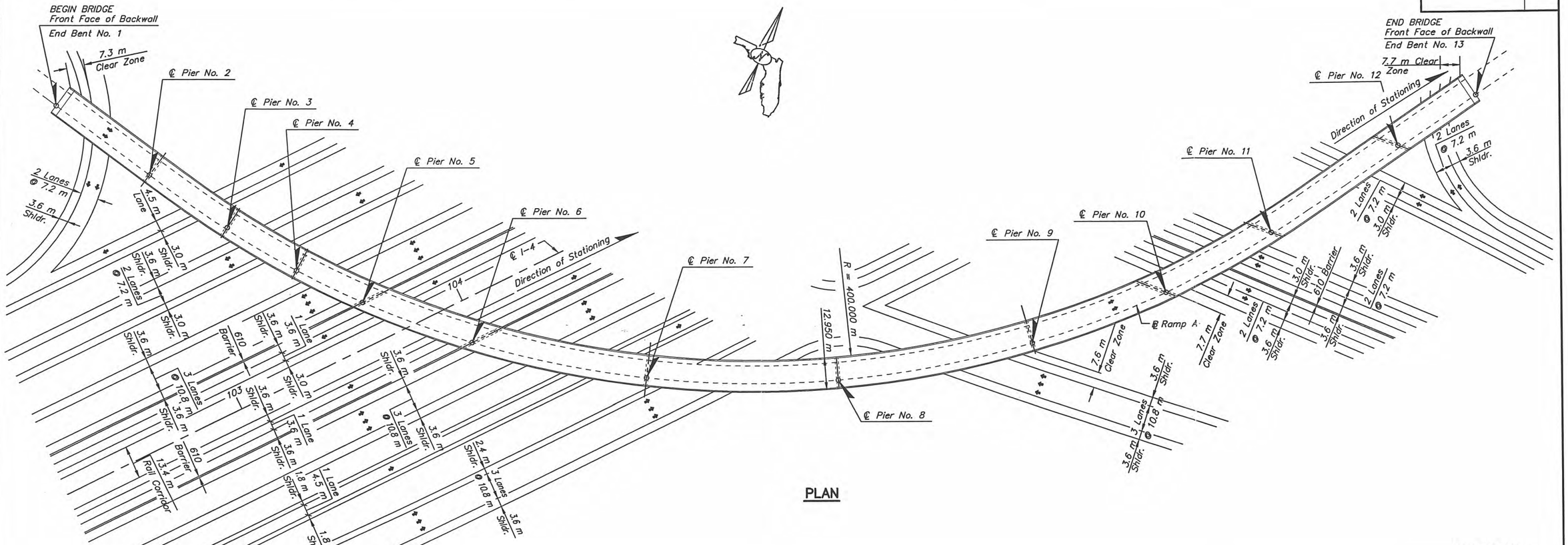
E.B. DIRECT CONNECT

SECTION

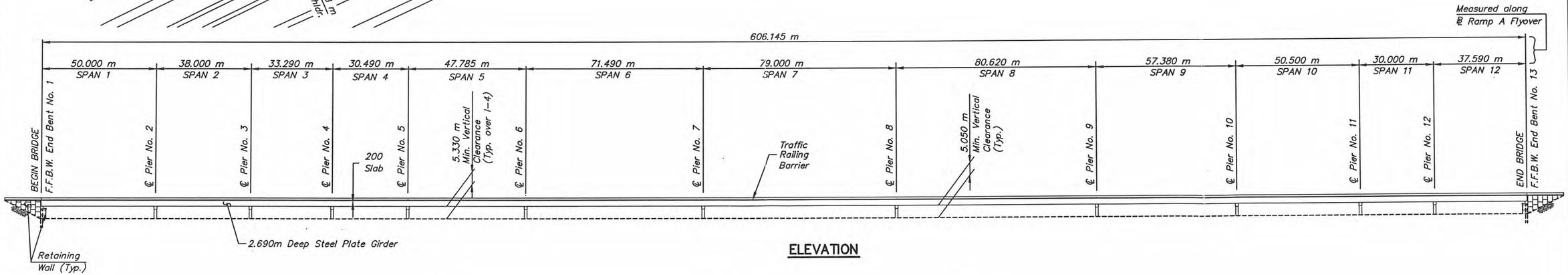
STATE PROJ. NO.

SHEET NO.

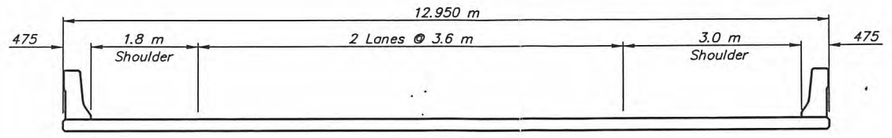
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

EXHIBIT 9-9

I-4/U.S. 192
RAMP BRIDGE A FLYOVER

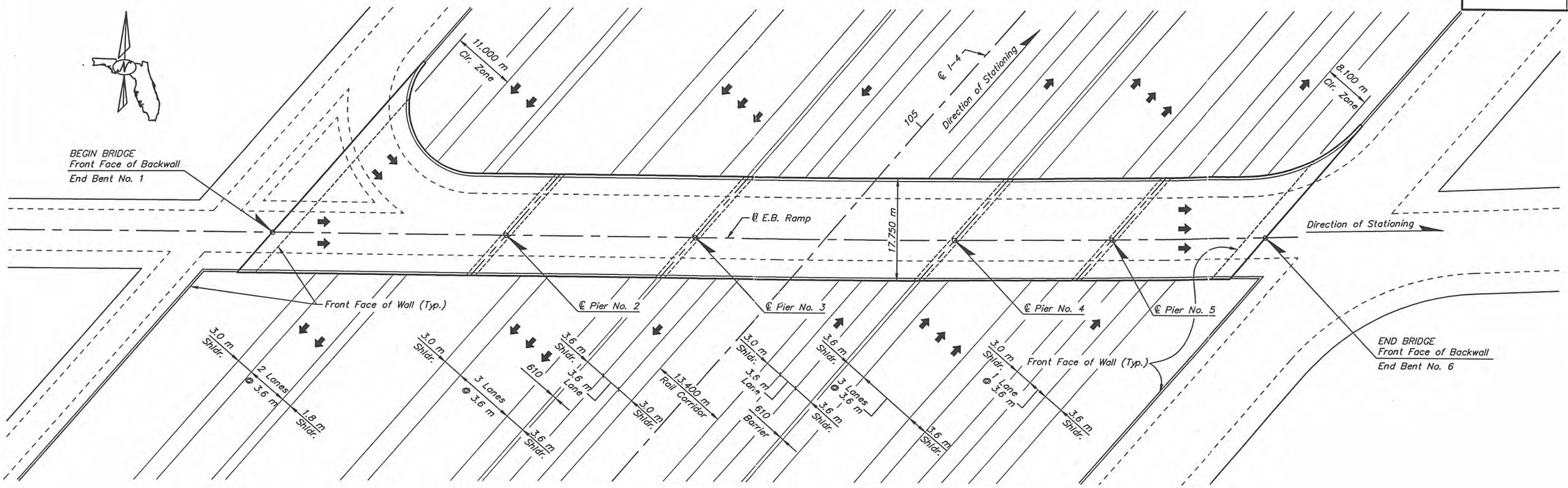
REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

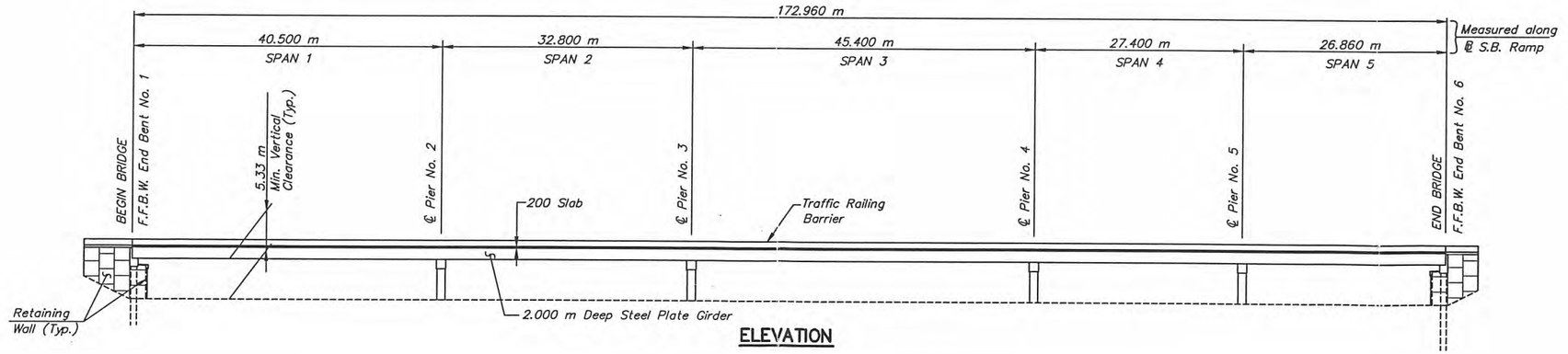
FLORIDA DEPARTMENT OF TRANSPORTATION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 7E-01.DWG DATE: APR 06, 1999 TIME: 3:12 PM REV. BY: RLG

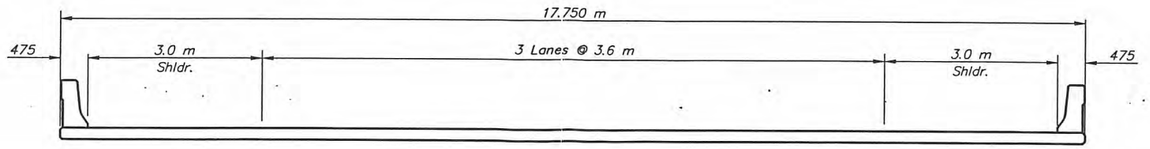
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 7E-02.DWG DATE: MAY 29, 1998 TIME: 2:31 PM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

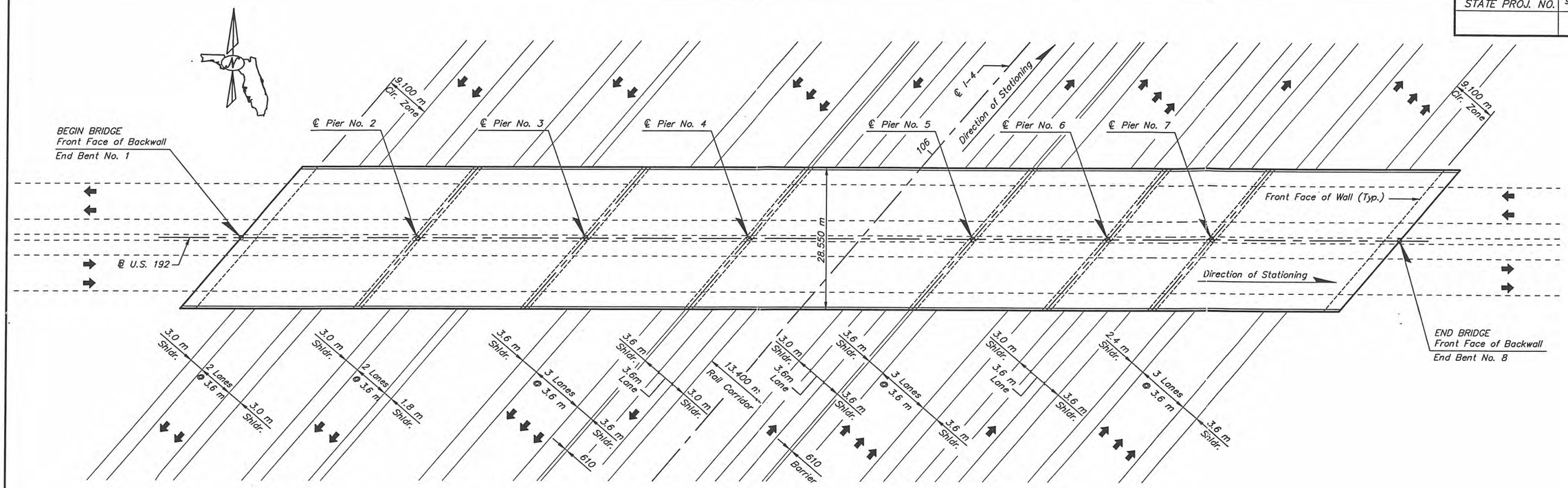
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

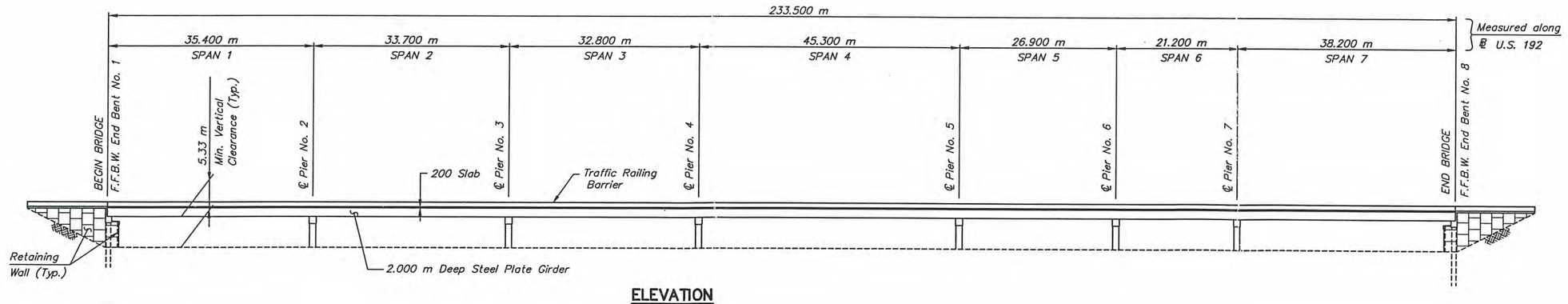
EXHIBIT 9-10

I-4/U.S. 192
E.B. RAMP OVER I-4

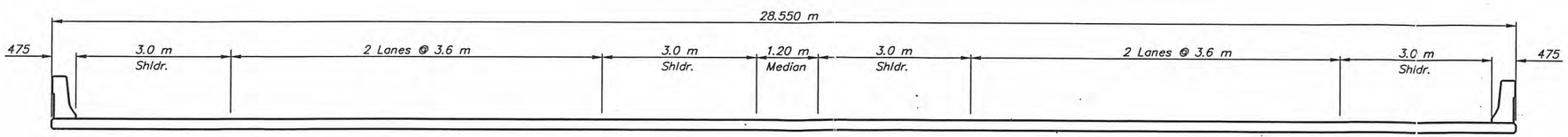
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 7E-03.DWG DATE: MAY 29, 1998 TIME: 1:35 PM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

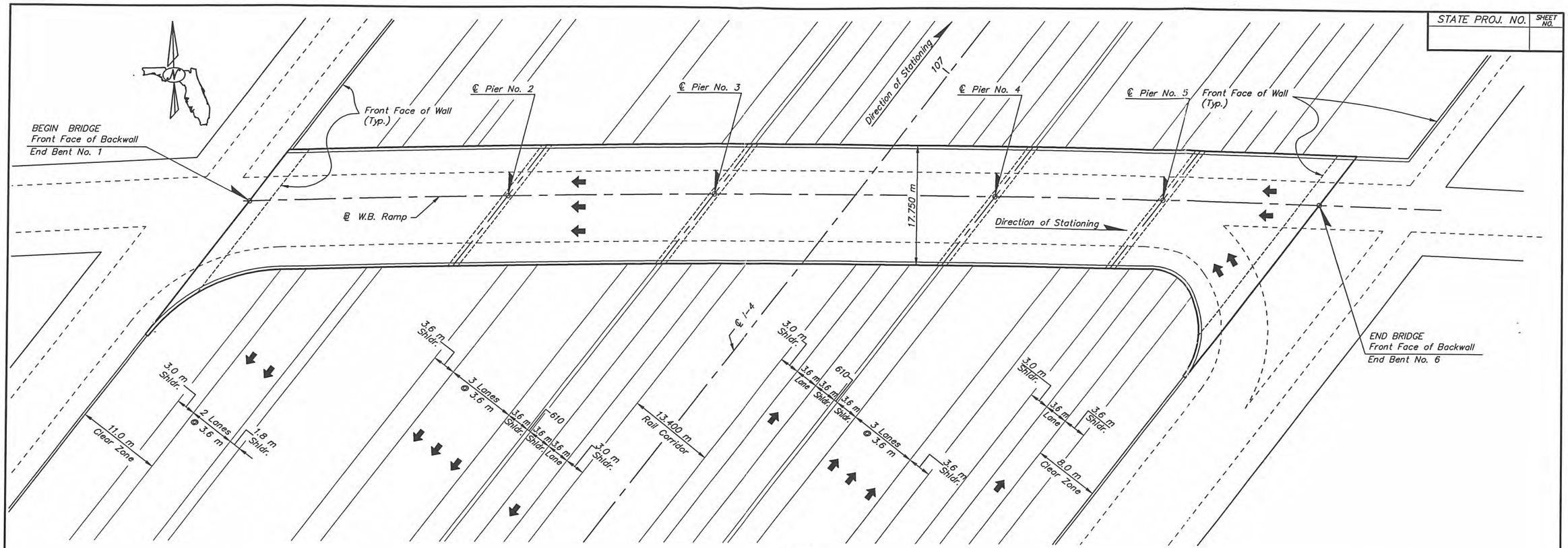
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

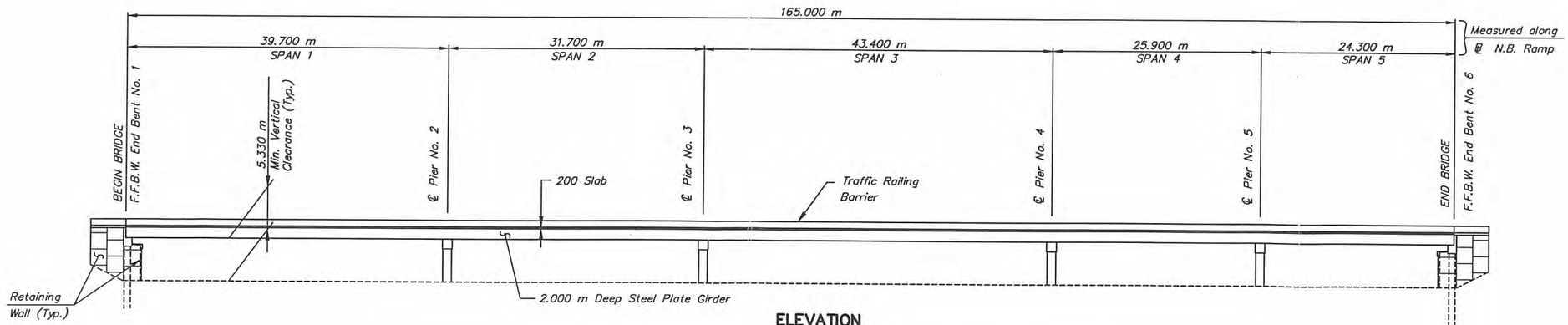
EXHIBIT 9-11

I-4/U.S. 192
U.S. 192 OVER I-4

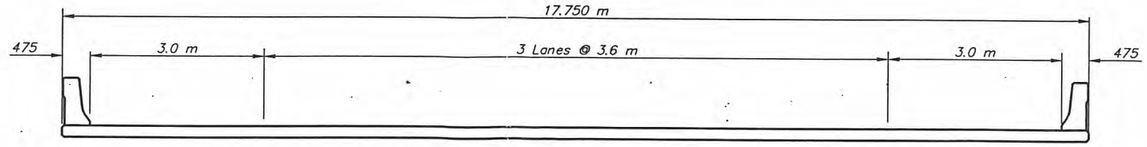
STATE PROJ. NO. | SHEET NO.



PLAN



ELEVATION



SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 7E-04.DWG DATE: MAY 29, 1998 TIME: 1:37 PM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

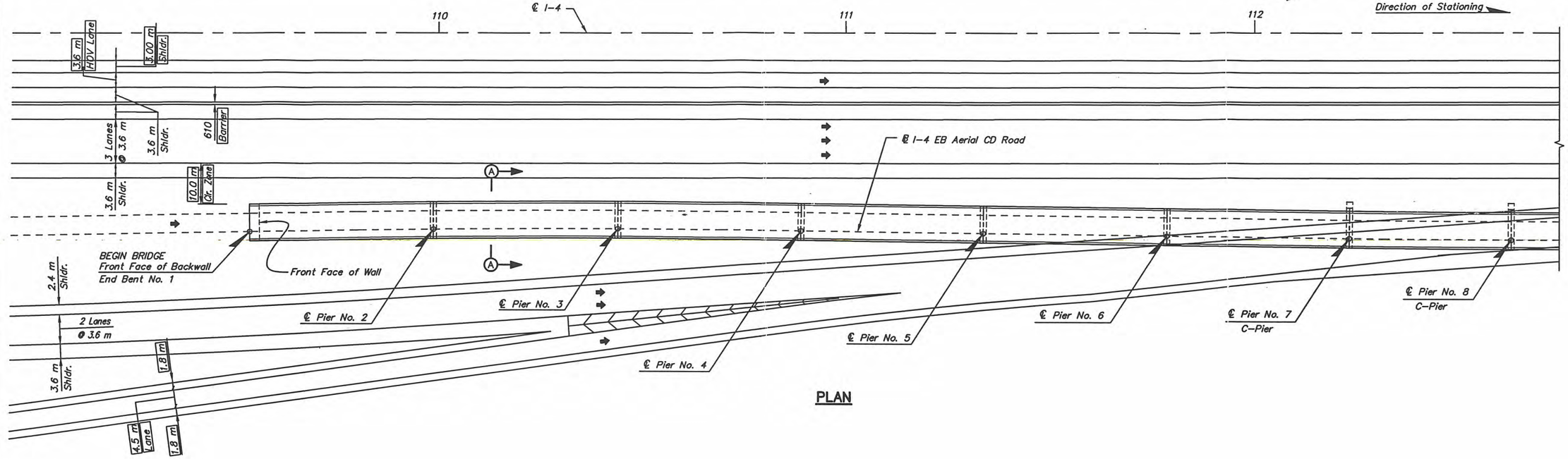
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

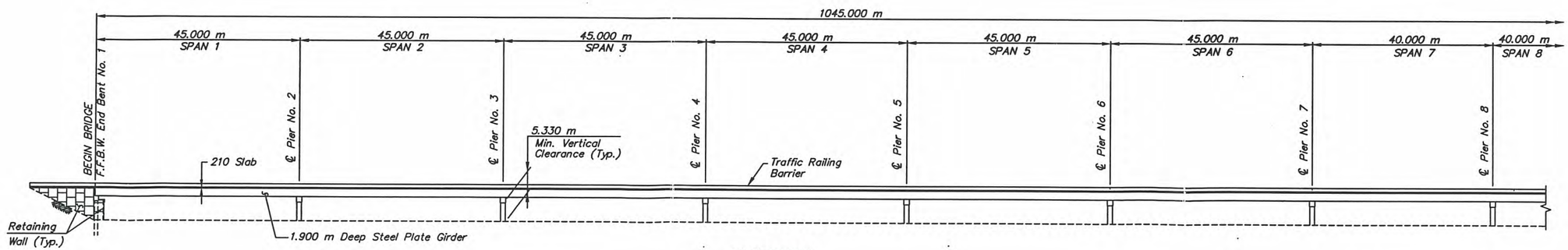
EXHIBIT 9-12

I-4/U.S. 192
W.B. RAMP OVER I-4

STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION

EXHIBIT 9-13

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: BACDRAMP1.DWG DATE: OCT 15, 1998 TIME: 8:53 AM REV. BY: QXN

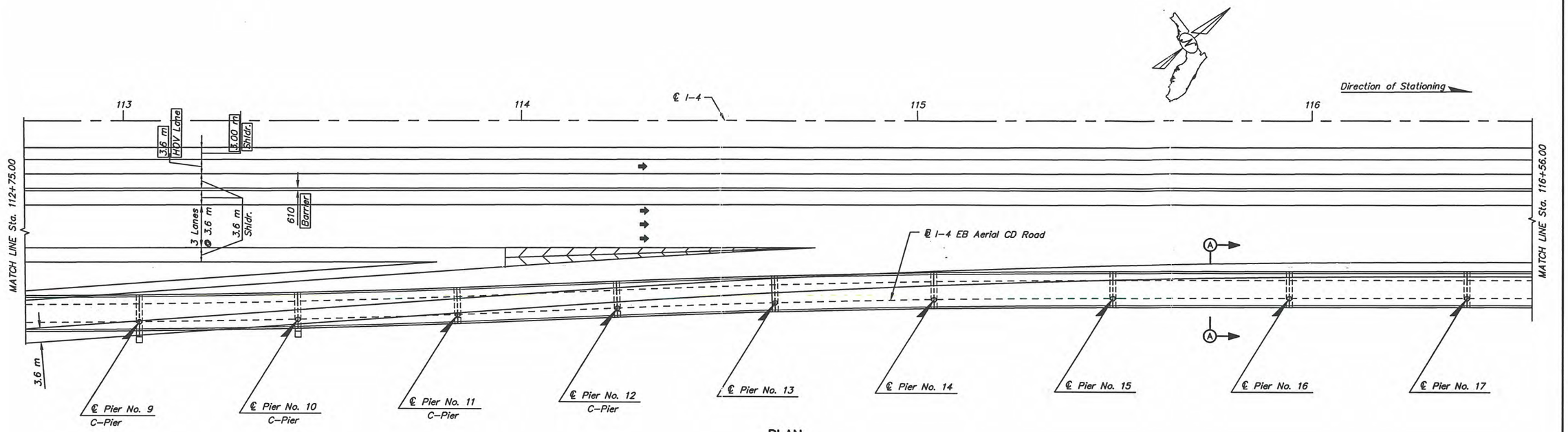
REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

HNTB ARCHITECTS ENGINEERS PLANNERS

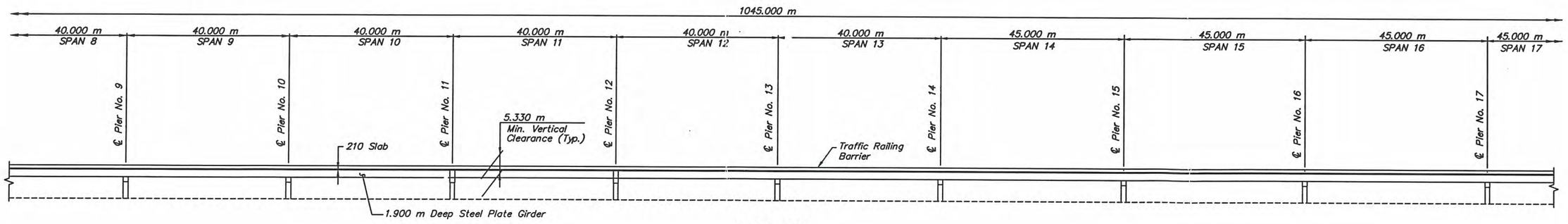
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 EB AERIAL CD ROAD
BETWEEN U.S. 192 AND OSCEOLA PARKWAY

STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION

EXHIBIT 9-13 (CON' T)

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

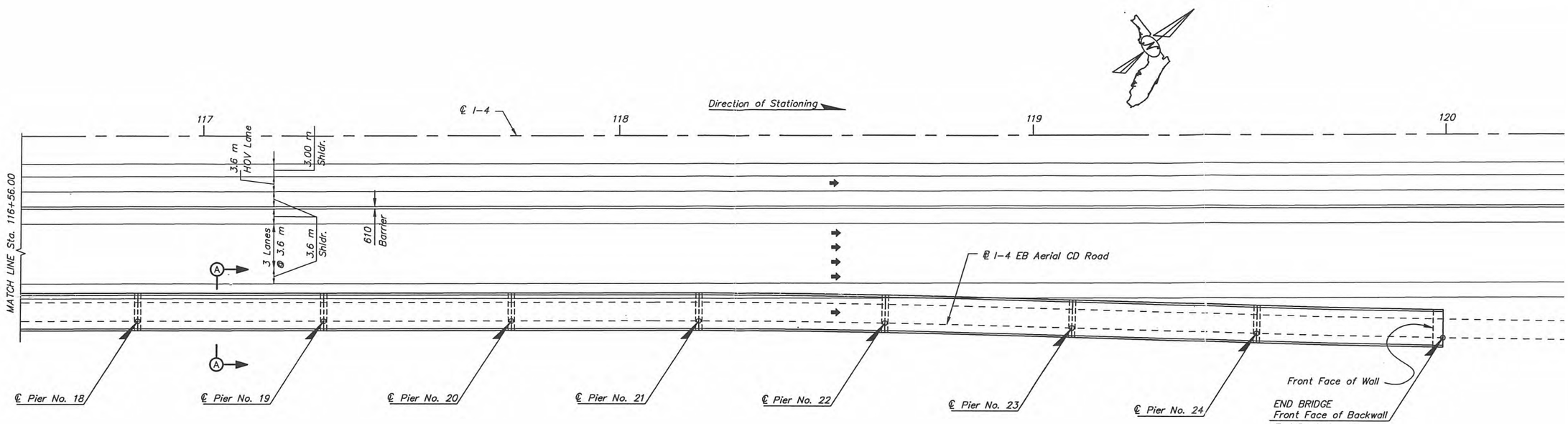
HNTB ARCHITECTS ENGINEERS PLANNERS

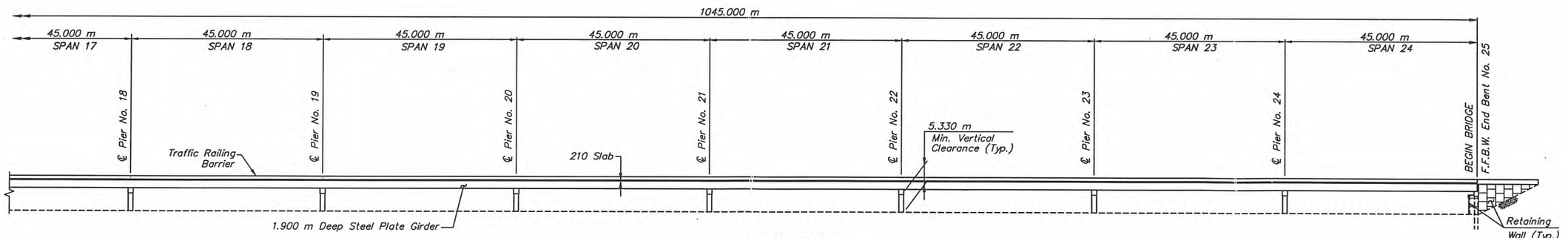
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 EB AERIAL CD ROAD
BETWEEN U.S. 192 AND OSCEOLA PARKWAY

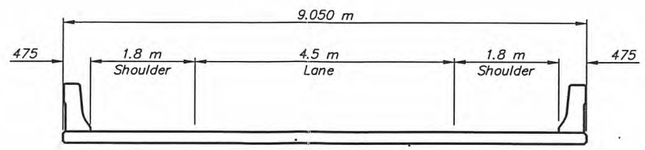
XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: BACDRAMP2.DWG DATE: OCT 15, 1998 TIME: 8:54 AM REV. BY: QXN

STATE PROJ. NO.	SHEET NO.





ELEVATION



SECTION A–A

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: BACDRAMP3.DWG DATE: OCT 15, 1998 TIME: 10:53 AM REV. BY: QXN

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

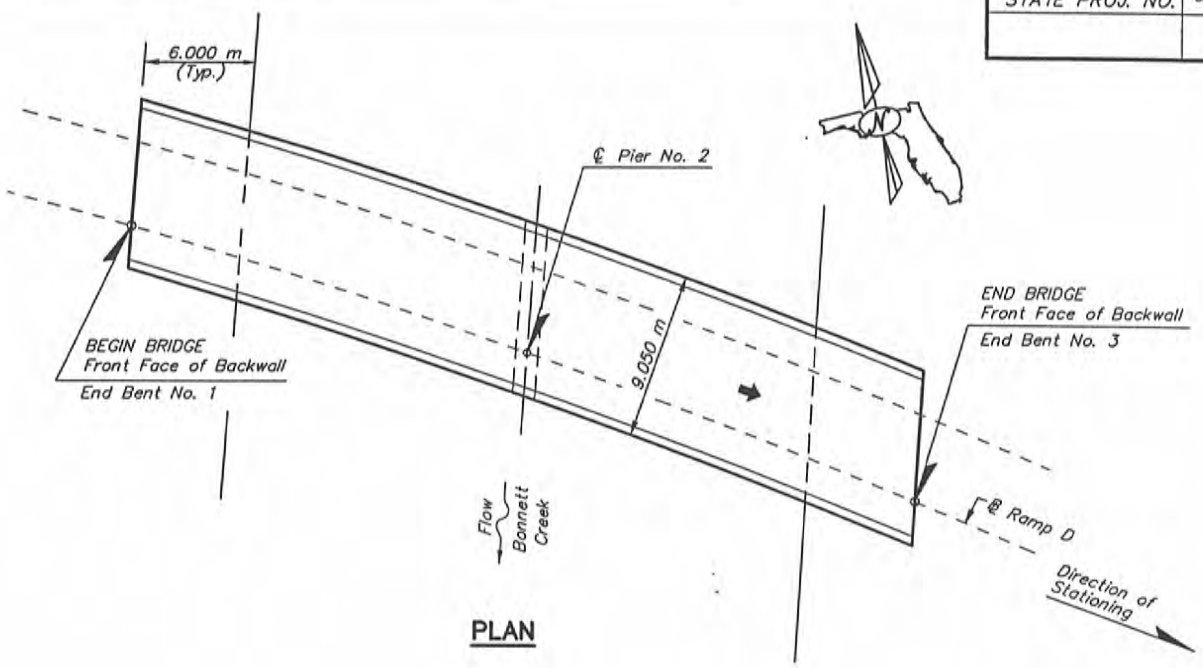
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

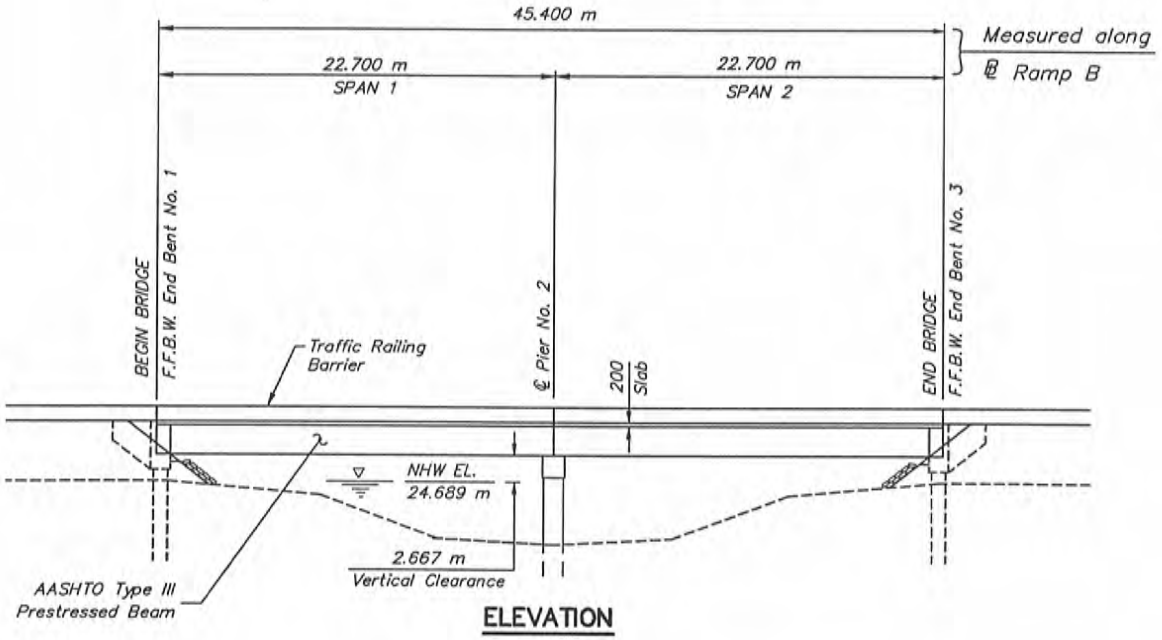
EXHIBIT 9–13 (CON'T.)

I–4 EB AERIAL CD ROAD
BETWEEN U.S. 192 AND OSCEOLA PARKWAY

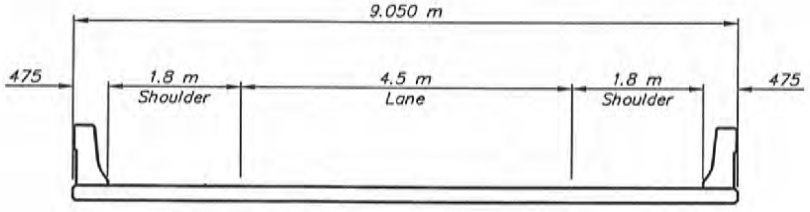
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



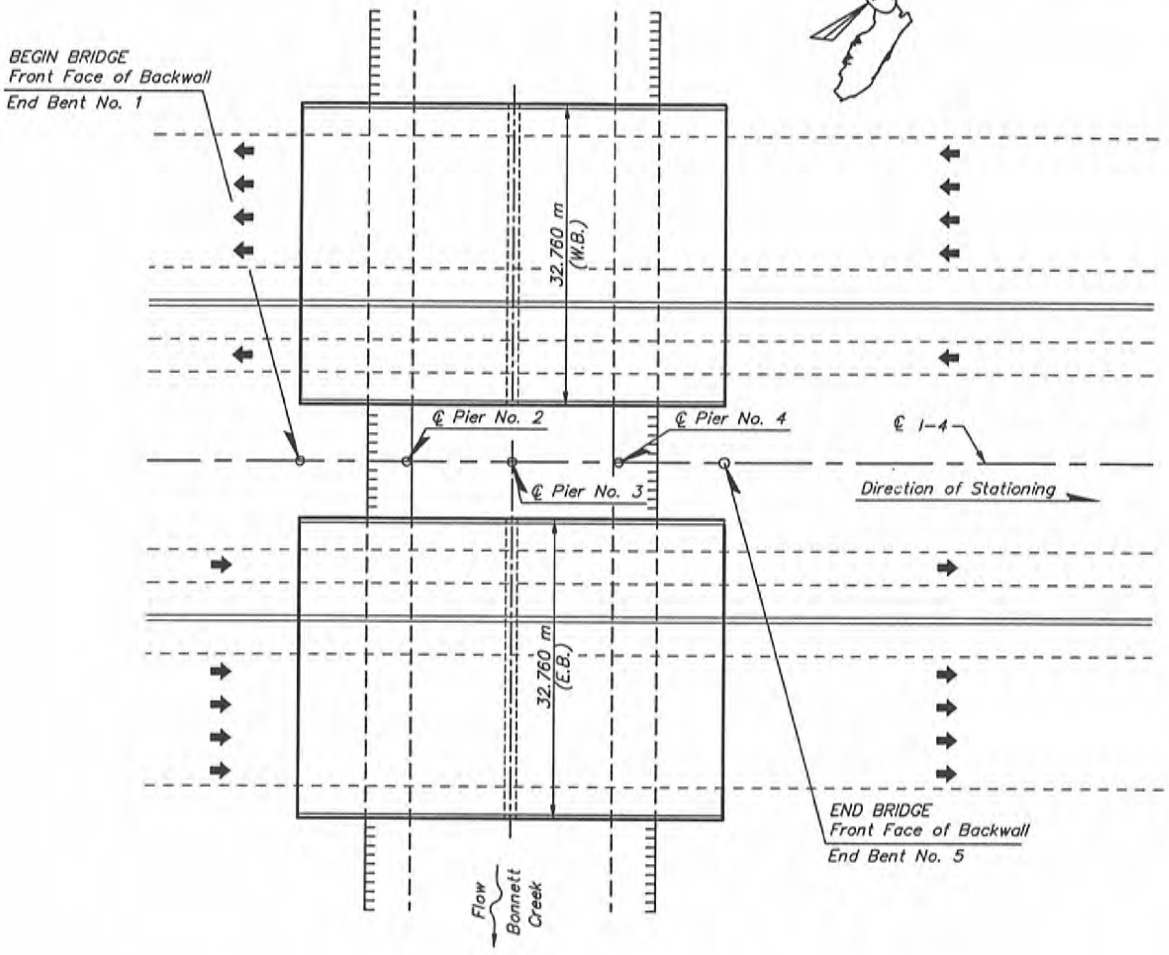
SECTION

EXHIBIT 9–14

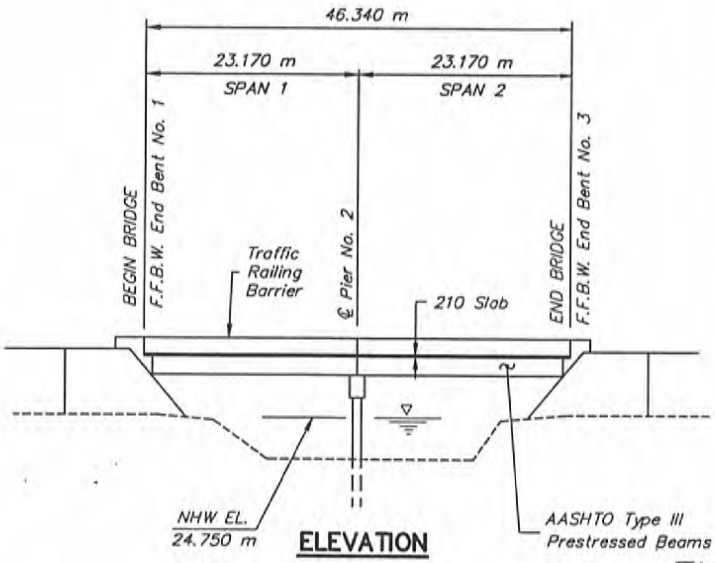
HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	RAMP D OF I–4 E.B. OVER BONNETT CREEK

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: BE-01.DWG DATE: MAY 29, 1998 TIME: 1:39 PM REV. BY: RLG

STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION

EXHIBIT 9-15

HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I-4 W.B. & E.B. OVER BONNET CREEK

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 8E-02.DWG DATE: JUL 14, 1998 TIME: 10:24 AM REV. BY: RLG

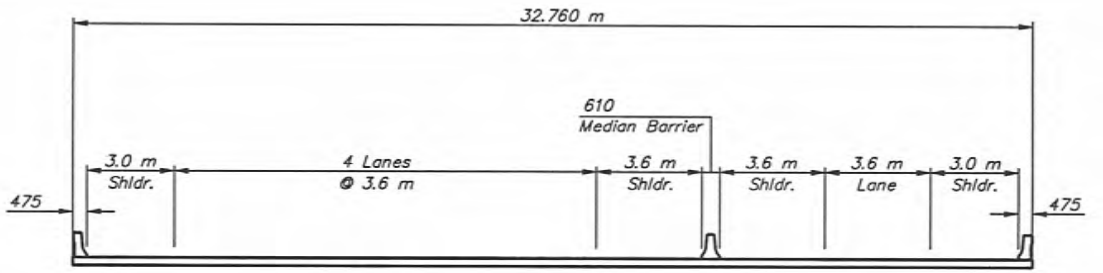
XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: BE-03.DWG DATE: JUL 14, 1998 TIME: 10:27 AM REV. BY: RLG

HNTB ARCHITECTS ENGINEERS PLANNERS

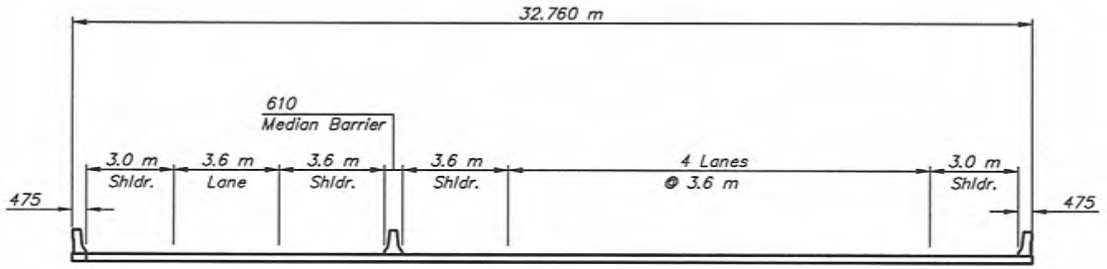
FLORIDA DEPARTMENT OF TRANSPORTATION

I-4 W.B. & E.B. OVER BONNET CREEK

EXHIBIT 9-16



WESTBOUND

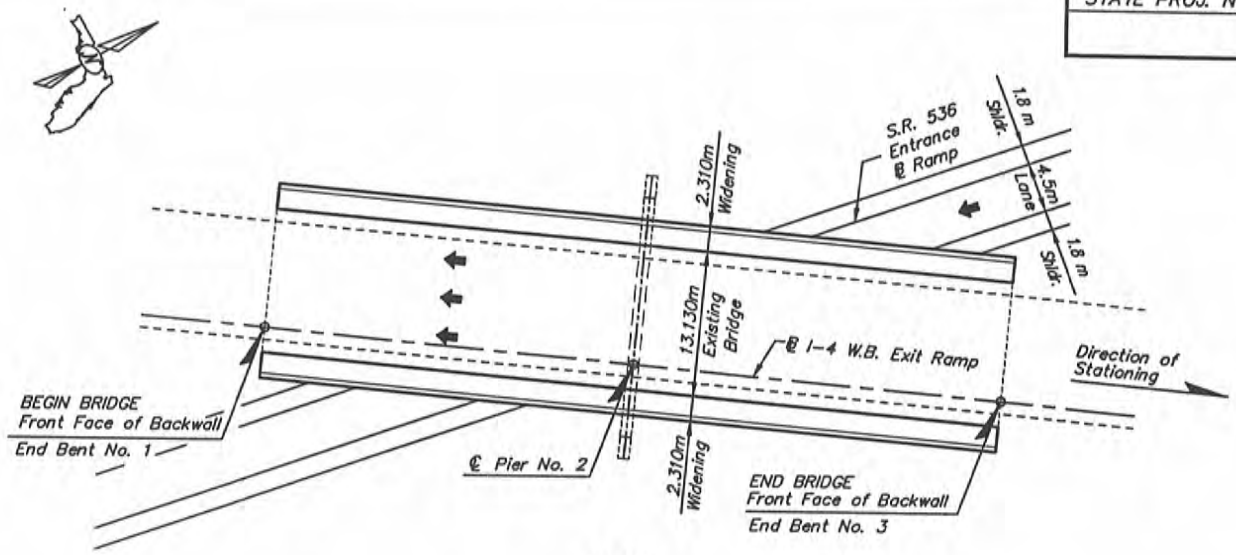


EASTBOUND

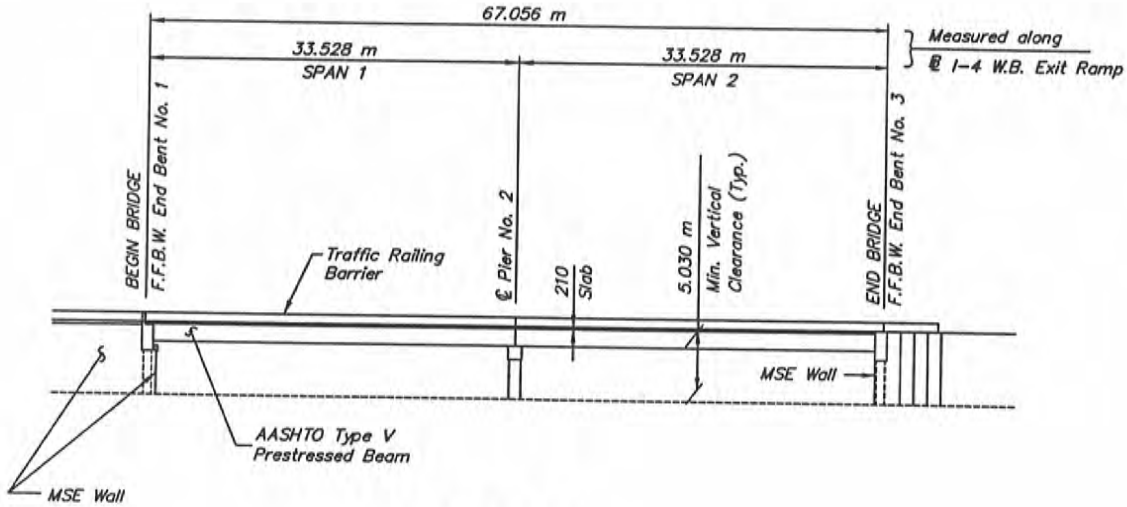
SECTION

STATE PROJ. NO.	SHEET NO.

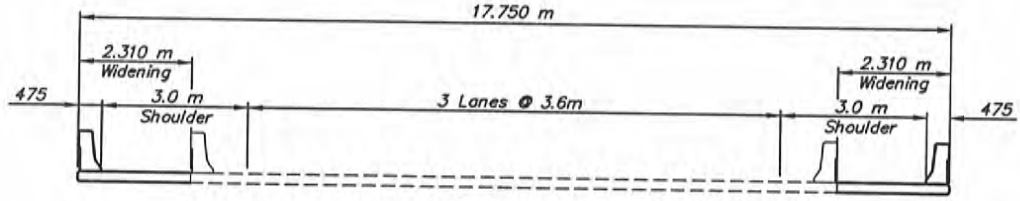
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



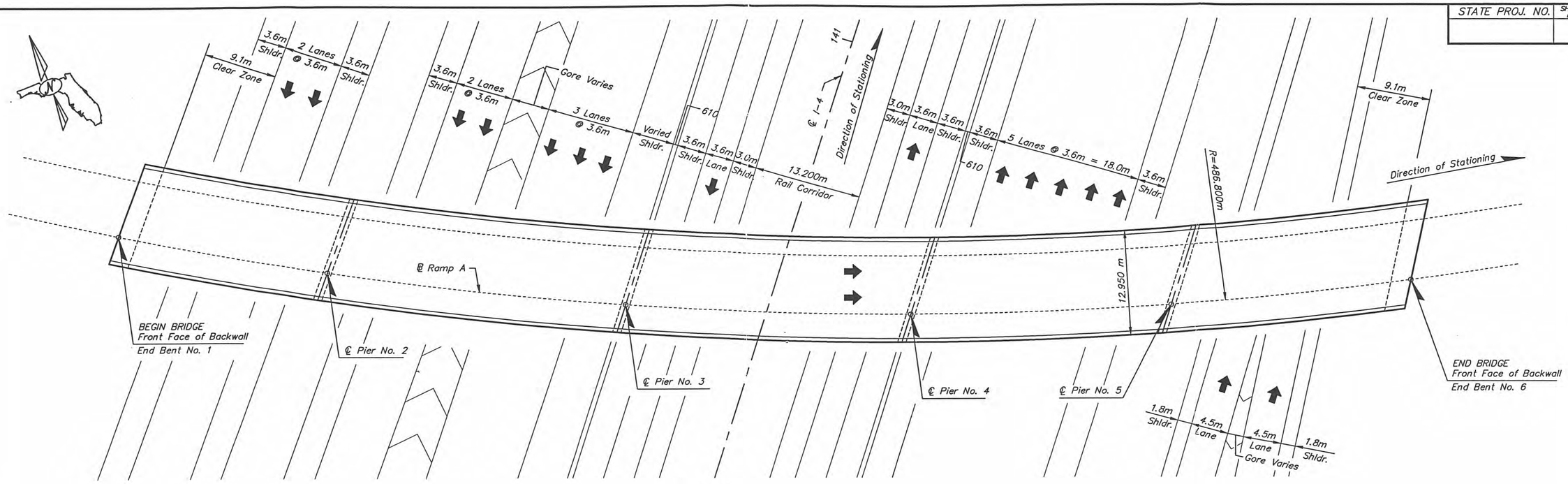
SECTION

EXHIBIT 9-17

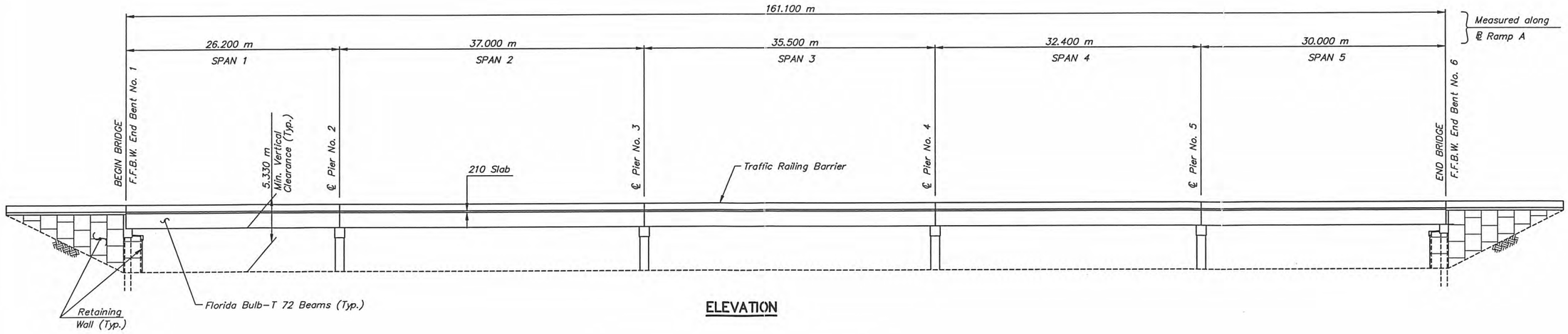
HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I-4 W.B. EXIT RAMP OVER S.R. 536 ENTRANCE RAMP

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: WBCD.DWG DATE: JUL 14, 1998 TIME: 9:07 AM REV. BY: RLG

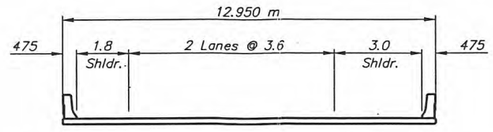
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: FIG-29.DWG DATE: JUL 14, 1998 TIME: 9:09 AM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

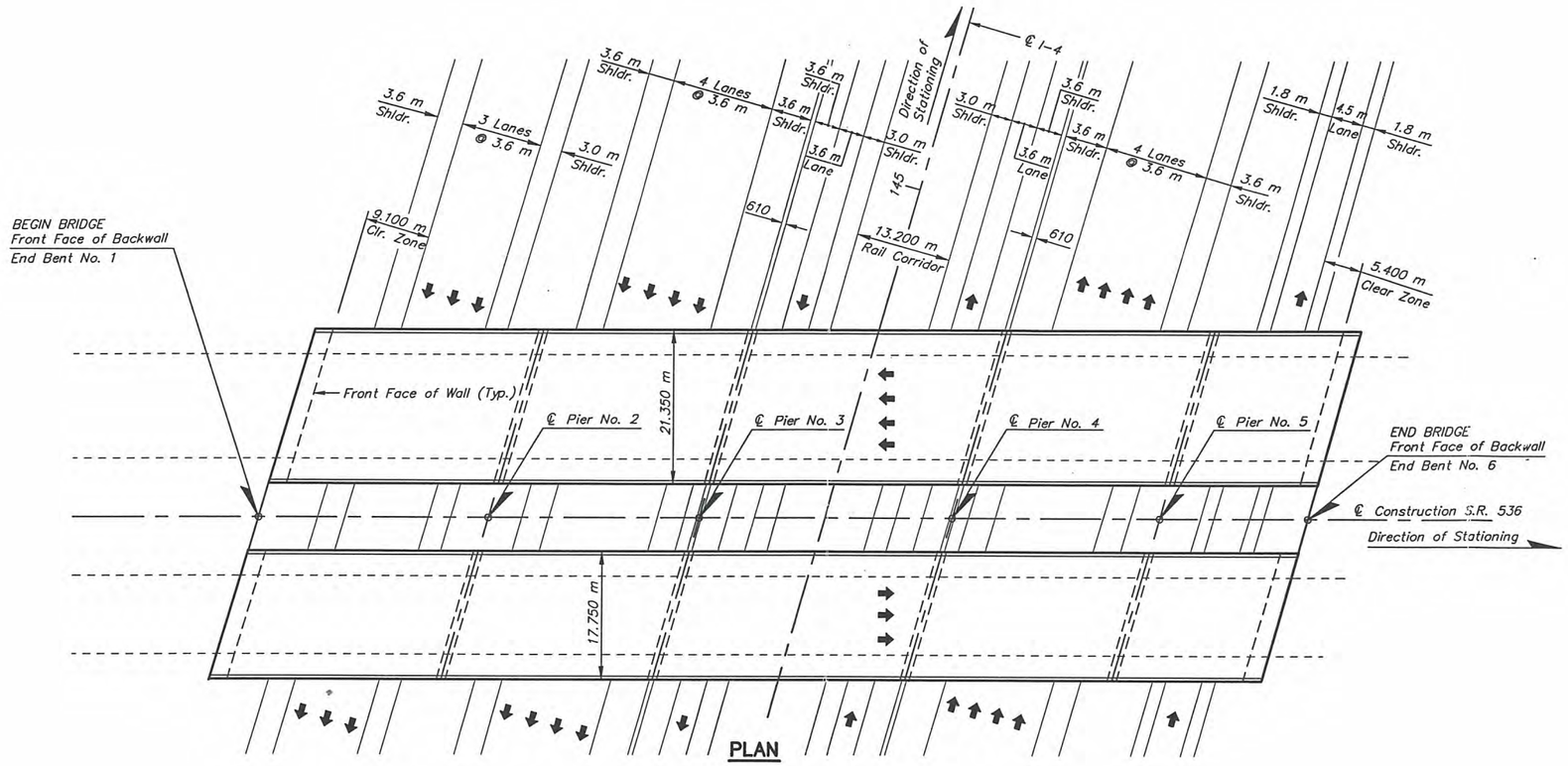
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

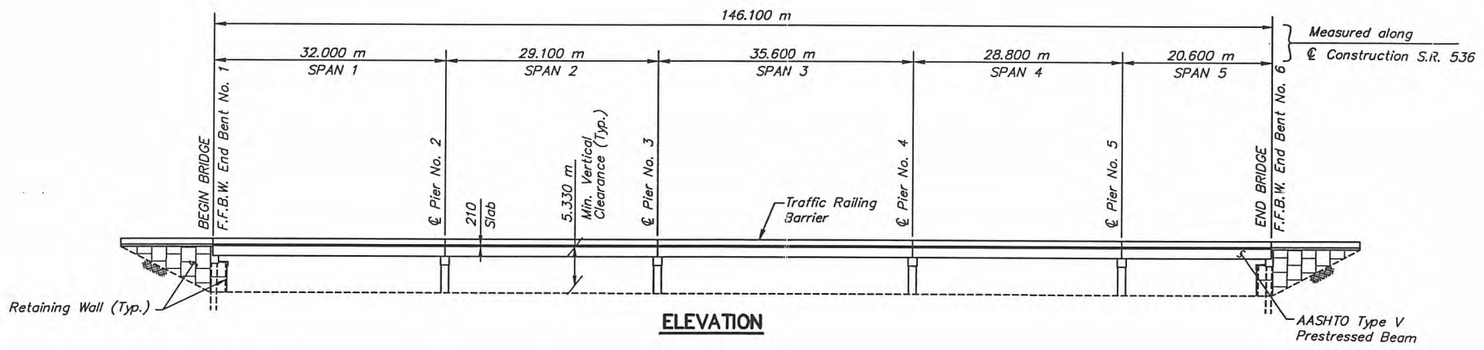
EXHIBIT 9-18

I-4/S.R. 536 RAMP BRIDGE A OVER I-4

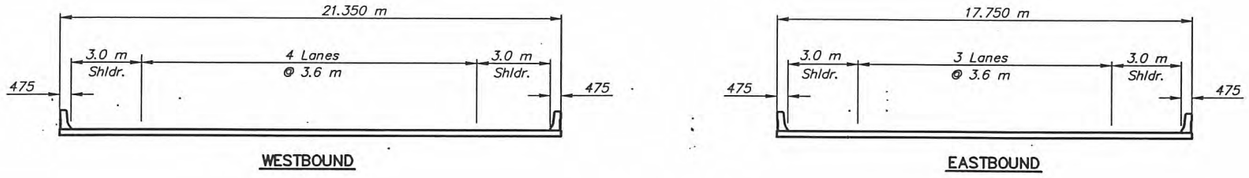
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



WESTBOUND **EASTBOUND**

SECTION

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 10-01.DWG DATE: JUL 14, 1998 TIME: 9:10 AM REV. BY: RLG

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

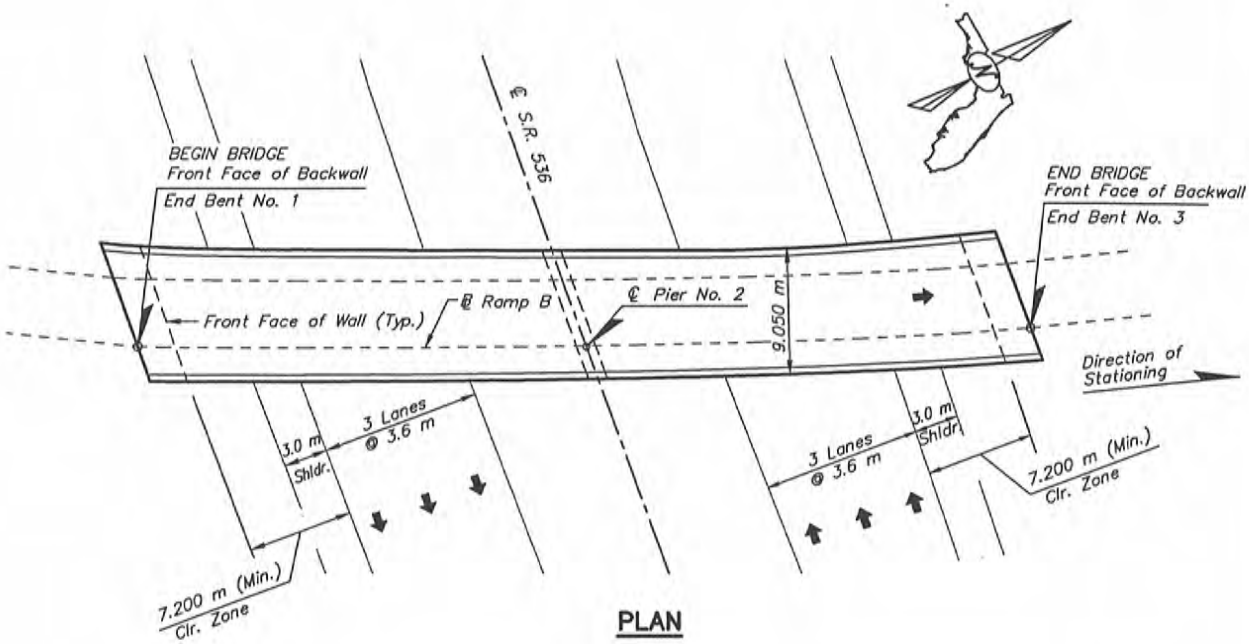
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

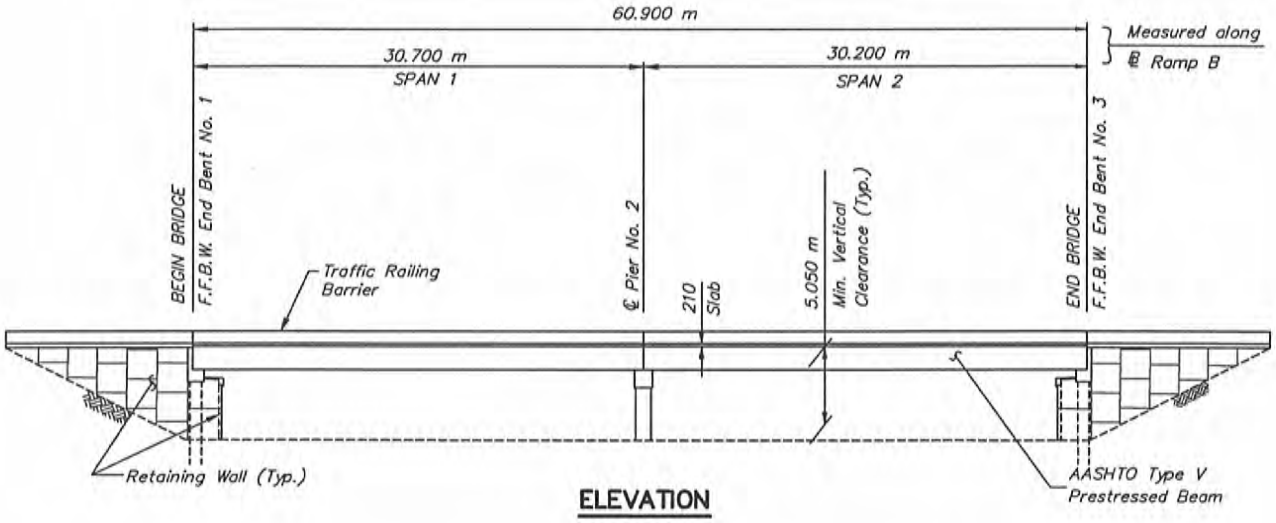
EXHIBIT 9-19

I-4/S.R. 536
S.R.536 OVER I-4

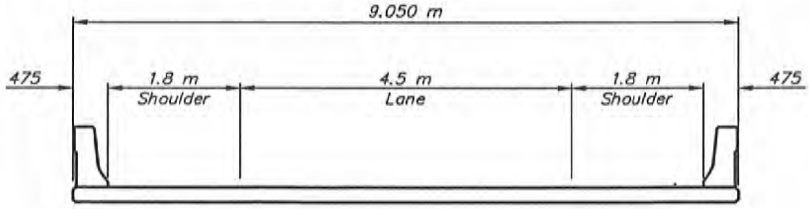
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



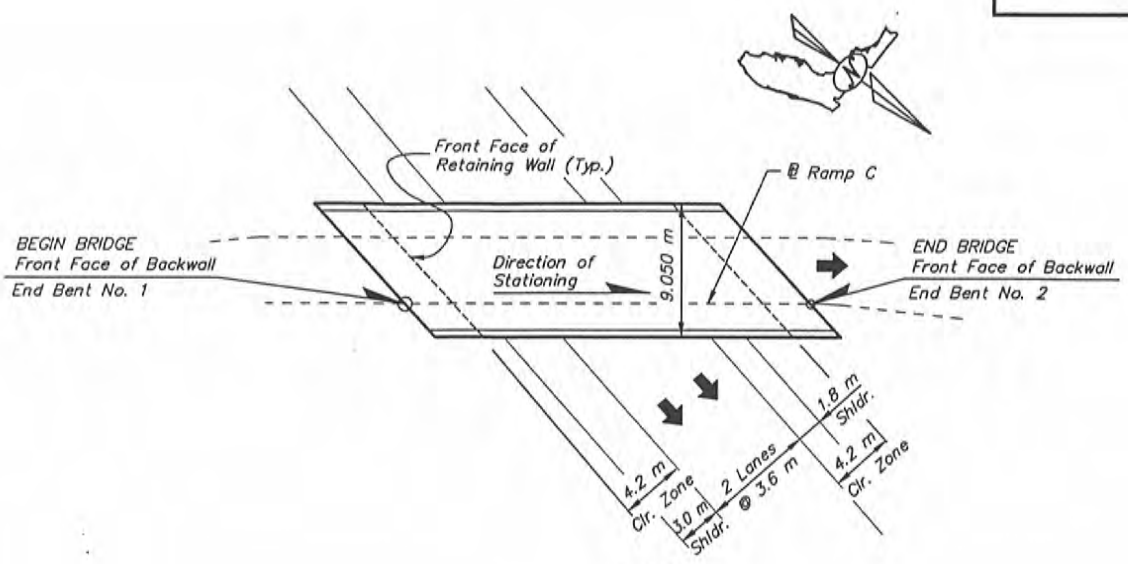
SECTION

EXHIBIT 9–20

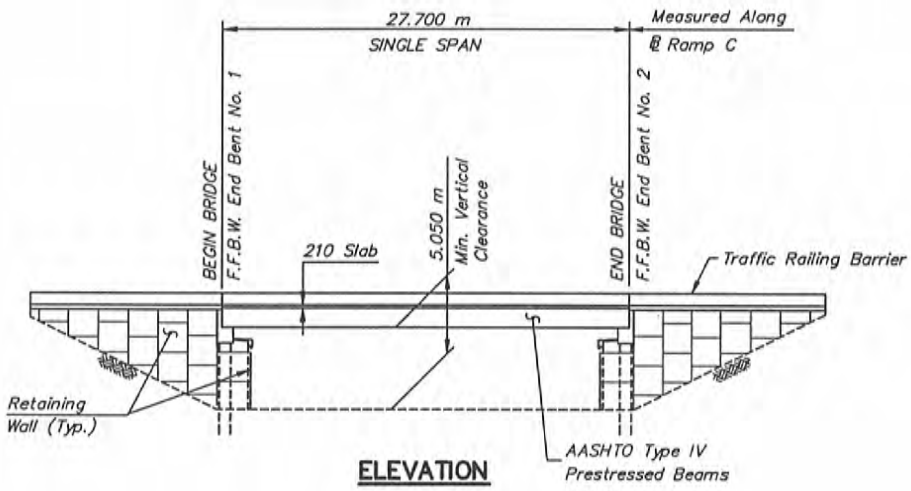
HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I–4/S.R. 536 RAMP BRIDGE B

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 10-02.DWG DATE: JUL 14, 1998 TIME: 9:11 AM REV. BY: RLG

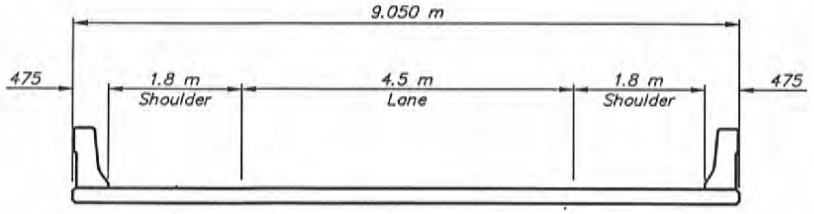
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



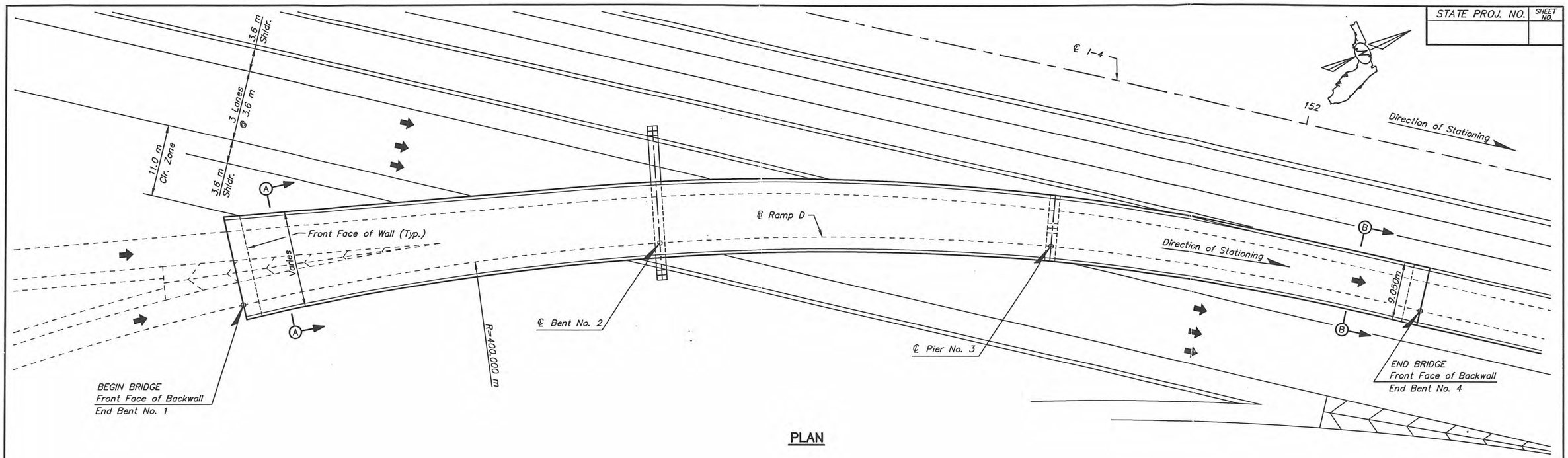
SECTION

EXHIBIT 9–21

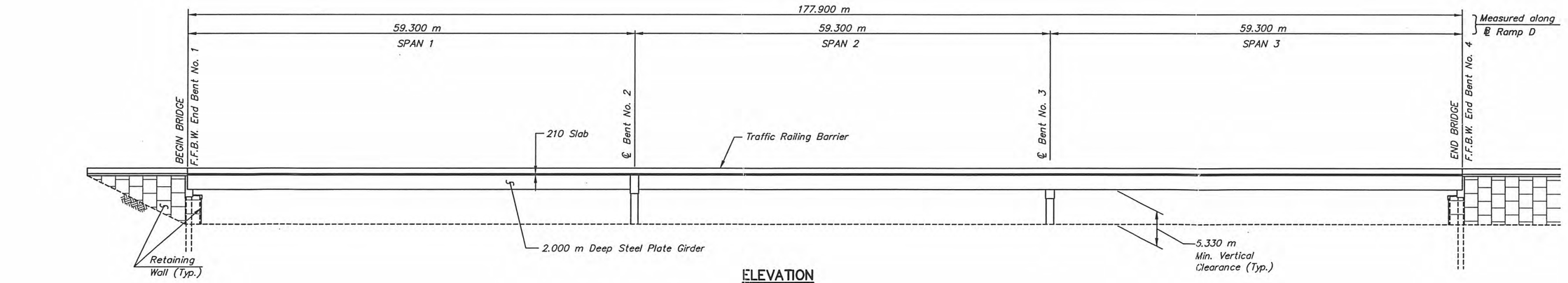
HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I–4/S.R. 536 RAMP BRIDGE C

XREF: M:\24434\BORDER\BOR-D4.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 10-03.DWG DATE: JUL 14, 1998 TIME: 9:12 AM REV. BY: RLG

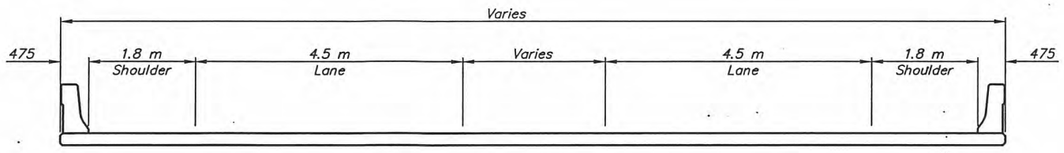
STATE PROJ. NO.	SHEET NO.



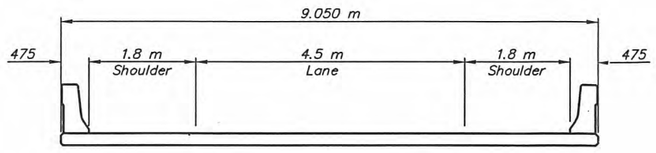
PLAN



ELEVATION



SECTION A–A



SECTION B–B

EXHIBIT 9–22

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

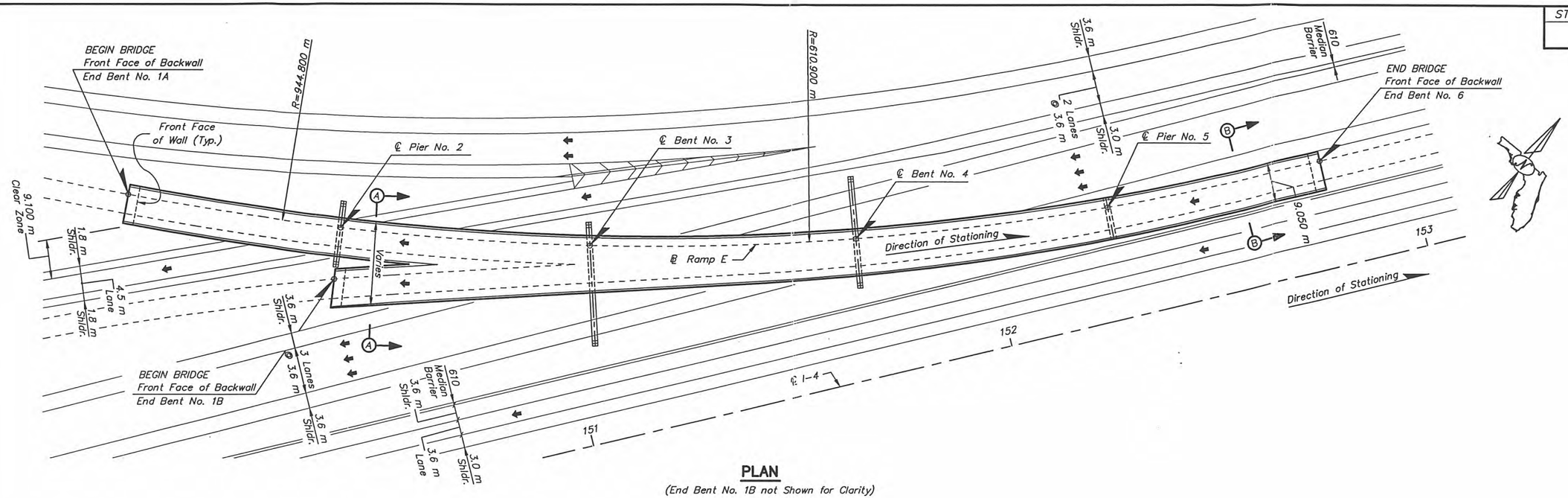
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4/S.R. 536
HOV DIRECT CONNECT RAMP (RAMP D)

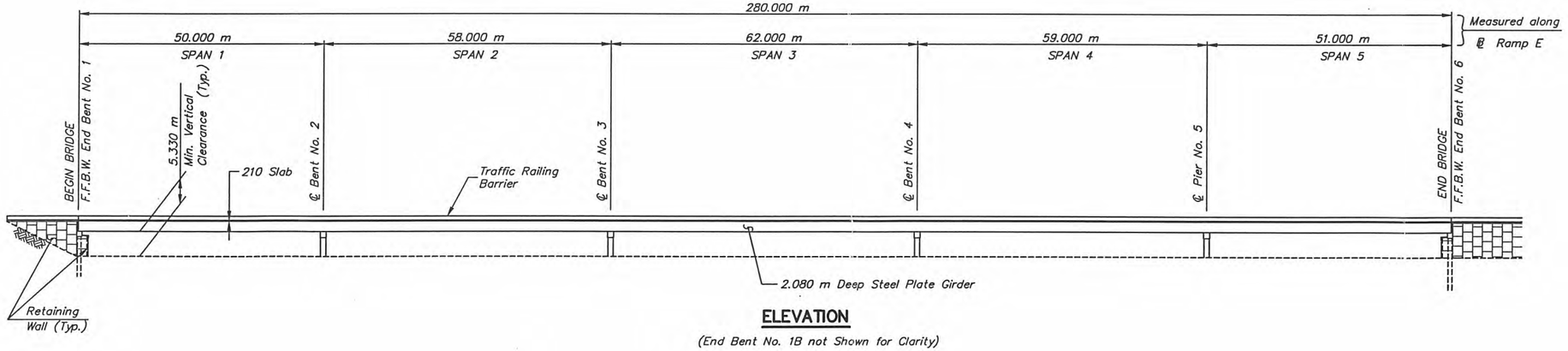
XREF: M:\2434\BORDER\BOR-03.DWG
NAME: M:\2434\FINAL DRAWINGS\
NAME: 10-04.DWG,DWG DATE: APR 05, 1999 TIME: 6:48 AM REV. BY: RLG

STATE PROJ. NO.	SHEET NO.



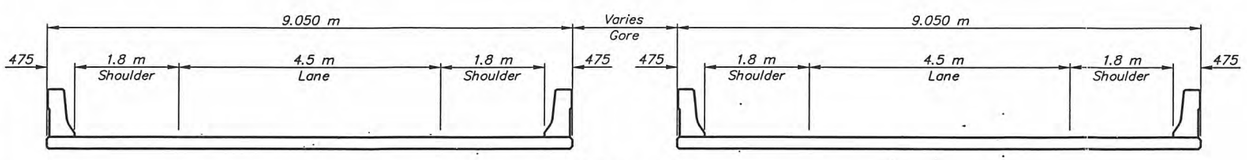
PLAN

(End Bent No. 1B not Shown for Clarity)

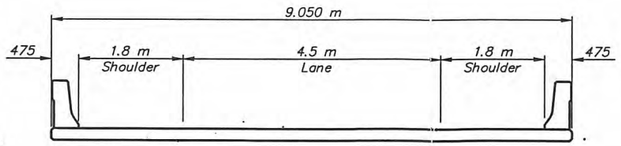


ELEVATION

(End Bent No. 1B not Shown for Clarity)



SECTION A–A



SECTION B–B

EXHIBIT 9–23

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

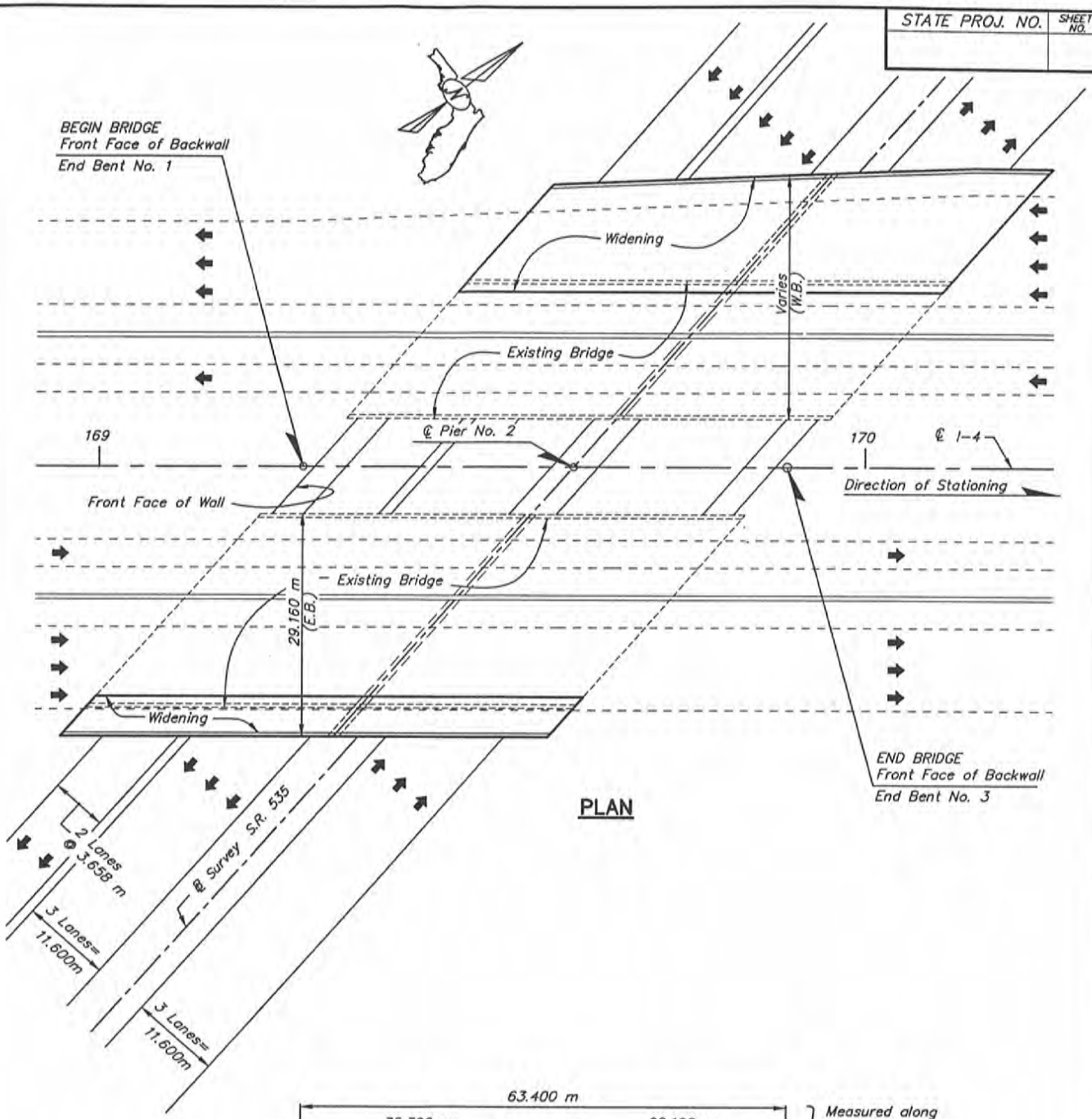
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

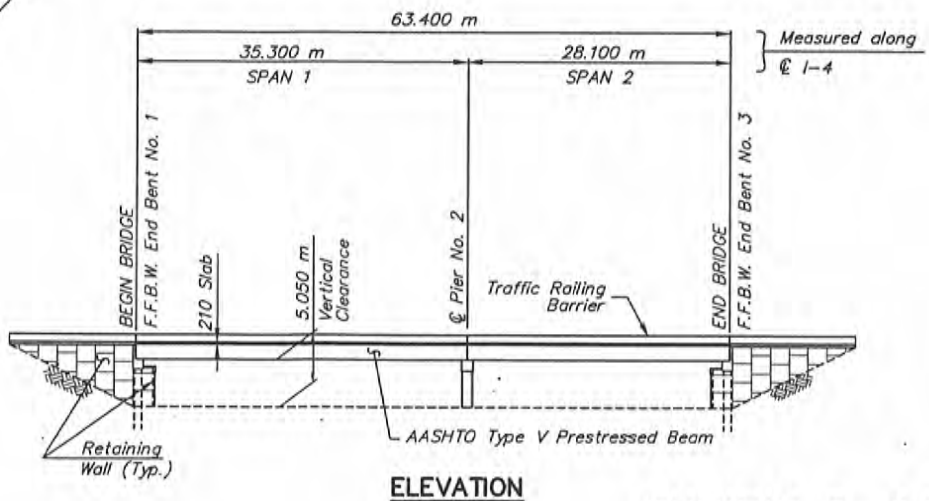
I-4/S.R. 536
HOV DIRECT CONNECT RAMP (RAMP E)

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 10-05.DWG DATE: JUL 14, 1998 TIME: 9:32 AM REV. BY: RLG

STATE PROJ. NO.	SHEET NO.



PLAN

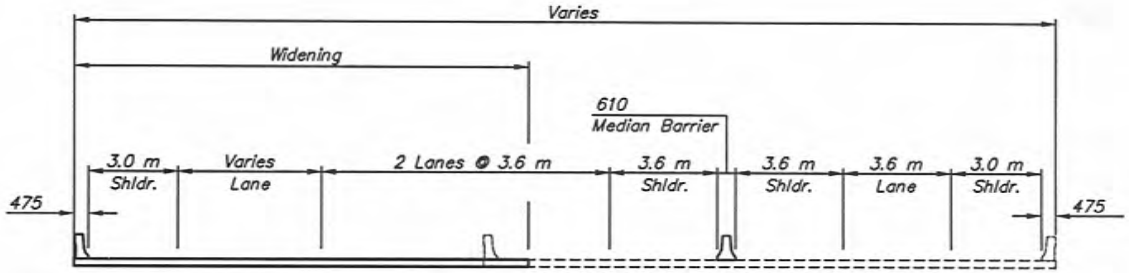


ELEVATION

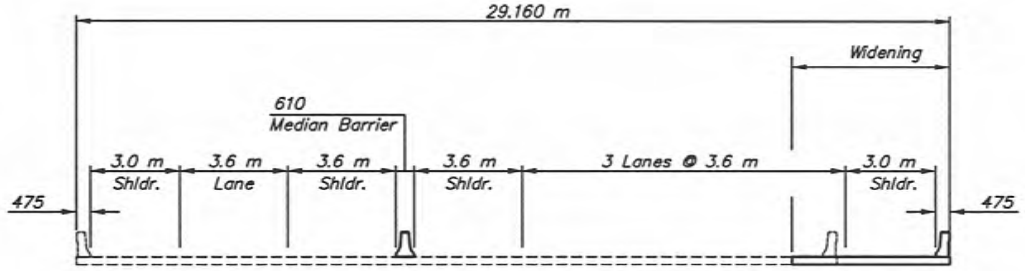
EXHIBIT 9-24

HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I-4/S.R. 535 WIDENING W.B. & E.B. I-4 OVER S.R. 535

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 11B-01A.DWG,DWG DATE: APR 05, 1999 TIME: 6:54 AM REV. BY: RLG



WESTBOUND



EASTBOUND

SECTION

EXHIBIT 9-25

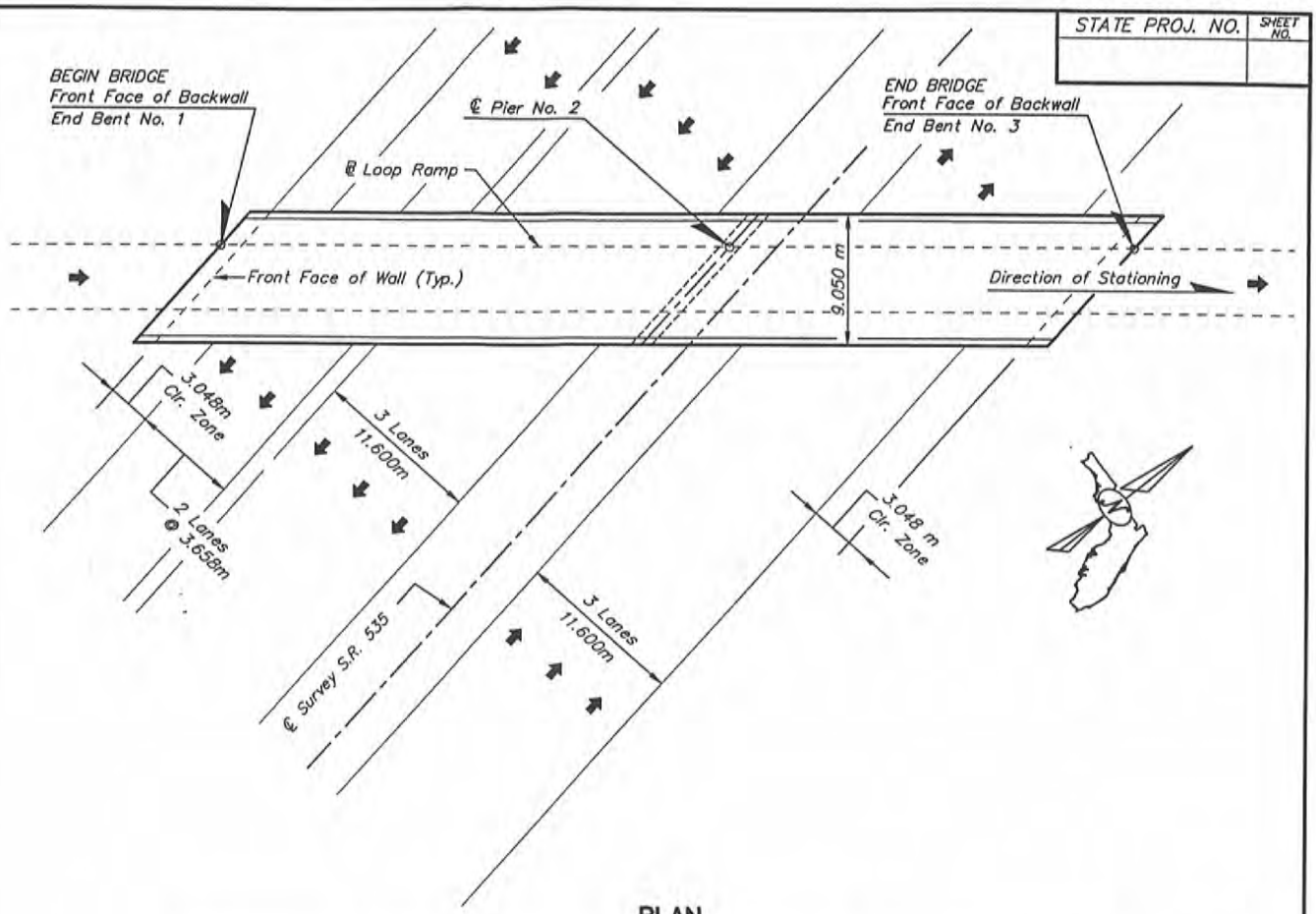
I-4/S.R. 535 WIDENING
W.B. & E.B. I-4 OVER S.R. 535

FLORIDA DEPARTMENT OF TRANSPORTATION

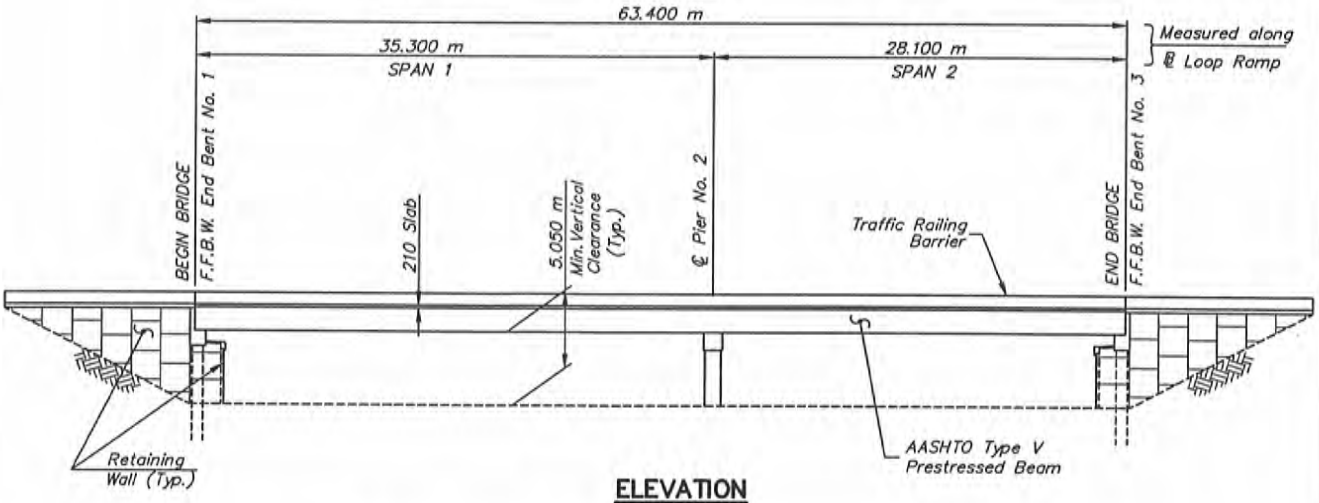
HNTB ARCHITECTS ENGINEERS PLANNERS

STATE PROJ. NO. | SHEET NO.

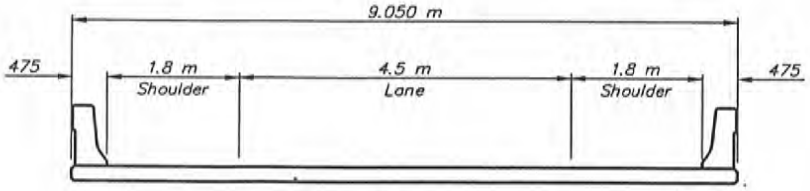
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



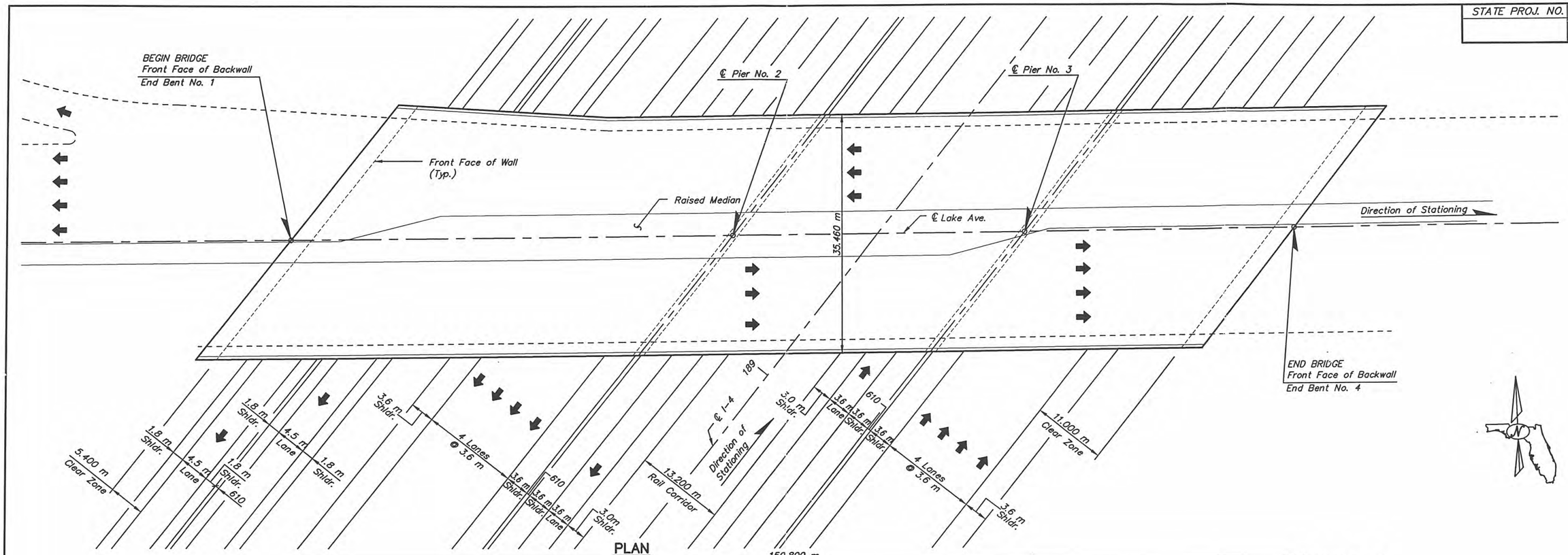
SECTION

EXHIBIT 9–26

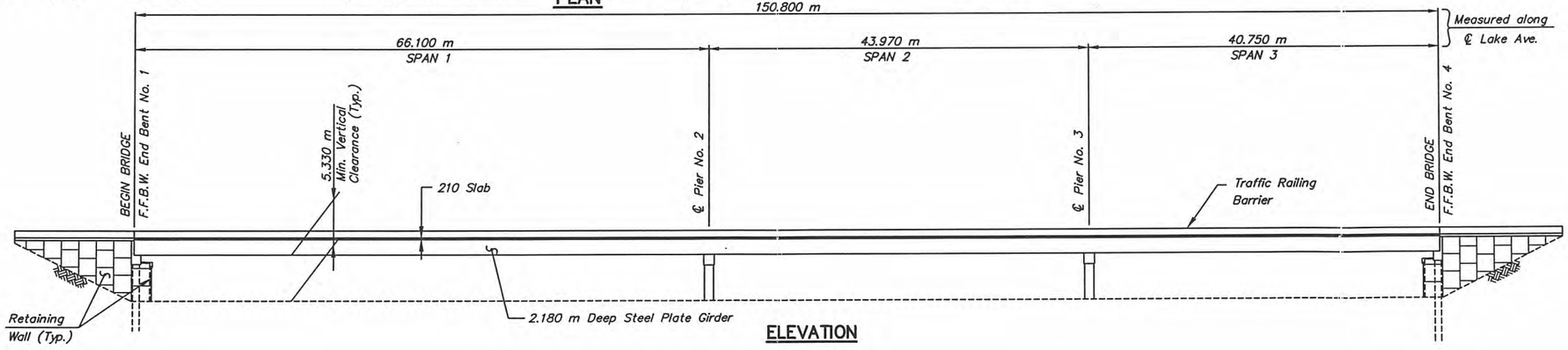
HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I–4/S.R. 535 LOOP RAMP OVER S.R. 535

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 11B-02.DWG DATE: JUL 14, 1998 TIME: 9:36 AM REV. BY: RLG

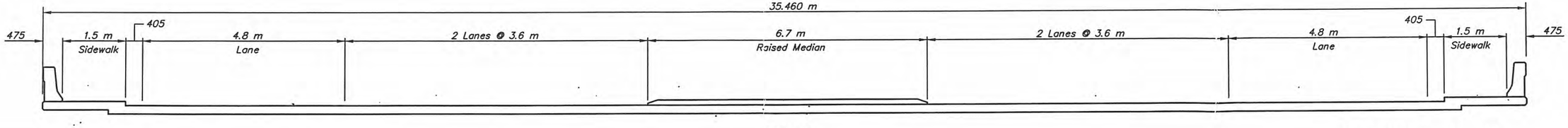
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

EXHIBIT 9-27

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

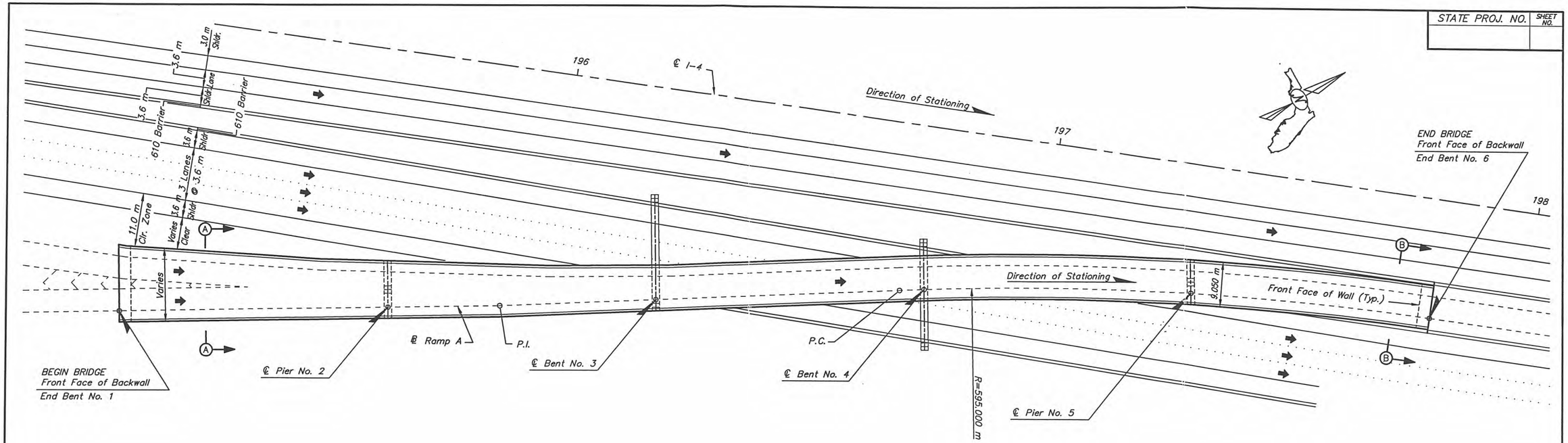
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

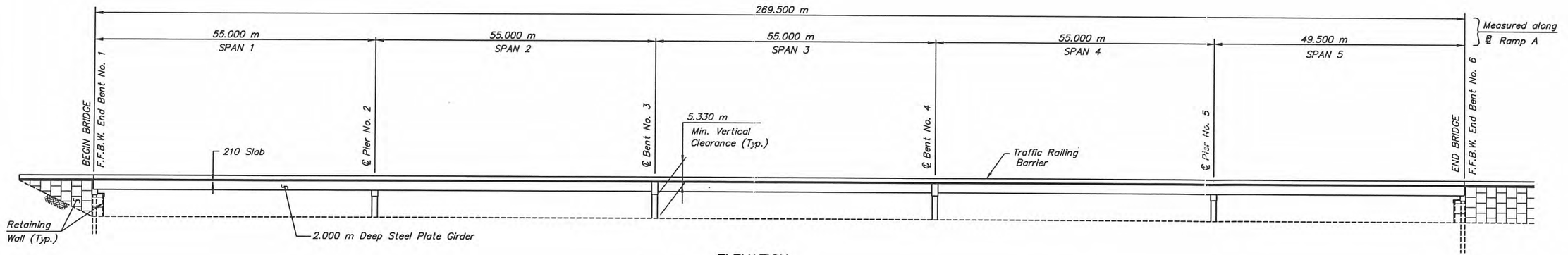
I-4/LAKE AVENUE
LAKE AVE. OVER I-4

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 12B-01.DWG.DWG DATE: APR 06, 1999 TIME: 1:58 PM REV. BY: RLG

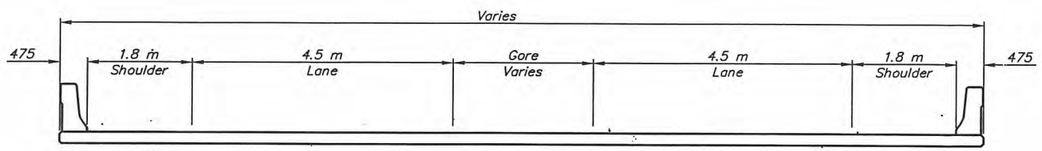
STATE PROJ. NO.	SHEET NO.



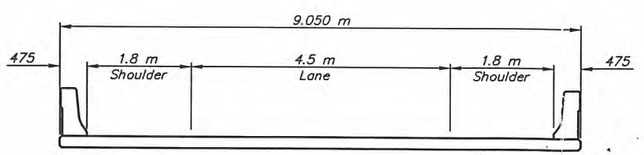
PLAN



ELEVATION



SECTION A–A



SECTION B–B

EXHIBIT 9–28

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

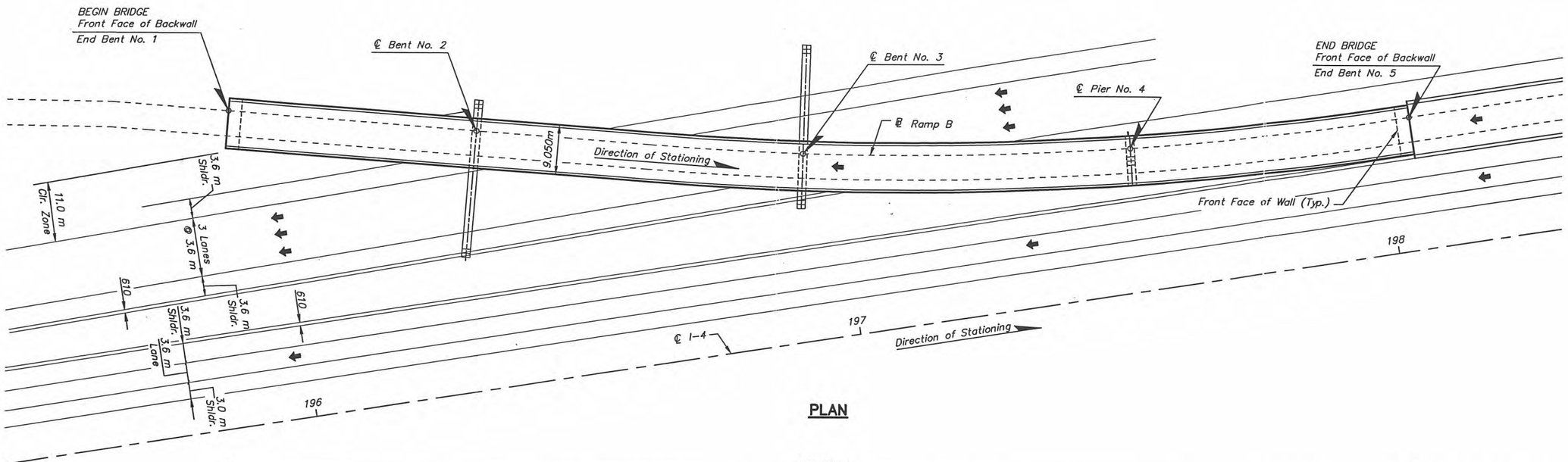
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

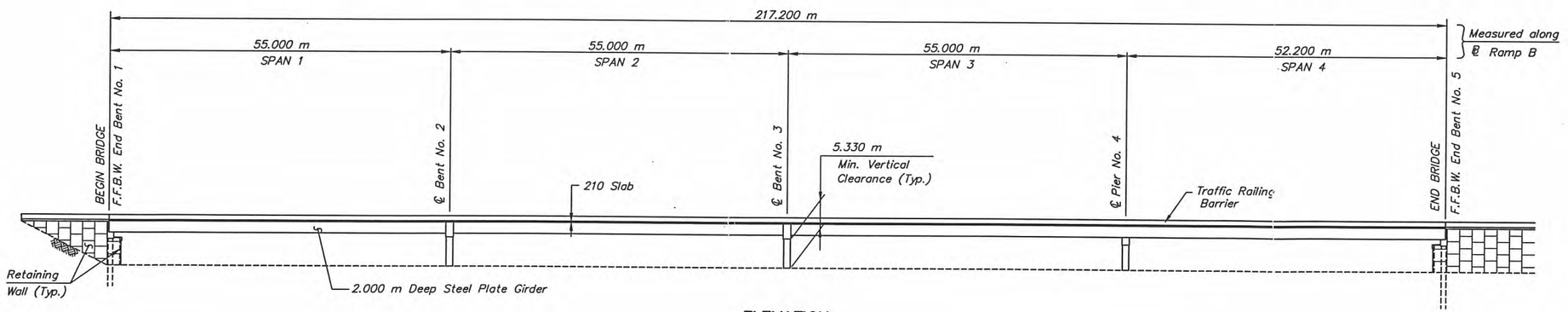
I–4/LAKE AVE.
HOV DIRECT CONNECT RAMP (RAMP A)

XREF: M:\2443\BORDER\BOR-03.DWG
NAME: M:\2443\FINAL DRAWINGS\
NAME: 13B-01.DWG DATE: APR 05, 1999 TIME: 7:25 AM REV. BY: RLG

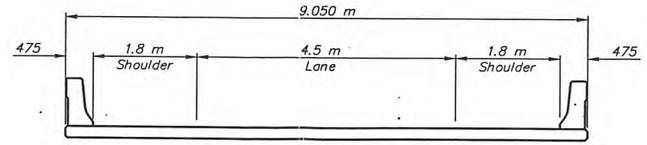
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

EXHIBIT 9-29

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

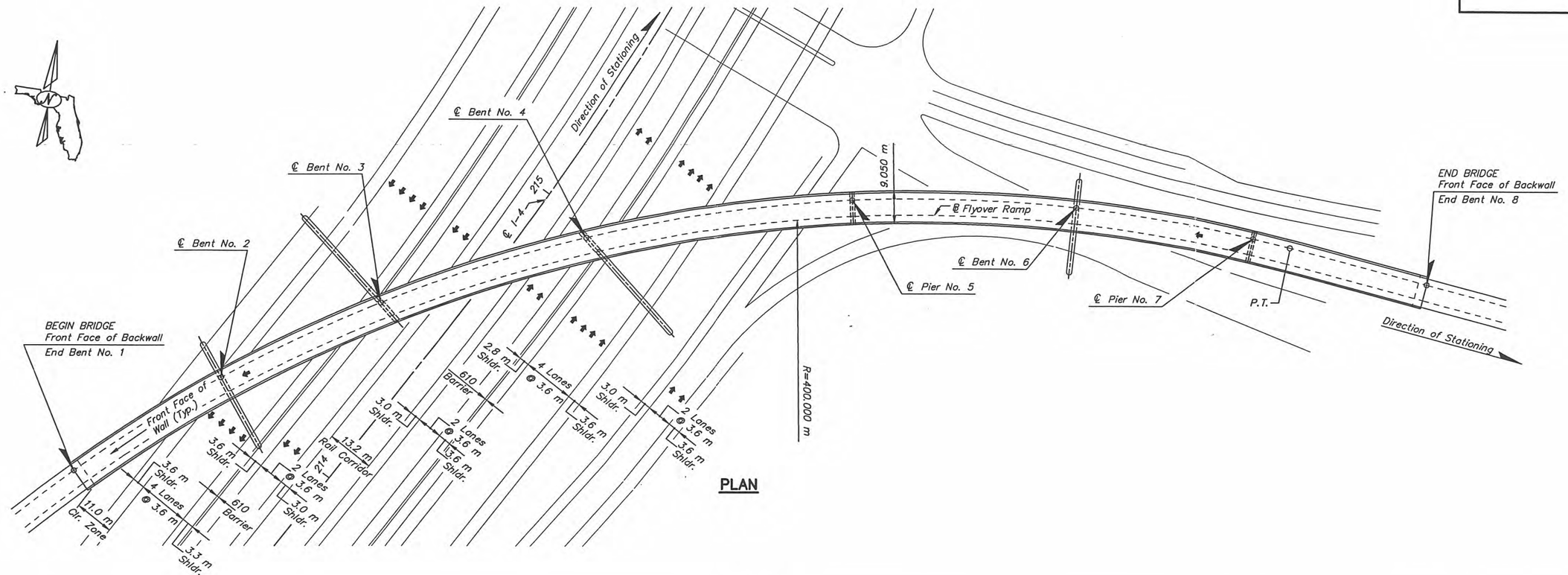
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

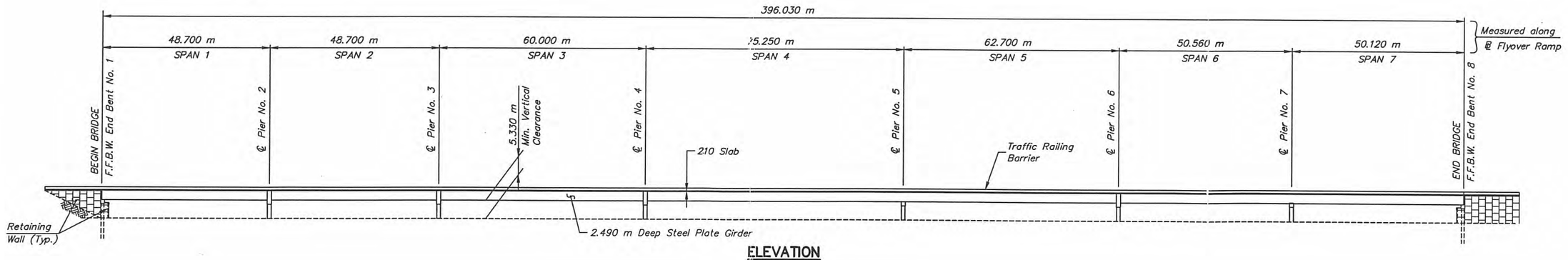
I-4/LAKE AVE.
HOV DIRECT CONNECT RAMP (RAMP B)

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 13B-02.DWG DATE: JUL 14, 1998 TIME: 10:07 AM REV. BY: RLG

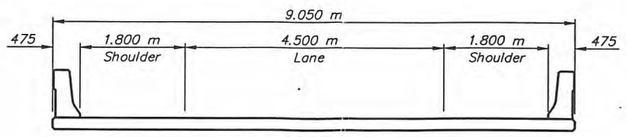
STATE PROJ. NO.	SHEET NO.



PLAN



ELEVATION



SECTION

EXHIBIT 9-30

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

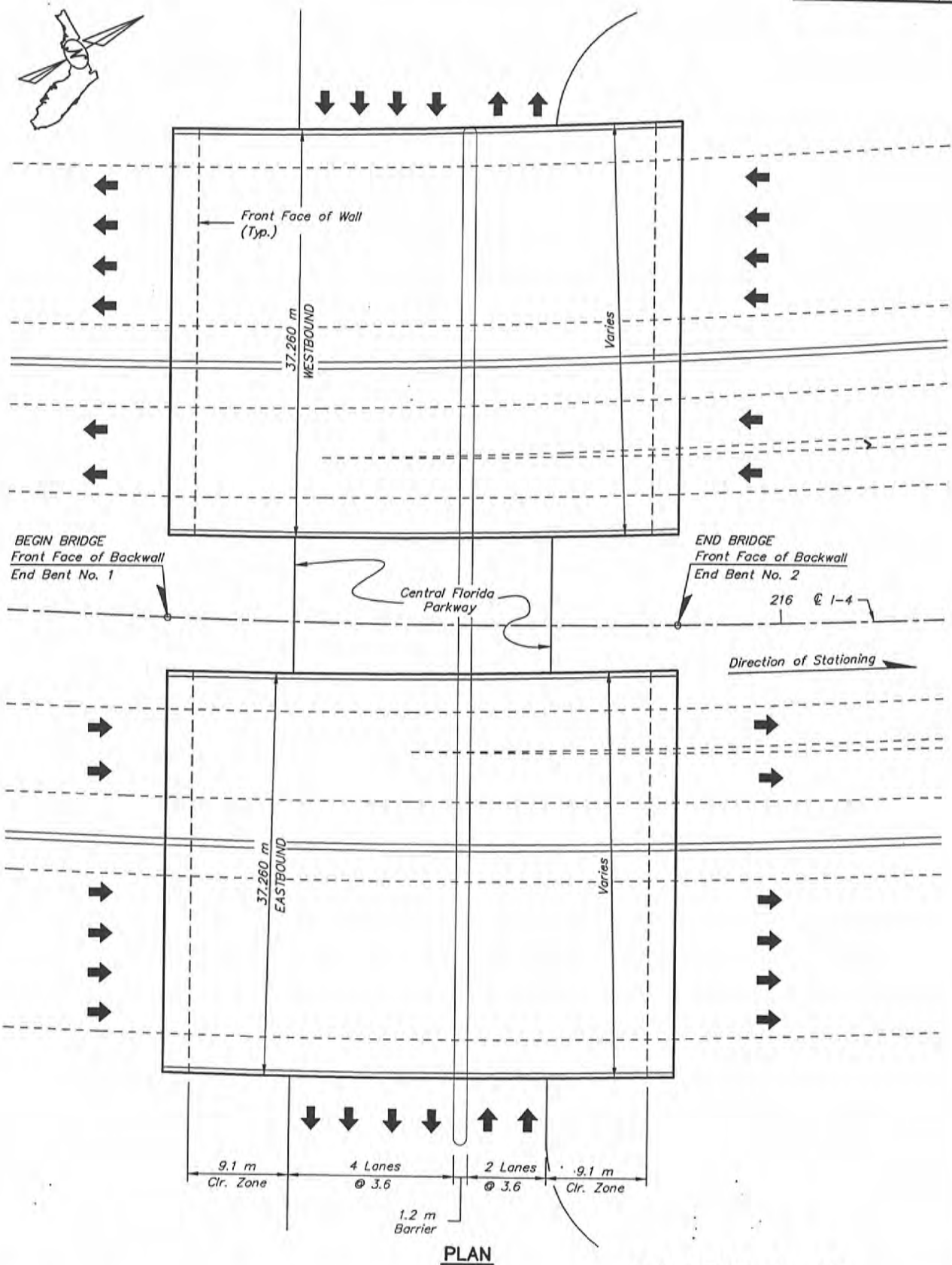
HNTB ARCHITECTS ENGINEERS PLANNERS

FLORIDA DEPARTMENT OF TRANSPORTATION

I-4/CENTRAL FLORIDA PARKWAY FLYOVER RAMP

XREF: M:\24434\BORDER\BOR-03.DWG
NAME: M:\24434\FINAL DRAWINGS\
NAME: 14A-01.DWG DATE: JUL 14, 1998 TIME: 10:09 AM REV. BY: RLG

STATE PROJ. NO.	SHEET NO.



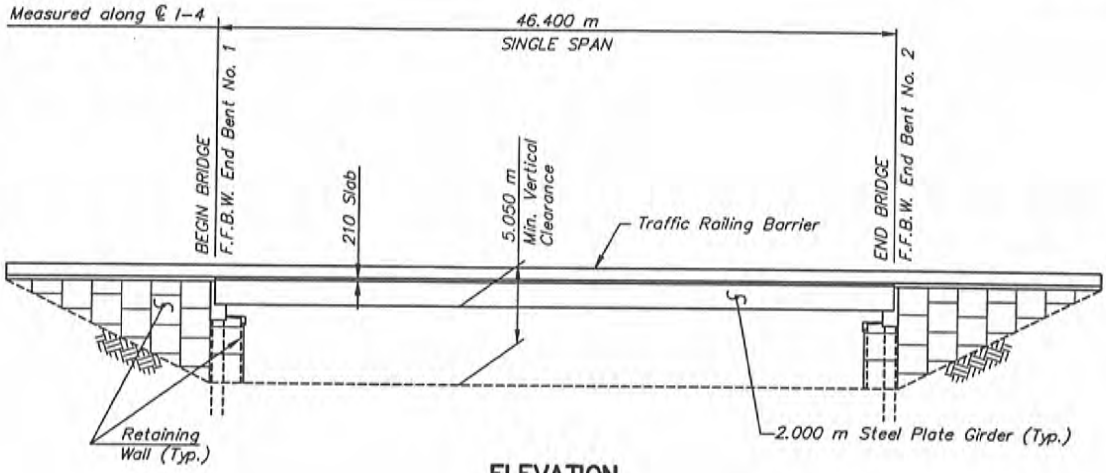
PLAN

EXHIBIT 9-31

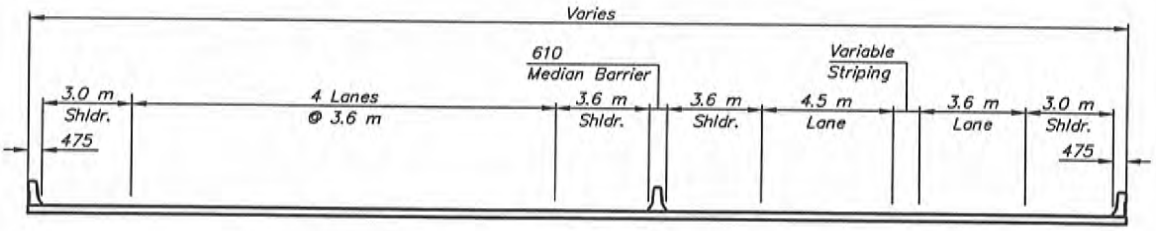
XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 14A-02A.DWG DATE: JUL 14, 1998 TIME: 10:10 AM REV. BY: RLG

HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I-4/CENTRAL FLORIDA PARKWAY I-4 W.B. & E.B. OVER CENTRAL FLA. PKWY.

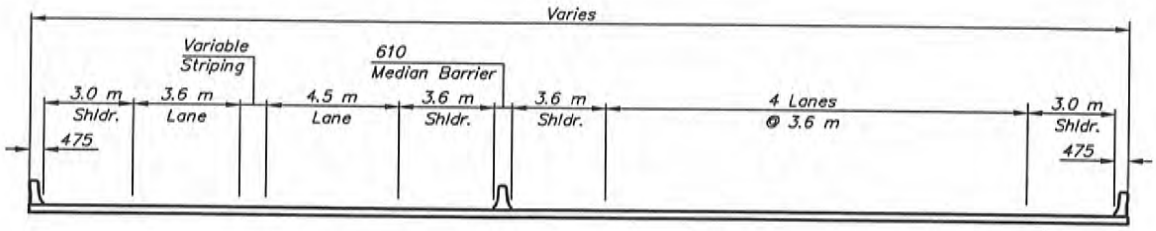
STATE PROJ. NO.	SHEET NO.



ELEVATION



WESTBOUND



EASTBOUND

SECTION

EXHIBIT 9-32

HNTB ARCHITECTS ENGINEERS PLANNERS	FLORIDA DEPARTMENT OF TRANSPORTATION	I-4 CENTRAL FLORIDA PARKWAY I-4 W.B. & E.B. OVER CENTRAL FLA. PKWY.

XREF: M:\24434\BORDER\BOR-04.DWG
NAME: M:\24434\FINAL DRAWINGS
NAME: 14A-02B.DWG DATE: JUL 14, 1998 TIME: 10:11 AM REV. BY: RLG

9.20.2 Western Beltway Ramps over I-4

The Preferred Build Alternative under consideration would utilize three span bridge to carry the Western Beltway Ramp C over I-4 (in the vicinity of Station 32+12.77± along I-4). The bridge is proposed to carry a total of one 4.500 m (15 ft.) traffic lane and two 1.800 m (6 ft.) shoulders. The proposed length for the bridge is 117.200 m (385 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 m (8 in.) reinforced concrete slab and 2.000 m deep steel plate girder with the following span lengths: Span 1 = 27.700 m (90.8 ft.), Span 2 = 50.900 m (167.0 ft.), Span 3 = 38.600 m (126.6 ft.). The total bridge surface area is 1,069.5 square meters, (11,512.0 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $866,295. Exhibit 9-4 illustrates the plan and elevation for this structure.

The Preferred Build Alternative under consideration would utilize four span bridge to carry the Western Beltway Ramp B over I-4 (in the vicinity of Station 33+41.44± along I-4). The bridge is proposed to carry a total of two 3.600 m (12 ft.) traffic lanes and two 3.000 m (10 ft.) shoulders. The proposed length for the bridge is 141.600 m (464.6 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 m (8 in.) reinforced concrete slab and 2.000 m deep steel plate girder with the following span lengths: Span 1 = 30.900 m (101.4 ft.), Span 2 = 37.900 m (124.4 ft.), Span 3 = 45.700 m (150.0 ft.), and Span 4 = 27.100 m (89.0 ft.). The total bridge surface area is 1,990.2 square meters, (21,422.3 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $1,612,062. Exhibit 9-5 illustrates the plan and elevation for this structure.

9.20.3 E. B. Direct Connect Ramp over I-4

The Preferred Build Alternative under consideration would utilize four span bridge to carry the eastbound direct connect ramp over I-4 (in the vicinity of Station 51+75.00± along I-4). The bridge is proposed to carry a 4.500 m (15.0 ft.) lane of traffic and two 1.800 m (6.0 ft.) shoulders. It has a radius of 584.500 m (1,917.7 ft.) measured along the baseline. The proposed bridge length is 225.600 m (740.2 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.) over I-4. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girder with four equal spans of 56.400 m (185.0 ft.). The total bridge surface area is 2,036 square meters (21,915 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $1,649,160. Exhibit 9-6 illustrates the plan and elevation for this structure.

9.20.4 I-4 W. B. & E. B. over Reedy Creek and E. B. Direct Connect Ramp over Reedy Creek

The Preferred Build Alternative under consideration would utilize six span twin bridge to carry I-4 over Reedy Creek (in the vicinity of Station 56+50.00± along I-4). The westbound bridge is proposed to carry five 3.600 m (12 ft.) general use travel lanes, two 3.600 m (12 ft.) HOV lanes, 0.610 m (2 ft.) median, 3.600 m (12 ft.) inside shoulders, and 3.000 m (10 ft.) outside shoulders. The eastbound bridge is proposed to carry a total of five 3.600 m (12 ft.) general use travel lanes, one 3.600 m (12 ft.) HOV lane, 0.610 m (2 ft.) median, 3.600 m (12 ft.) inside shoulders, and 3.000 m (10 ft.) outside shoulders. The proposed length for the bridge is 180.000 m (590.6 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type V girders with a span arrangement of six equal spans of 30.000 m (98.4 ft.). The total bridge surface area is 16,034 square meters (172,589 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $12,987,540. Exhibits 9-7 and 9-8 illustrate the plan and elevation for this structure.

The Preferred Build Alternative under consideration would also utilize six span bridge to carry eastbound direct connect ramp over Reedy Creek (in the vicinity of Station 56+50.00± along I-4). The bridge is proposed to carry a 4.500 m (15 ft.) traffic lane and two 1.800 m (6 ft.) shoulders. The proposed length for the bridge is 180.000 m (590.4 ft.). The superstructure and span lengths are similar to the ones of I-4 over Reedy Creek. The total bridge surface area is 1,636 square meters. Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $1,325,160. Exhibits 9-7 and 9-8 illustrate the plan and elevation for this structure.

9.20.5 I-4/U.S. 192 - Ramp Bridge A Flyover

The Preferred Build Alternative under consideration would utilize a twelve-span bridge to carry the ramp over I-4 and U.S. 192 (in the vicinity of Station 103+00.00± along I-4). The bridge is proposed to carry two 3.600 m (12.0 ft.) traffic lanes, one 1.800 m (6.0 ft.) inside shoulder, and one 3.000 m (10.0 ft.) outside shoulder. The total bridge length is 606.145 m (1988.7 ft.) with a minimum vertical clearances of 5.330 m (17.5 ft.) over I-4 and 5.050 m (16.6 ft.) over U.S. 192. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.690 m (106 in.) deep steel plate girders with the following span lengths: Span 1 = 50.000 m (164.0 ft.), Span 2 = 38.000 m (124.7 ft.), Span 3 = 33.290 m (109.2 ft.), Span 4 = 30.490 m (100.0 ft.), Span 5 = 47.785 m (156.8 ft.), Span 6 = 71.490 m (234.5 ft.), Span 7 = 79.000 m (259.2 ft.), Span 8 = 80.620 m (264.5 ft.), Span 9 = 57.380 (188.3 ft.), Span 10 = 50.500 m (165.7 ft.), Span 11 = 30.000 m (98.4 ft.), and Span 12 = 37.590 m (123.3 ft.). The total bridge surface area is 8,215 square meters (88425.0 sq. ft.). Using a unit cost of $910.00 per square meter (due to very long span), the estimated total construction cost for this structure is $7,475,650. Exhibit 9-9 illustrates the plan and elevation for this structure.

9.20.6 I-4/U.S. 192 - E. B. Ramp over I-4

The Preferred Build Alternative under consideration would utilize five span bridge to carry the U.S. 192 eastbound ramp over I-4 (in the vicinity of Station 104+25.00± along I-4). The bridge is proposed to carry a total of three 3.600 m (12 ft.) traffic lanes and two 3.000 m (10 ft.) shoulders. The proposed length for the bridge is 172.900 m (567.3 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders with the following span lengths: Span 1 = 40.500 m (132.9 ft.), Span 2 = 32.800 m (107.6 ft.), Span 3 = 45.400 m (149.0 ft.), Span 4 = 27.400 m (89.9 ft.) and Span 5 = 26.860 m (88.1 ft.). The total bridge surface area is 3,240 square meters (34,875 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $2,624,400. Exhibit 9-10 illustrates the plan and elevation for this structure.

9.20.7 U.S. 192 over I-4

The Preferred Build Alternative under consideration would utilize seven span bridge to carry U.S. 192 over I-4 (in the vicinity of Station 105+75.00± along I-4). The bridge is proposed to carry a total of four 3.600 m (12 ft.) traffic lanes, 1.200 m (4 ft.) median, 3.000 m (10 ft.) inside and outside shoulders. The proposed length for the bridge is 233.500 m (766.1 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.) over I-4. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders with the following span lengths: Span 1 = 35.400 m (116.1 ft.), Span 2 = 33.700 m (110.6 ft.), Span 3 = 32.800 m (107.6 ft.), Span 4 = 45.300 m (148.6 ft.), Span 5 = 26.900 m (88.3 ft.), Span 6 = 21.200 m (69.6 ft.) and Span 7 = 38.200 m (125.3 ft.). The total bridge surface area is 6,668 square meters (71,774 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $5,401,080. Exhibit 9-11 illustrates the plan and elevation for this structure.

9.20.8 I-4/U.S. 192 - W. B. Ramp over I-4

The Preferred Build Alternative under consideration would utilize five span bridge to carry the U.S. 192 westbound ramp over I-4 (in the vicinity of Station 106+50.00± along I-4). The bridge is proposed to carry a total of three 3.600 m (12.0 ft.) traffic lanes and two 3.000 m (10.0 ft.) shoulders. The proposed length for the bridge is 165.000 m (541.3 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders with the following span lengths: Span 1 = 39.700 m (130.2 ft.), Span 2 = 31.700 m (104.0 ft.), Span 3 = 43.400 m (142.4 ft.), Span 4 = 25.900 m (85.0 ft.) and Span 5 = 24.300 m (79.7 ft.). The total bridge surface area is 3,144 square meter (33,842 sq. ft.). Using a unit cost of $810.00 per square meters, the estimated total construction cost for this structure is $2,546,640. Exhibit 9-12 illustrates the plan and elevation for this structure.

9.20.9 I-4 E. B. Aerial CD Road Between U.S. 192 and Osceola Parkway

The Preferred Build Alternative under consideration would utilize a twenty-four span bridge to carry the East Bound Aerial CD Road over the East Bound I-4 on-ramp (in the vicinity of Station 109+50.00± to 120+00.00±). The bridge is proposed to carry one 4.500 m (15 ft.) travel lane and 1.800 m (6 ft.) shoulders. The proposed bridge length is 1045.000 m (3428.5 ft.) with a minimum vertical clearance of 5.50 m (18.0 ft.) over I-4 Ramp. The superstructure is composed of a 200 mm (8 in.) reinforced concrete slab and 1.900 m (75 in.) deep steel plate girders with the following span lengths: Spans 1 to 6 = 45.000 m (147.6 ft.), Span 7 to 13 = 40.000 m (131.2 ft.), and Span 14 to 24 = 45.000 m (147.6 ft.). The total bridge surface area is 9,500 square meters (102,257 sq. ft.). Using a unit cost of $910.00 per square meter due to extra long bridge, the estimated total construction cost for this structure is $8,645,000. Exhibit 9-13 illustrates the plan and elevation for this structure.

9.20.10 Ramp I-4 E. B. (Ramp D) to Osceola Parkway over Bonnet Creek

The Preferred Build Alternative under consideration would utilize two span bridge to carry I-4 eastbound ramp over Bonnet Creek. The bridge is proposed to carry a 4.500 m (15 ft.) traffic lane and two 1.800 m (6 ft.) shoulders. The proposed length for the bridge is 45.400 m (149.0 ft.) with a minimum vertical clearance of 2.667 m (8.75 ft.) over the NHW level. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type III girders with a span arrangement of two equal spans of 22.700 m (74.5 ft.). Rubble riprap is used along the slopes of the creek to prevent scouring. The total bridge surface area is 411 square meters. Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $332,910. Exhibit 9-14 illustrates the plan and elevation for this structure.

9.20.11 I-4 W. B. & E. B. over Bonnet Creek

The Preferred Build Alternative under consideration would utilize two span twin bridge to carry I-4 over the Bonnet Creek. The proposed westbound and eastbound bridges will have the same typical section consisting of four 3.600 m (12 ft.) main travel lanes and one 3.600 m (12 ft.) HOV lane separating by a 0.610 m (2 ft.) median, 3.600 m (12 ft.) inside shoulders, and 3.000 m (10 ft.) outside shoulders. Each proposed bridge will provide 32.760 m (107.5 ft.) of total deck width. The proposed length for the bridge is 46.340 m (152 ft.) with a minimum vertical clearance of 2.000 m (6.6 ft.) above the seasonal high water level. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type III girders with two equal span lengths: Span 1 = Span 2 = 23.170 m (76 ft.). The total bridge surface area is 3,036 square meters (33,842 sq. ft.). Using a unit cost of $810.00 per square meters, the estimated total construction cost for this structure is $2,459,160. Exhibits 9-15 and 9-16 illustrate the plan and elevation for this structure.

9.20.12 Ramp I-4 W.B. Exit to Osceola Parkway over S.R. 536 Entrance Ramp

The Preferred Build Alternative under consideration would result in the widening of the existing two span bridge to carry the I-4 Western Beltway Exit Ramp over S.R. 536 Entrance Ramp (in the vicinity of Station 133+80.00± along I-4). The proposed bridge provides 17.750 m (58.2 ft.) of total deck width and has a typical section consisting of three 3.600 m (12.0 ft.) traffic lanes, 3.0 m (10.0 ft.) shoulder, and 1.8 m (6.0 ft.) shoulder. The bridge will be widened about 2.310 m (7.6 ft.) on both outside shoulders. The superstructure of the widening will match the one of the existing bridge which is composed of a 210 m (8 in.) reinforced concrete slab and AASHTO Type V Prestressed Beams. The total bridge length is 67.056 m (220 ft.) measured along base line of I-4 Exit Ramp with equal span lengths: Span 1 = Span 2 = 33.528 m (110.0 ft.). The total bridge widened surface area is 309.9 square meters, (3,335.7 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $251,019. Exhibit 9-17 illustrate the plan and elevation for this structure.

9.20.13 I-4/S.R. 536 - Ramp Bridge A over I-4

The Preferred Build Alternative under consideration would utilize five span bridge to carry I-4/S.R.536 Ramp Bridge A over I-4 (in the vicinity of Station 140+57.72± along I-4). The bridge is proposed to carry a total of two 3.600 m (12 ft.) traffic lanes, one 3.000 m (10 ft.) shoulder, and one 1.8 m (6.0 ft.). The proposed length for the bridge is 161.100 m (528.6 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 m (8 in.) reinforced concrete slab and Florida Bulb-T 72 Beams with the following span lengths: Span 1 = 26.2 m (86.0 ft.), Span 2 = 37.000 m (121.4 ft.), Span 3 = 35.500 m (116.5 ft.), Span 4 = 32.400 m (106.3 ft.) and Span 5 = 30.000 m (98.4 ft.). The total bridge surface area is 2,083.2 square meters, (22,423.4 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $1,687,392. Exhibit 9-18 illustrates the plan and elevation for this structure.

9.20.14 S.R. 536 over I-4

The Preferred Build Alternative under consideration would utilize five span twin bridges to carry S.R. 536 over I-4 (in the vicinity of Station 144+50.00± along I-4). The westbound bridge is proposed to carry a total of four 3.600 m (12 ft.) traffic lanes and two 3.000 m (10 ft.) shoulders. The eastbound bridge is proposed to carry a total of three 3.600 m (12 ft.) traffic lanes and two 3.000 m (10 ft.) shoulders. The proposed length for the bridge is 146.100 m (479.3 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type V girders with the following span lengths: Span 1 = 32.000 m (105.0 ft.), Span 2 = 29.100 m (95.5 ft.), Span 3 = 35.600 m (116.8 ft.), Span 4 = 28.800 m (94.5 ft.) and Span 5 = 20.600 m (67.6 ft.). The total bridge surface area is 5,755 square meters

(61,946 sq. ft.). Using a unit cost of $810.00 per square meters, the estimated total construction cost for this structure is $4,661,550. Exhibit 9-19 illustrates the plan and elevation for this structure.

9.20.15 I-4/S.R. 536 - Ramp Bridge B over S.R. 536

The Preferred Build Alternative under consideration would utilize two span bridge to carry the Ramp Bridge B over S.R. 536 (in the vicinity of Station 144+50.00± along I-4). The bridge is proposed to carry a 4.500 m (15.0 ft.) traffic lane and two 1.800 m (6.0 ft.) shoulders. The proposed length for the bridge is 60.9 m (199.8 ft.) with a minimum vertical clearance of 5.050 m (16.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type V girders with the following span lengths: Span 1 = 30.700 m (100.7 ft.) and Span 2 = 30.200 m (99.1 ft.). The total bridge surface area is 552 square meters (5,942 sq. ft.). Using a unit cost of $810.00 per square meters, the estimated total construction cost for this structure is $447,120. Exhibit 9-20 illustrates the plan and elevation for this structure.

9.20.16 I-4/S.R. 536 - Ramp Bridge C over I-4

The Preferred Build Alternative under consideration would utilize one span bridge (in the vicinity of Station 147+50.00± along I-4). The bridge is proposed to carry a 4.500 m (15.0 ft.) traffic lane and two 1.800 m (6.0 ft.) shoulders. The proposed length for the bridge is 27.700 m (90.9 ft.) with a minimum vertical clearance of 5.050 m (16.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type IV girders. The total bridge surface area is 125 square meters (1,345 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $101,250. Exhibit 9-21 illustrates the plan and elevation for this structure.

9.20.17 I-4/S.R. 536 - HOV Direct Connect Ramp (Ramp D)

The Preferred Build Alternative under consideration would utilize three span bridge to carry Ramp D over the general use lanes of I-4 (in the vicinity of Station 151+00.00± along I-4). The bridge is proposed to carry two traffic lanes, both 4.500 m (15.0 ft.), at the End Bent No. 1 and will merge into one lane of 3.600 m (12.0 ft.) at the End Bent No. 2. The 1.800 m (6 ft.) shoulders are maintained along both sides of the bridge. The proposed length for the bridge is 177.900 m (583.7 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (80 in.) deep steel plate girders with a span arrangement of three equal spans of 59.300 m (194.6 ft.). The total bridge surface area is 2,039 square meters (21,948 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $1,651,590. Exhibit 9-22 illustrates the plan and elevation for this structure.

9.20.18 I-4/S.R. 536 - HOV Direct Connect Ramp (Ramp E)

The Preferred Build Alternative under consideration would utilize five span bridge to carry Ramp E over the general use lanes of I-4 (in the vicinity of Station 151+25.00± along I-4). The bridge is proposed to carry one 4.500 m (15.0 ft.) traffic lane at End Bent No. 6 and expands at End Bent No. 1 to carry two 4.500 m (15 ft.) lanes. The 1.800 m (6 ft.) shoulders are maintained along both sides of the bridge. The proposed length for the bridge is 280.000 m (918.6 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.080 m (82 in.) deep steel plate girders with the following span lengths: Span 1 = 50.000 m (164.0 ft.), Span 2 = 58.000 m (190.3 ft.), Span 3 = 62.000 m (203.4 ft.), Span 4 = 59.000 m (193.600 ft.), and Span 5 = 51.000 m (167.3 ft.). The total bridge surface area is 3,225 square meters (34714 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $2,612,250. Exhibit 9-23 illustrates the plan and elevation for this structure.

9.20.19 I-4 W. B. & E. B. over S.R. 535 Widening

The Preferred Build Alternative under consideration would result in the widenings of the existing two span twin bridge to carry the I-4 over the S.R. 535. The total deck surface from gutter to gutter of the proposed westbound bridge varies from 29.160 m (95.7 ft.) to 32.760 m (107.5 ft.) and have a typical section consisting of four 3.600 m (12.0 ft.) travel lanes, one varying auxiliary lane, 0.610 m (2.0 ft.) median, 3.600 m (12.0 ft.) inside shoulders, and 3.000 m (10 ft.) outside shoulders. The westbound widening will vary approximately from 13.947 m (45.8 ft.) to 16.140 m (53.0 ft.). The proposed eastbound bridges provides 29.160 m (95.7 ft.) of total deck width having a typical section consisting of four 3.600 m (12.0 ft.) travel lanes, 0.610 m (2.0 ft.) median, 3.600 m (12.0 ft.) inside shoulders, and 3.000 m (10.0 ft.) outside shoulders. The eastbound widening will be approximately 5.226 m (17.1 ft.). The superstructure of the widenings will match the one of the existing bridge which is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type V Prestressed Beams. The total bridge length is 63.400 m (208.0 ft.) measured along center line of I-4 with the following span lengths: Span 1 = 35.300 m (115.8 ft.) and Span 2 = 28.100 m (92.2 ft.). The total bridge widened surface area is 1,223 square meter. Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $990,630. Exhibits 9-24 and 9-25 illustrate the plan and elevation for this structure.

9.20.20 I-4/S.R. 535 - Loop Ramp over S.R. 535

The Preferred Build Alternative under consideration would utilize two-span bridge to carry the loop ramp over the S.R. 535 (in the vicinity of Station 168+75.00± along I-4). The bridge is proposed to carry one 4.500 m (15.0 ft.) lane of traffic and two 1.800 m (6.0 ft.) shoulders. The proposed length for the bridge is 63.400 m (208.0 ft.) with a minimum vertical clearance of 5.050 m (16.5 ft.) over S.R. 535. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and AASHTO Type V Prestressed Beams with the following span lengths: Span 1 = 35.300 (115.8 ft.), Span 2 = 28.100 m (92.2 ft.).

The total bridge surface area is 574 square meters (6,178 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $464,940. Exhibit 9-26 illustrates the plan and elevation for this structure.

9.20.21 I-4/Lake Avenue - Lake Avenue over I-4

The Preferred Build Alternative under consideration would utilize three span bridge to carry Lake Avenue over I-4 (in the vicinity of Station 185+25.00± along I-4). For both the eastbound and westbound directions, the bridge carries two 3.600 m (12 ft.) through lanes, one 4.800 m (16 ft.) outside through lane, and a sidewalk to the outside. In addition, the westbound direction carries a variable width right turn lane. The wider outside through lanes accommodate bicycle traffic. Both eastbound and westbound travelways are separated by a 6.700 m (22 ft.) median, which accommodates a 3.600 m (12 ft.) left turn lane for each direction along a portion of the structure. The alignment of Lake Avenue over this crossing follows a tangent line with End Bent Nos. 1 and 4 having the same skew angle. The proposed bridge length is 150.800 m (494.8 ft.) with a vertical clearance of 5.330 m (17.5 ft.) over I-4. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.180 m (86 in.) deep steel plate girders with the following span lengths: Span 1 = 66.080 m (216.8 ft.), Span 2 = 43.970 m (144.3 ft.) & Span 3 = 40.750 m (133.7 ft.). The total bridge surface area is 5,400 square meters. Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $4,374,000. Exhibit 9-27 illustrates the plan and elevation for this structure.

9.20.22 I-4/Lake Avenue - HOV Direct Connect Ramp (Ramp A)

The Preferred Build Alternative under consideration would utilize five span bridge to carry the Ramp A over the general use travel lanes of I-4 (in the vicinity of Station 196+50.00± along I-4). Along the first span, the bridge is proposed to carry two 3.600 m (12 ft.) travel lanes, a varied gore, and 1.800 m (6.0 ft.) shoulders. Along the Span Numbers 2, 3, 4 and 5, the bridge is proposed to carry one 4.500 m (15 ft.) travel lane and 1.800 m (6 ft.) shoulders. The proposed bridge length is 269.500 m (884.2 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.) over I-4. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders with the following span lengths: Spans 1 through 4 of 55.000 m (180.4 ft.) and Span 5 = 49.500 m (162.4 ft.). The total bridge surface area is 2,791 square meters (30,042 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $2,260,710. Exhibit 9-28 illustrates the plan and elevation for this structure.

9.20.23 I-4/Lake Avenue - HOV Direct Connect Ramp (Ramp B)

The Preferred Build Alternative under consideration would utilize four span bridge to carry the Ramp B over the general use travel lanes of I-4 (in the vicinity of Station 197+00.00± along I-4). The bridge is proposed to carry one 4.500 m (15 ft.) travel lane and 1.800 m (6 ft.) shoulders. The proposed bridge length is 217.20 m (712.6 ft.) with a

minimum vertical clearance of 5.330 m (17.5 ft.) over I-4. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders with the following span lengths: Spans 1 through Span 3 = 55.000 m (180.4 ft.) and Span 4 = 52.200 m (171.3 ft.). The total bridge surface area is 1,966 square meters (21,162 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $1,592,460. Exhibit 9-29 illustrates the plan and elevation for this structure.

9.20.24 I-4/Central Florida Parkway - Flyover Ramp

The Preferred Build Alternative under consideration would utilize seven span bridge to carry the Central Florida Parkway Flyover Ramp over the I-4 (in the vicinity of Station 215+00.00± along I-4). The bridge is proposed to carry one 4.500 m (15 ft.) travel lane and 1.800 m (6 ft.) shoulders. It has a radius of 400.0 m (1312.3 ft.) measured along the baseline The proposed bridge length is 396.030 m (1299.3 ft.) with a minimum vertical clearance of 5.330 m (17.5 ft.) over I-4. The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.490 m (98 in.) deep steel plate girders with the following span lengths: Spans 1 and 2 = 48.700 m (159.8 ft.), Span 3 = 60.000 m (196.9 ft.), Span 4 = 75.250 m (246.9 ft.), Span 5 = 62.700 m (205.7 ft.), Span 6 = 50.560 m (165.9 ft.), and Span 7 = 50.120 m (164.4 ft.). The total bridge surface area is 3,564 square meters (38,363 sq. ft.). Using a unit cost of $910.00 per square meter due to extra long spans, the estimated total construction cost for this structure is $3,243,240. Exhibit 9-30 illustrates the plan and elevation for this structure.

9.20.25 I-4 W. B. & E. B. over Central Florida Parkway

The Preferred Build Alternative under consideration would utilize single span twin bridges to carry the I-4 over Central Florida Parkway (in the vicinity of Station 215+75.00± along I-4). Both westbound and eastbound bridges are proposed to carry four 3.600 m (12 ft.) general use travel lanes, 3.600 m (12 ft.) and 4.500 m (15 ft.) HOV lanes separated by a variable striping, 0.610 m (2 ft.) median, 3.600 m (12 ft.) inside shoulders, and 3.000 m (10 ft.) & 1.800 m (6 ft.) inside shoulders. The proposed bridge length is 46.400 m (152.2 ft.) with a vertical clearance of 5.050 m (16.5 ft.). The superstructure is composed of a 210 mm (8 in.) reinforced concrete slab and 2.000 m (79 in.) deep steel plate girders. The total bridge surface area is 3,427 square meters (36,888 sq. ft.). Using a unit cost of $810.00 per square meter, the estimated total construction cost for this structure is $2,775,870. Exhibits 9-31 and 9-32 illustrate the plan and elevation for this structure.

9.21 Special Features

As described previously, the proposed improvements to I-4 Section 1 include barrier separated special use/HOV lanes. This facility will allow trips to travel from Tampa or Lakeland to Walt Disney World via the special use lanes without contending with general

use lane turbulence near interchanges or local freeway traffic. This facility will also allow traffic heading to the Orlando International Airport, the east side of Orlando, the east coast, and bypass traffic to access the Central Florida Greeneway (S.R. 417) without traveling through congested general use lanes. For tourists or others with three or more occupants, the facility allows traffic from the southwest to continue in the HOV lanes east of World Drive to downtown Orlando or points northeast. Commuters, tourists, or others with three or more occupants may use the HOV facility throughout the resort area or the Orlando metropolitan area.

The barrier separated facility provides a true commitment to HOV within the area. As explained in section 9.18 of this report, use of the barrier separated HOV lanes by accident diversion traffic can be limited to only major accidents. This creates the perception that the HOV lane is a *premium* facility where travel times are almost always *guaranteed.* This perception will likely help to increase HOV ridership.

Enforcement of the HOV lanes is an key issue and important to success of this project. Mainline enforcement areas and ramp enforcement pads are planned where grade separated access points are used. This will make enforcement for the barrier HOV simpler than the buffer HOV. Comments received from local law enforcement has been favorable toward this treatment.

The barrier separated HOV lanes also have other advantages such as the ability to have control of volumes and violations and the ability to use the lane for a potentially large number of uses, such as for special event traffic. Access to the HOV lanes within Section 1 is provided by several at-grade slip ramps and direct connect flyover ramps. HOV access details were developed for this project and are shown in the appendix.

Since significant residential development is planned near the I-4/Lake Avenue interchange, a 1.5 acre park and ride lot has been located there, as part of the Preferred Build Alternative, to serve the HOV travel demand to/from the northeast along I-4. The lot size was determined based on the volume of HOV traffic accessing the HOV lanes at Lake Avenue and information from other studies. This information helped to estimate the proportion of carpools which contain family members and the portion of carpools forming from adjacent park and ride lots. Since most of the land uses within Section 1 are destination arrivals, other park and ride facilities will be northeast of the Section 1 study area closer to residential areas.

9.22 Access Management

Access management is the practice of controlling vehicular access to a roadway in order to increase roadway efficiency and improve travel safety by reducing the number of traffic conflicts encountered by roadway users. The State Highway System Access Management Act (335.18 F.S.) mandates the implementation of access management

standards based on the Access Management Classification System developed in Administrative Rule 14-97. I-4 has been identified as Access Management Class 1 under this system.

Property access impacts were evaluated to determine whether access can be maintained in interchange areas via the local roadway network. Meetings were conducted with some property owners regarding property access. The only impacted development where access may be restricted due to the recommended improvements is the Embassy Suites Hotel, which is located in the southwest quadrant of the proposed I-4/Lake Avenue interchange. This issue was discussed with the FDOT Access Management Committee.

The Embassy Suites Hotel currently has two full access driveways on Lake Avenue. FDOT right-of-way estimates are that this is a $62 million parcel. The two parcels shown on the aerial photography as vacant in the southeast quadrant of the Lake Avenue/Palm Parkway intersection are under construction with two new hotels. Access to Embassy Suites cannot be provided through these new hotel sites. Further, Turkey Lake Road is under construction to be extended southward from Central Florida Parkway to Palm Parkway. This will create a major intersection of Palm Parkway/Turkey Lake Road with Lake Avenue. The next intersection to the east will be the ramp terminal intersection on the west side of the Lake Avenue interchange. Access management will not allow an additional full access location between these two intersections. Therefore, driveway access is being considered directly opposite the I-4 westbound ramps/Lake Avenue intersection. Without a driveway at this intersection, the only access that could be provided is a right-in/right-out driveway. This will cause significant business damages to the Embassy Suite Hotel resulting in extremely expensive right-of-way costs. Further, it will impact the traffic operations of the interchange by forcing all traffic exiting the site destined to either I-4 westbound or local access west of I-4 to U-turn within the interchange area. The Department requests further consideration by FHWA to this break in access, and believes the design concept as shown is a reasonable compromise, balancing traffic operations and cost issues. Further consideration should be given to access management during final design.

9.23 Aesthetics and Landscaping

Design aesthetics could be incorporated into the signage, lighting, bridges, fencing, retaining walls, and guardrail elements of the I-4 Section 1 project, if desired. Consideration should be given to such project aesthetics during the design phase of the project, depending on the overall construction budget for the I-4 Section 1 project.

Urban Design Guidelines are being prepared by the I-4 Section 2 PD&E consultant with the following goals and objectives:

- to improve the overall aesthetics and unity of the interstate system,
- to establish a hierarchy of areas for special visual emphasis, and

- to develop a palette of man-made and natural design elements to be used in the implementation of the design and reconstruction project.

A consideration of several urban design elements are being considered within the guidelines which include retaining walls and embankments, bridge structures, noise walls, landscape materials, opportunities for public art, specialty paving and surfacing, streetscape elements, and others. Evaluation criteria have been developed to establish levels of treatment which considers gateways and special design areas. Three levels of treatment have been developed, which include rural (level 1, baseline), moderate (level 2), and urban (level 3, extensive), to indicate the extensiveness of aesthetic treatments. These aesthetic treatments could be extended into the I-4 Section 1 PD&E study area.

Walt Disney World, Sea World, and the International Drive resort areas are adjacent to the northeastern end of the project. Coordination between these businesses and FDOT could result in some aesthetic design features and landscaping needs. This issue needs to be coordinated with the overall construction budget for the project and developed closer to the design phase of this project. The I-4/World Drive interchange has been identified as a "gateway" into the tourist area and the BeeLine Expressway (S.R. 528) interchange is a "gateway" into the Orlando urban area. Aesthetic treatments could be used at these two interchange locations to welcome tourists and others to the area.

Although there are no immediate plans to landscape any areas of the proposed project beyond sodding of the roadway median and border areas, there may be adequate space for landscaping in select areas should it be desired and cost feasible. Further consideration should be given to landscape concepts during the design phase of the project depending on the overall construction budget and the amount of vegetation which could be safely accommodated within these project areas.