



# Florida Department of Transportation

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**DATE:** December 22, 2004

**TO:** Registered Plans Preparation Manual Holders

**FROM:** Brian Blanchard, P.E. *by James A. Hill*  
State Roadway Design Engineer

**CC:** Bob Greer, William Nickas, Jim Mills

**SUBJECT:** IMPLEMENTATION - PLANS PREPARATION MANUAL  
JANUARY 1, 2005 UPDATES

The January 1, 2005 Updates include:

1. Revisions to Plans Preparation Manual (PPM), Volume I English, January 2003 (Topic No. 625-000-007).
2. Revisions to PPM, Volume II English, January 2003 (Topic No. 625-000-008).

The major changes in design requirements are to be implemented as follows:

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## **Volume I, Chapter 1, Section 1.8 Access Management**

### SUMMARY OF CHANGE:

Section 1.8 has been updated to match the current Policy (Topic No. 625-010-021). Also, Table 1.8.4 has been deleted (since Rule 14-97 is being updated, the values in this table are of limited use).

### IMPLEMENTATION:

These changes are corrections and are effective immediately.

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## **Volume I, Chapter 1, Section 1.11 Context Sensitive Solutions in Design**

### SUMMARY OF CHANGE:

This section has been added to alert designers that they should consider context sensitive solutions on all projects.

### IMPLEMENTATION:

This change is clarification of existing requirements and is effective immediately.

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**Volume I, Chapter 2, Section 2.1.6.1 Alternative Roadway Paving Treatment**

**SUMMARY OF CHANGE:**

This section has been added to address the use of alternative paving treatments such as patterned/textured pavement and restricting the use of architectural pavers on the traveled way of the State Highway System. Corresponding changes have been made to Chapters 21.5.12 and 25.4.3.

**IMPLEMENTATION:**

These changes were effective on all applicable projects beginning with the July 2004 letting.

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**Volume I, Chapter 2, Tables 2.3.1, 2.3.2, & 2.3.4 (Shoulder Widths and Slopes...)**

**SUMMARY OF CHANGE:**

Added footnote explaining that “N/A” does not mean that a shoulder is unnecessary; rather, shoulder is not typically present at those locations (i.e., it is not required when adjacent to the through lane).

**IMPLEMENTATION:**

This change is clarification of existing requirements and is effective immediately.

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**Volume I, Chapter 2, Table 2.5.2 Highways with Curb or Curb and Gutter in Urban Areas**

**SUMMARY OF CHANGE:**

This table was revised to clarify the point from which the border width is measured in urban areas (face of curb or lip of gutter).

**IMPLEMENTATION:**

This change is clarification of existing requirements and is effective immediately.

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**Volume I, Chapter 2, Table 2.6.1 Maximum Grades**

**SUMMARY OF CHANGE:**

This table was revised to update the values in the 45 mph column for Flat Terrain and add a 45mph column for Rolling Terrain. Note 3 (regarding critical lengths of upgrades) was changed from 300 to 200 lb/hp trucks.

**IMPLEMENTATION:**

These changes are corrections corresponding to recent changes in AASHTO and are effective immediately.

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**Volume I, Chapter 2, Section 2.8.2 Vertical Curves**

**SUMMARY OF CHANGE:**

Section 2.8.2 has been revised to clarify that the K values for crest vertical curves are based on an eye height of 3.5' and an object height of 6". Corresponding note has also been added to Table 2.8.5.

**IMPLEMENTATION:**

This change is clarification of existing requirements and is effective immediately.

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**Volume I, Chapter 2, Section 2.13.3 Offset Left Turn Lanes**

**SUMMARY OF CHANGE:**

Section 2.13.3 has been added to include considerations for improving sight distance for left turning vehicles by using offset left turn lanes. Corresponding Figures 2.13.1, 2.13.2 and 2.13.3 have also been added.

**IMPLEMENTATION:**

These changes are considerations that may be implemented immediately.

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**Volume I, Chapter 2, Table 2.14.1 Ramp Widths – Turning Roadways**

**SUMMARY OF CHANGE:**

Note 1 has been changed to clarify that AASHTO adjustments do not apply to this table.

Also, a new Note 3 has been added to encourage increasing the ramp width to 24 ft. where accommodation of future resurfacing is a factor. A corresponding change has been made to Section 25.4.5.

**IMPLEMENTATION:**

This change to Note 1 is clarification of existing requirements and is effective immediately. Note 3 contains considerations that may be implemented immediately.

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**Volume I, Chapter 2, Section 2.16.8 Superelevation**

**SUMMARY OF CHANGE:**

New language has been added to clarify that the superelevation rates for suburban typical sections are based on  $e_{max} = 0.10$  calculations, and that the superelevation transition rates are to be commensurate with those for rural highways with 55 mph design speeds. Corresponding changes have also been made to Figure 2.16.3.

**IMPLEMENTATION:**

These changes are clarification of existing requirements and are effective immediately.

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**Volume I, Chapter 4, Section 4.5.2 Selection & Section 4.5.3 Design**

**SUMMARY OF CHANGE:**

New language has been added to point out that various types of crash cushions and attenuation devices approved for use on Department projects can be found on the Qualified Products List (QPL), and the detail for those systems may be found in the Design Standards and approved QPL Drawings.

**IMPLEMENTATION:**

These changes are clarification of existing requirements (since some details may already be found in QPL drawings) and are effective immediately.

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**Volume I, Chapter 8, Section 8.8 Drop-Off Hazards for Pedestrians and Bicyclists**

**SUMMARY OF CHANGE:**

A note has been added to alert designers that care should be taken when using railings or fencing near intersections as they could obstruct the driver's line of sight.

**IMPLEMENTATION:**

These changes are considerations that may be implemented immediately.

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**Volume I, Chapter 9, Section 9.3 Cost Estimate**

**SUMMARY OF CHANGE:**

This section has been added requiring the submittal of a cost estimate (break out the cost for large and small plants) with proposed landscaping plans.

**IMPLEMENTATION:**

These changes are effective on all applicable projects beginning immediately.

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**Volume I, Chapter 10, Section 10.3 Comprehensive Work Zone Traffic Control Planning**

**SUMMARY OF CHANGE:**

New language has been added under the topic Contract Specifications stating additional considerations for work stoppages, and that the designer should coordinate with local agencies regarding local events or other community sensitive issues.

**IMPLEMENTATION:**

These changes are considerations that may be implemented immediately.

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**Volume I, Chapter 10, Section 10.13.2 Barrier Walls (Temporary)**

**SUMMARY OF CHANGE:**

New language has been added to clarify requirements for Portable Concrete Barriers that are used on bridges and retaining wall sections, and for transitioning Type K Barrier Wall used on bridges the Index 415 Barrier Wall on the adjoining roadway.

**IMPLEMENTATION:**

These changes are clarification of existing requirements and are effective immediately.

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**Volume I, Chapter 10, Section 10.13.5 Crash Cushions**

**SUMMARY OF CHANGE:**

This section was updated to clarify requirements for the designer to determine the need and type of temporary crash cushions for each site specific condition. Additional guidance and requirements for when and how to use the different temporary crash cushion systems have also been provided.

**IMPLEMENTATION:**

These changes are clarification of existing requirements and are effective immediately.

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**Volume I, Chapter 10, Section 10.14.7 Lane Closure Analysis**

**SUMMARY OF CHANGE:**

This section has been updated to identify new daytime lane closure restrictions for Florida's Turnpike, and that designers must be aware of lane closure policies other Districts may have.

This section has also been updated to provide a provision for the use of the Highway Capacity Manual (HCS2000) methodology for lane closure analysis in lieu of the PPM method.

**IMPLEMENTATION:**

The Turnpike [Daytime Lane Closure Procedure](#) became effective on June 10, 2004.

The Highway Capacity Manual lane closure analysis methodology may be used on all applicable projects beginning immediately.

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**Volume I, Chapter 13, Section 13.5.4 Projects Affecting Interstate Logo Signs**

**SUMMARY OF CHANGE:**

This new section has been added to alert designers of new requirements for projects that may have potential impacts to Interstate Logo Signs. Corresponding changes have also been made to Section 7.2.5.

**IMPLEMENTATION:**

These changes are effective on all applicable projects beginning immediately.

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**Volume I, Chapter 20, Section 20.1 General**

**SUMMARY OF CHANGE:**

This section has been updated with the requirement that all projects be delivered in electronic format. Additional changes have been made throughout Chapter 20 to provide guidance on electronic delivery.

**IMPLEMENTATION:**

This change is effective on all projects beginning with the July 2005 letting.

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**Volume I, Chapter 20, Section 20.4 Revisions to the Contract Plans Package**

**SUMMARY OF CHANGE:**

This section has been updated with additional guidance for making design revisions.

**IMPLEMENTATION:**

These changes are clarification of existing requirements and are effective immediately.

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**Volume I, Chapter 20, Exhibits 20-A, 20-B and 20-C**

**SUMMARY OF CHANGE:**

Exhibit 20-A (Transmittal of Plans, Specifications, and Estimates (PS&E) Package) has been updated to provide for the combined electronic transmittal of the PS&E Package using one transmittal.

Exhibit 20-B (Contract File Index) has been updated, and is now an integral part of the PS&E Package Transmittal.

Exhibit 20-C (Revision Memo) has been updated to provide for the electronic transmittal of Plans revisions and/or supplemental specifications.

Corresponding changes relating to the changes to the Exhibits have been made throughout Chapter 20.

**IMPLEMENTATION:**

These changes are effective on all projects beginning with the July 2005 letting but the forms may be used immediately on fully electronic deliveries.

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**Volume I, Chapter 21, Table 21.3 Horizontal Clearance to Trees**

**SUMMARY OF CHANGE:**

This table has been updated to allow a reduced horizontal clearance in areas where the border width or median width is constrained.

**IMPLEMENTATION:**

This change is effective on all projects beginning immediately.

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**Volume I, Chapter 25, Section 25.4.5 Lane and Shoulder Widths**

**SUMMARY OF CHANGE:**

This section has been changed to clarify that the widths in the tables are to allow existing lanes/shoulders to remain at, not for them to be reduced to those widths.

**IMPLEMENTATION:**

These changes are clarification of existing requirements and are effective immediately.

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**Volume I, Chapter 25, Section 25.4.8 Shoulder Treatment**

**SUMMARY OF CHANGE:**

This section has been changed to provide right turn lane shoulder requirements when a bike lane is provided between the through lane and a right turn lane.

**IMPLEMENTATION:**

This change reflects current practice agreed upon by the District Design Engineers and is effective immediately.

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**Volume I, Chapter 25, Section 25.4.13 Vertical Clearance**

**SUMMARY OF CHANGE:**

This section has been updated to include the vertical clearance criteria from Section 25.4.25.4 (which has been deleted).

**IMPLEMENTATION:**

These changes are clarification of existing requirements and are effective immediately.

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**Volume I, Chapter 25, Section 25.4.19 Pedestrian, Bicyclist and Transit Needs**

**SUMMARY OF CHANGE:**

This section has been changed to clarify that even if new sidewalk is to be constructed, existing non-conforming driveways are not required to be upgraded to meet ADA requirements.

**IMPLEMENTATION:**

This change is clarification of existing requirements and is effective immediately.

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**Volume I, Chapter 25, Section 25.4.21 At-Grade Railroad Crossings**

**SUMMARY OF CHANGE:**

This section has been changed to clarify that Index 560 vertical alignment criteria apply to RRR projects.

**IMPLEMENTATION:**

This change is clarification of existing requirements and is effective immediately.

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**Volume I, Chapter 26, Section 26.9.7 Alternative Designs**

**SUMMARY OF CHANGE:**

This section has been updated to add considerations for evaluating justification for alternative designs.

**IMPLEMENTATION:**

These changes are based on the Structures Office Temporary Design Bulletin C04-03 and became effective March 31, 2004.

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**Volume I, Chapter 29, Section 29.1 General**

**SUMMARY OF CHANGE:**

This new section has been added to include new anchor bolt requirements for sign, signal and lighting structures (50-year service life), and weld requirements for steel sign and signal structures.

**IMPLEMENTATION:**

These changes are based on the Structures Office Temporary Design Bulletin C03-03 and became effective June 24, 2003.

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**Volume I, Chapter 29, Section 29.4.1 General Requirements**

**SUMMARY OF CHANGE:**

This section has been updated to include new requirements for the arm to pole connection on mast arm structures.

**IMPLEMENTATION:**

These changes are based on the Structures Office Temporary Design Bulletin C03-03 and became effective June 24, 2003.

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**Volume I, Chapter 30, Section 30.2.2 Retaining Walls (Proprietary Design) (Design...**

**SUMMARY OF CHANGE:**

Item 1.f (Preapproved Standard Drawings) has been updated to identify where to find drawings and details for retaining wall systems before and after the July 2006 letting date. Corresponding language added to Section 30.2.3.

**IMPLEMENTATION:**

These changes are informational and are effective immediately.

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**Volume II, Chapter 2, Section 2.1 General**

**SUMMARY OF CHANGE:**

This section has been changed to add “Intelligent Transportation System (ITS) Plans” as a standard component plan set. Corresponding changes were also made to Volume 2: Figure 2.1, Section 2.3.2.2, Section 3.5, and Section 3.6; and in Volume 1: Section 14.3.

**IMPLEMENTATION:**

These changes are effective on all applicable projects beginning immediately.

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**Volume II, Chapter 3, Section 3.12 Design Standards Modifications**

**SUMMARY OF CHANGE:**

This section has been renamed from “Interim Standards” to “Design Standards Modifications”. This section has been changed to provide new requirements for the information to be shown on the Key Sheet. The applicable Interim Standards information that was being placed on the Key Sheet is being replaced by the applicable Design Standards Modifications. Corresponding changes have also been made to Exhibit KS-1.

**IMPLEMENTATION:**

These changes are effective on all applicable projects beginning with the July 2005 letting.

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**Volume II, Chapter 6, Section 6.2 Mandatory Information**

**SUMMARY OF CHANGE:**

This section has been changed to show that pavement designs are now described in the plans by thickness rather than spread rate. Corresponding changes have also been made to Exhibits TYP-1 through TYP-15, and in Volume I, Sections 22.5 and 22.7

**IMPLEMENTATION:**

These changes were presented in the April 5, 2004 Basis of Estimates cover letter, and are effective on all applicable projects beginning with the January 2005 letting.

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**Volume II, Chapter 29 Intelligent Transportation Systems Plans**

**SUMMARY OF CHANGE:**

This Chapter has been added to provide basic requirements for ITS Plans.

**IMPLEMENTATION:**

These changes are effective on all applicable projects beginning immediately.

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All other changes in the January 1, 2005 Plans Preparation Manual Update Package primarily consist of minor editing, clarification and/or error corrections and are effective immediately. In addition, Chapter 2 of Volume 1 was reformatted to bring the criteria tables and figures together with their corresponding sections. This was done as a result of the 2004 PPM User Survey.

If you have any questions please contact this office, 850-414-4356, Suncom 994-4356.

# PLANS PREPARATION AND ASSEMBLY



**STATE OF FLORIDA  
DEPARTMENT OF TRANSPORTATION**

**CONTRACT PLANS**

FINANCIAL PROJECT ID 196058-1-52-01  
(FEDERAL FUNDS)  
MANATEE COUNTY (13160)  
STATE ROAD NO. 70

**COMPONENTS OF CONTRACT PLANS SET**

- ROADWAY PLANS
- SOBBING AND PAVEMENT MARKING PLANS
- SIGNALIZATION PLANS
- LIGHTING PLANS
- LANDSCAPE PLANS
- ARCHITECTURAL PLANS
- STRUCTURAL PLANS

**INDEX OF ROADWAY PLANS**

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2 - 2A	SUMMARY OF PAY ITEMS
3	DRAINAGE MAP
4 - 5	TYPICAL SECTIONS
6	TYPICAL SECTION DETAILS
7	SUMMARY OF QUANTITIES
8 - 12	SOB QUANTITY DATA SHEETS
13 - 15	BACK-OF-SIDEWALK PROFILES
16 - 17	SUMMARY OF DRAINAGE STRUCTURES
18 - 23	ROADWAY PLAN-PROFILES
24 - 25	SPECIAL PROFILES
26 - 40	INTERSECTION LAYOUT/DETAIL, DRAINAGE STRUCTURES, LATERAL DITCH PLAN-PROFILES, LATERAL DITCH CROSS SECTIONS, SPECIAL DETAILS, ROADWAY SOLE SURVEY, CROSS SECTIONS
41	STORM WATER POLLUTION PREVENTION PLAN
42	TRAFFIC CONTROL PLANS
43	UTILITY ADJUSTMENTS
44	SELECTIVE CLEANING AND GRUBBING

**REVISIONS**

NO.	DATE	DESCRIPTION
1	01/01/03	ISSUED FOR BIDDING
2	01/01/03	ISSUED FOR BIDDING
3	01/01/03	ISSUED FOR BIDDING
4	01/01/03	ISSUED FOR BIDDING
5	01/01/03	ISSUED FOR BIDDING
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50	01/01/03	ISSUED FOR BIDDING

PROJECT LENGTH IS BASED ON E CONSTRUCTION

LENGTH OF PROJECT		
	LINEAR FEET	MILES
ROADWAY	3480.79	0.655
BRIDGES	84	84
NET LENGTH OF PROJECT	3480.79	0.653
EXCEPTIONS	84	84
GROSS LENGTH OF PROJECT	3480.79	0.655

KEY SHEET REVISIONS

NO.	DATE	DESCRIPTION
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49	01/01/03	ISSUED FOR BIDDING
50	01/01/03	ISSUED FOR BIDDING

FINANCIAL PROJECT ID 196058-1-52-01  
Roadway Sheets 25, 26 & 27 (Sheeted 3-20-04)  
Signalization Sheets 74 & 75 (Sheeted 3-20-04)

FINANCIAL PROJECT ID 196058-1-52-01  
Roadway Sheets 1, 4, 7 & 8 (Sheeted 3-20-04)  
Signalization Sheets 74 & 75 (Sheeted 3-20-04)  
Structure Sheets 28 & 29 (Sheeted 3-20-04)  
Summary of Pay Items (Sheeted 3-20-04)

FINANCIAL PROJECT ID 196058-1-52-01  
Roadway Sheets 25, 26 & 27 (Sheeted 3-20-04)  
Signalization Sheets 74 & 75 (Sheeted 3-20-04)

FOOT PROJECT NUMBER: THOMAS DUFFER

**FDOT**



**DESIGN**

Volume  
**II**

Plans Preparation Manual

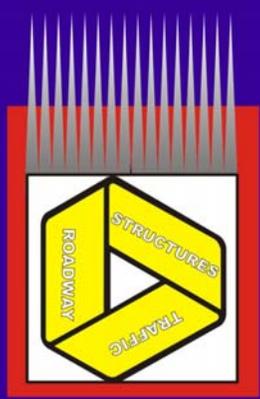
January 2003

Revised January 1, 2005

# PLANS PREPARATION AND ASSEMBLY

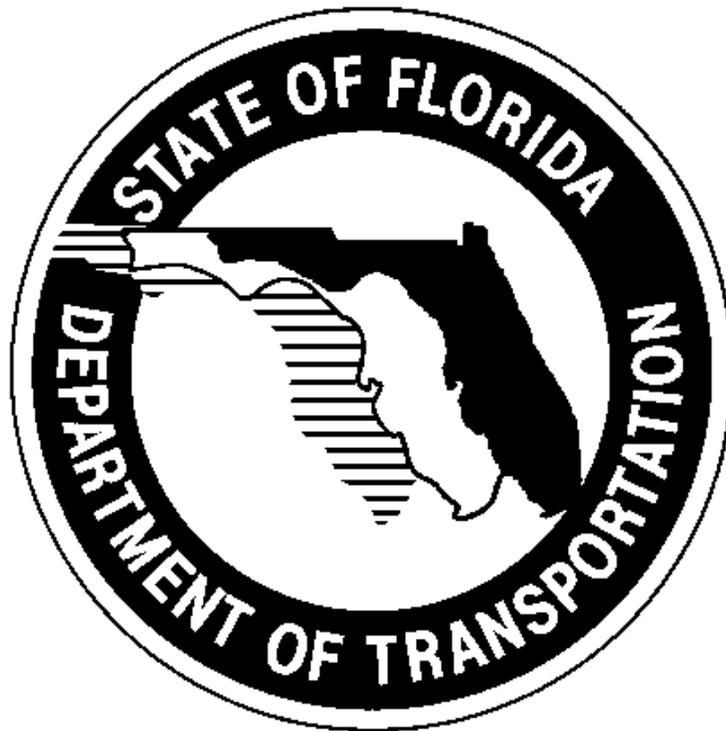


Florida Department Of Transportation



# PLANS PREPARATION MANUAL

## VOLUME II



### ROADWAY DESIGN OFFICE

TALLAHASSEE, FLORIDA

JANUARY 2003

FOURTH EDITION

UPDATED JANUARY 1, 2005

<http://www.dot.state.fl.us/rddesign/PPM Manual/PPM.htm>

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## Introduction

# Plans Preparation Manual, Volume II

### PURPOSE:

This *Plans Preparation Manual, Volume II* sets forth requirements for the preparation and assembly of contract plans for Florida Department of Transportation (FDOT) projects. The information contained herein applies to the preparation of contract plans for both roadways and structures.

### AUTHORITY:

*Section 334.044(2), Florida Statutes.*

### SCOPE:

This procedure impacts anyone preparing roadway and structures contract plans for the Department.

### GENERAL INFORMATION:

*Chapter 334* of the *Florida Statutes*, as part of the Florida Transportation Code, establishes the responsibilities of the State, counties, and municipalities for the planning and development of the transportation systems serving the people of Florida, with the objective of assuring development of an integrated, balanced statewide system. The Code's purpose is to protect the safety and general welfare of the people of the State and to preserve and improve all transportation facilities in Florida. Under **Section 334.044**, the Code sets forth the powers and duties of the Department of Transportation including to adopt rules, procedures and standards for the conduct of its business operations and the implementation of any provisions of law for which the Department is responsible.

## PROCEDURE:

The standards and applications contained in this volume of the *Plans Preparation Manual* are requirements for the design and preparation of contract plans used in the construction of FDOT projects. This volume is to be used in conjunction with *Volume I* of the *Plans Preparation Manual (PPM) (Topic No. 625-000-007)*.

The preparation of roadway and structures plans is primarily a matter of sound application of acceptable engineering criteria, standards and presentation techniques. While the requirements contained in this volume provide a basis for uniformity in plans preparation, precise formatting and presentation standards which apply to individual situations must rely on good engineering practice and judgment. The use of these requirements does not relieve the engineer from the professional responsibility for the accuracy and completeness of the contract plans set(s).

### 1. **PLANS PREPARATION MANUAL, VOLUME II** - MANUAL ORGANIZATION

#### a. Background

The Florida Department of Transportation's *Plans Preparation Manual* was previously published as a two volume set in 1989. The manual preceded Department requirements for use of the Metric System, and featured only English units. *Volume I* contained design criteria and process requirements, while *Volume II* addressed plans preparation and assembly.

This English version of *Volume II* was produced using the same basic format, and closely paralleling, *Volume II - Metric*. This was due in large part to the outdated information in the 1989 English version for such areas as Computer Aided Design Drafting (CADD), plans processing, sheet sizes, etc.

#### b. Organization

The *Plans Preparation Manual, Volume II* contains specific requirements for plans production and assembly. The manual consists of individual chapters, each addressing the requirements for a plan sheet or component, and is ordered according to the way a standard plans set would be assembled.

## 2. DISTRIBUTION

This document is distributed through **FDOT Maps and Publications Sales**.

Copies may be obtained from:

Florida Department of Transportation  
Maps and Publications Sales, Mail Station 12  
605 Suwannee Street  
Tallahassee, FL 32399-0450  
Telephone (850) 414-4050 SUNCOM 994-4050  
FAX Number (850) 414-4915  
<http://www.dot.state.fl.us/MapsAndPublications/>

For updates and manual registration information contact:

Roadway Design Office, Mail Station 32  
Telephone (850) 414-4310 SUNCOM 994-4310  
FAX Number (850) 414-5261  
<http://www.dot.state.fl.us/rddesign/>

## 3. REVISIONS AND UPDATES

**Plans Preparation Manual** holders are encouraged to submit comments and suggestions for changes to the manual to the Roadway Design Office. When ideas or suggestions are received they will be reviewed by appropriate Roadway and/or Structures Design staff in a timely manner and will be coordinated with other offices affected by the proposed change.

Structures design issues which are subject to modification and revision will be processed in coordination with the Structures Design Office.

Proposed revisions are distributed in draft form to the District Design Engineers (DDE). The DDE coordinates the review of the proposed revisions with other affected district offices such as Structures Design. The goal is to obtain a majority opinion before revisions are made.

The Roadway Design Office will also coordinate proposed revisions or additions with affected offices within the Central Office. Substantive revisions that result in policy change will be coordinated with the Executive Committee for concurrence.

Revisions are voted on jointly by the District Design Engineers and the State Roadway Design Engineer (for Roadway Design issues) or the State Structures Design Engineer (for Structures Design issues). Each district will have one vote and the central office will have two votes; for a total of ten votes. Requirements mandated by FHWA or State Rules will not be subject to this majority vote.

All revisions and updates will be coordinated with the Organization and Procedures Office prior to distribution to ensure conformance with and incorporation into the Department's Standard Operating System. The standard interval for issuing updates to the **PPM** is yearly, in January, when the adopted revisions and addenda will be distributed to registered holders of the manual.

Items warranting immediate change will be made with the approval of the State Roadway Design Engineer in the form of a Design Bulletin.

## **TRAINING:**

None required.

## **FORMS ACCESS:**

Documents marked as **SAMPLES** provide only a starting point allowing users to change or alter the document as needed to fit specific situations. Samples are not official forms of the Department.

# Chapter 1

## Production of Plans

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# Chapter 1

## Production of Plans

### 1.1 General

This volume shall be used in conjunction with **Volume I - English** of the **Plans Preparation Manual**. Close attention must be paid to the harmonizing of design criteria and processes outlined in **Volume I** with the related areas of plans preparation and presentation required in this volume.

The contract plans set and the specifications are the key documents for project construction and on which the contractor bases his bid. Hence, it is imperative that the contract plans and specifications set forth the work to be done in a clear and concise manner.

The Engineer of Record (EOR) must provide quality control of plans, CADD files and deliverables as outlined in the Department's **CADD Manual, Topic No. 625-050-001** (or latest version) and this volume. These resources, in conjunction with district and project scope requirements, shall form the basis for contract plans format and assembly.

Plan sheets content and appearance will follow the requirements of this volume. Refer to the FDOT CADD Production Criteria Guide for such features as line weight, style, color, and level.

The exhibits shown in this volume were developed using FDOT criteria/standards in force at the time of their creation. See **Volume I** for criteria.

## 1.2 Legibility Guidelines

Normally, all letters and figures should be readable from either the bottom or right edge of the sheet. The guide for reading is as follows:

1. Horizontal Line: Read left to right
2. Vertical Line: Read bottom to top
3. Diagonals: Read left to right

Abbreviations may be used where they save time and space. Abbreviations must be clear and easily understood. A list of standard abbreviations is given in the ***Design Standards, Index No. 001***.

Standard symbols for Roadway Design are shown in the ***Design Standards, Index No. 002***, the Symbol Cell Library, and other CADD sources.

## 1.3 Displaying Information and Data

The following rules apply for displaying information and data in the plans:

1. Dimensioning Requirements:
  - a. Typical Section Elements, including lane widths and shoulder widths - in feet, generally as a whole number.
  - b. Horizontal control points on plans, including survey centerline, baseline, intersections and alignment - in feet to 2 decimal places.
  - c. Vertical alignment control points, (PVC, PVI, PVT) and profile grade elevations - in feet to 2 decimal places.
  - d. Profile Grade - in percent to 3 decimal places.
  - e. Proposed flow lines - in feet to 1 decimal place.
  - f. Manhole tops and grate elevations - in feet to 2 decimal places.
  - g. Ditch elevations - in feet to 1 decimal place (to nearest 0.05 when controlled by percent of grade).
  - h. Box Culvert Spans and Heights - (Show feet as a whole number using the span by height format: e.g., 10 x 6 means the span is 10 feet and the height is 6 feet): In feet as a whole number for new construction; in feet to 2 decimal places for extensions of existing box culverts.
2. Display alignment bearings, degree of curve and delta angles for curve data in degrees, minutes and seconds, rounded to the nearest second.
3. Express slope ratios in vertical to horizontal (V:H) format. For example, show roadside slopes as 1:6, 1:4, etc.

### 1.3.1 Converting from Metric to English

1. When converting metric values related to surveys, right of way and other geometric alignment use the U.S. Survey Foot taken to a minimum of 8 decimal places:

$$1 \text{ foot} = \frac{12 \text{ inches/foot}}{39.37 \text{ inches/meter}} = 0.304 \ 800 \ 61 \text{ meters}$$

For other direct mathematical conversions use the SI definition: 1 foot = 0.3048 meters

2. Display direct mathematical (soft) converted values to 2 decimal places.
3. On resurfacing projects where the original construction was done in metric, hard convert typical section dimensions (lane widths, shoulder widths, etc.) where existing conditions permit.

Use direct mathematical (soft) conversion for existing pavement widths in curbed sections, existing right of way widths, and existing median widths.

Further information that may be useful in the converting Metric to English may be found in **Appendix A** of this volume.

## 1.4 Base Sheet Format

All plan sheet formats are contained in the FDOT Engineering/CADD Systems Software. Sheet borders include a place for the Financial Project ID. For those projects that still have a State Project Number, the number must be added to each sheet in the plans. A separate cell is available for placement above the Financial Project ID as shown below:

**Figure 1.1 Project Information Block**

		<i>STATE PROJECT NO.</i>		
		<i>STATE OF FLORIDA</i>		
		<i>DEPARTMENT OF TRANSPORTATION</i>		
		<i>ROAD NO.</i>	<i>COUNTY</i>	<i>FINANCIAL PROJECT ID</i>

The blank space immediately left of the box for Financial Project ID information is provided for the Engineer of Record information as required in **Section 19.2, Volume I**.

Contract plans shall be plotted to scale on size B (11" X 17") multipurpose paper. These plots are to be generated from image files in accordance with the **CADD Manual, Section 3.8.3**. Care must be taken in setting up plotting equipment and software to center the sheet border and provide a minimum 3/4" margin at each end of the sheet. This is necessary to maintain plan sheet scales and to facilitate the reproduction process used for providing contract plan sets for advertisement and construction.

Sheets that feature grids (cross sections, plan-profile, etc.) can be plotted with minor grid lines turned off or on. If the minor grids are plotted, they are to be half-toned. The FDOT Engineering/CADD System Software provides Microstation system plot drivers for this task. Pen tables for half-toning, using CAD Net plotting, are also available from the FDOT Engineering/CADD Systems Office.

No aerial photography of any type is permitted in final contract plans.

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## Chapter 2

### Sequence of Plans Preparation

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## Chapter 2

### Sequence of Plans Preparation

#### 2.1 General

The set of plans depicting in detail the desired construction work is known as the "Contract Plans Set". This set consists of all sheets pertaining to roadway design (Roadway Plans), and other component plans. The other component plans are comprised of:

1. Signing and Pavement Marking Plans
2. Signalization Plans
3. Intelligent Transportation Systems (ITS) Plans
4. Lighting Plans
5. Landscape Plans
6. Architectural Plans
7. Structures Plans

All plan details shall be included in the Roadway Plans or one of the component plans listed above. Components other than those listed above shall not be used unless approved by the State Roadway Design Engineer. Such approval should be requested prior to the Phase II submittal.

Utility Joint Participation Agreement Plans have a separate Financial Project ID and are placed in the back of the contract plans set.

The contract plans set should be prepared systematically, undergoing phases of review and revision to ensure technically correct and clear plans.

## 2.2 Data Collection and Presentation

### 2.2.1 Type of Project

The type and amount of data required for each project depends on the project. For new construction and reconstruction projects which have had a Project Development and Environment (PD&E) phase the data to be used for plans preparation could include the following:

1. Preliminary Engineering Report
2. Project Scope
3. Project schedule
4. Field survey and/or CADD files (including existing features such as topography, ground elevations, drainage structures, and right of way)
5. R/W requirements
6. Soils information
7. Commitments for environmental permits or mitigation
8. Typical Section Package
9. Traffic Data
10. Pedestrian and bicycle considerations
11. Structural design requirements
12. Commitments to local government(s)

For projects without the PD&E phase, such as RRR or Safety projects, some of the items listed will not be required. Regardless of type, all projects should begin with a field review to determine other requirements such as additional survey needs, utility information, etc.

Additional information can be found in **Chapters 13-16** of **Volume I**. These chapters contain a comprehensive discussion of the critical issues and major activities for the design process, from initial to final engineering.

## **2.2.2 Presentation of Existing Data**

CADD files generated from the field survey will contain existing topography and other characteristics of the project site. These also include the existing utilities and drainage structures within the limits of the project.

All data pertaining to topography, horizontal location of existing utilities and drainage structures shall be shown on the plan portion of the appropriate sheets (whether they are plan view only, or plan-profile).

## **2.2.3 Proposed Typical Section**

Typical sections show the cross sectional design elements of a roadway. In addition to the Typical Section Sheet, certain elements of the typical section are shown on various other plan sheets, such as the Plan-Profile Sheets and Cross Sections. The various chapters for individual plan sheets address the specific requirements for displaying data (including typical section elements) on those sheets.

## **2.2.4 Geometrics**

The Engineer of Record (EOR) sets the horizontal and vertical geometrics for a project and develops or supervises development of the CADD files used in the production of various plans sheets.

Horizontal geometrics include the baseline survey/centerline construction with bearings, curve data, angles or bearings at street intersections, pavement widths, taper lengths, left turn lanes, and other geometric elements. These elements are plotted on the plan portion of the plan-profile sheets, as well as other appropriate plan sheets.

Vertical geometrics show the vertical curves and grades of the roadway along the profile grade line. On municipal projects back-of-sidewalk profiles are developed to provide a vertical alignment which addresses drainage requirements and harmonizes connections to adjacent properties. The back-of-sidewalk profiles may be included in the roadway plans as directed by the district.

On all projects which include the development of a vertical alignment the existing ground line along the baseline of survey and the proposed profile grade line shall be plotted on the profile portion of appropriate sheets in the roadway or structures plans.

## 2.2.5 Cross Sections

Information required for plotting existing cross sections is obtained from survey data and CADD files. These data, along with existing utilities and proposed templates, are shown on the cross sections. Refer to **Chapter 18** of this volume for additional information.

## 2.3 Phase Submittals

### 2.3.1 General

Requirements relating to the *design process* for various submittals are given in **Chapter 16, Volume I** of this manual. Refer to that chapter for additional guidance in preparing submittals for review by the Department.

For bridge submittal requirements see **Chapter 26, Volume I**.

### 2.3.2 Phases

The remainder of this chapter outlines, in detail, the sequence for contract plans preparation and assembly, as well as the information required to be presented on the various plan sheets which are included in design phase submittals.

As stated in **Section 16.4 of Volume I**.. "The number of submittals and phase reviews shall be determined on a project-by-project basis and shall be defined in the scope. Submittals allow functional areas to review the development of the project as contained in the scope."

Standard submittal phases are as follows:

#### SUBMITTAL PHASES

- Phase I
- Phase II
- Phase III
- Phase IV

Minor projects should typically have two phase reviews.

**Figure 2.1** summarizes the plans sheet status for each submittal. No phase is complete until all review comments have been resolved and documented.

The technical accuracy required for the design is the responsibility of the Engineer of Record. Prior to submitting the plans for a formal FDOT Phase review, the design organization (in-house or consultant) shall conduct a review to ensure technically correct and complete plans. Any revisions or corrections noted during the review shall be incorporated into the plans before submittal for the formal Phase review.

When deemed necessary by the Engineer of Record, or as requested by the district, phase submittals may include an additional plan sheet titled "Notes for Reviewers." This sheet is placed as the second sheet in the submittal package. It contains information pertinent to design criteria and special project requirements, as well as other details or notes which call the reviewer's attention to issues and features unique to the project design. The sheet is to be used only in the review process and is not included in the final plans.

**Figure 2.1 Summary of Phase Submittals**

ITEM	PHASE	PHASE*	PHASE	PHASE
	I	II	III	IV
Key Sheet	P	P	C	F
Summary of Pay Items		P	C	F
Drainage Map	P	P	C	F
Interchange Drainage Map	P	P	C	F
Typical Section	P	C	C	F
Summary of Quantities			C	F
Box Culvert Data			C	F
Summary of Drainage Structures			C	F
Project Layout	P	C	C	F
Roadway Plan-Profile	P	P	C	F
Special Profile	P	P	C	F
Back-of-Sidewalk Profile	P	C	C	F
Interchange Layout	P	P	C	F
Ramp Terminal Details		P	C	F
Intersection Layout/Detail	P	P	C	F
Drainage Structures		P	C	F
Optional Materials Tabulation		P	C	F
Lateral Ditch Plan-Profile		P	C	F
Lateral Ditch Cross Section		P	C	F
Retention/Detention Ponds		P	C	F
Cross Section Pattern		P	C	F
Roadway Soil Survey		P	C	F
Cross Sections	P	P	C	F
Stormwater Pollution Prevention Plan		P	C	F
Traffic Control Plans	P	P	C	F
Utility Adjustment		P	C	F
Selective Clearing and Grubbing		P	C	F
Mitigation Plans		P	C	F
Miscellaneous Structures Plans		P	C	F
Signing and Pavement Marking Plans		P	C	F
Signalization Plans		P	C	F
Intelligent Transportation System (ITS) Plans		P	C	F
Lighting Plans		P	C	F
Landscape Plans	P	P	C	F
Utility Joint Participation Agreement Plans			C	F
Computation Book			C	F
Contract Time			P	F

**Status Key:**

- P** - Preliminary
- C** - Complete but subject to change
- F** - Final

\* Projects which have a structures plans component are required to submit the latest set of structures plans with the Phase II roadway submittal.

## 2.3.2.1 Requirements for Phase I Submittal

Unless otherwise directed by the district, the following elements are required for a Phase I set of plans.

### **KEY SHEET**

Location Map w/ location of project on map  
All applicable Financial Project ID's  
(Federal Funds) notation, if applicable  
Exceptions & Equations  
County Name  
State Road Number  
Length of project box  
North arrow and scale  
Approval signature lines  
Railroad crossing (if applicable)  
Revision box  
Governing Standards & Specifications dates  
Project Manager's Name  
Begin & end project station and begin mile post  
Begin & end bridge stations  
Consultant's name, address, contract number,  
Certificate of Authorization number and vendor  
number (if applicable)

### **DRAINAGE MAP - PLAN VIEW**

North arrow and scale  
Drainage divides and ground elevations  
Drainage areas and flow direction arrows  
Equations  
High water information as required  
Preliminary horizontal alignment  
Section, township, range lines  
Street names  
Begin & end stations of project, bridge, bridge  
culverts & exceptions  
Existing structures & pipes with relevant  
information

State, Federal, county highway numbers (as  
appropriate)

### **DRAINAGE MAP - PROFILE VIEW**

Preliminary profile grade & existing ground line  
Horizontal & vertical scale  
Begin & end stations of project, bridges, bridge  
culverts & exceptions  
Equations

### **INTERCHANGE DRAINAGE MAP**

North arrow and scale  
Stationing along baselines  
Ramp baselines with nomenclature  
Begin and end bridge stationing  
Preliminary interchange configuration  
R/W lines  
Preliminary interchange drainage with drainage  
areas and flow direction arrows

### **TYPICAL SECTIONS**

Mainline and crossroad typicals  
R/W lines  
Special details (bifurcated sections, high fills,  
etc.)  
Traffic data

### **PROJECT LAYOUT / Reference Points**

Plan-profile sheet sequence (mainline and  
crossroads)  
Reference points (if layout sheet is required)

### **PLAN AND PROFILE - PLAN VIEW**

North arrow and scale  
Baseline of survey, equations  
Curve data (including superelevation)  
Existing topography including utilities  
Preliminary horizontal geometrics/dimensions  
Existing & proposed R/W lines (if available)  
Centerline of construction (if different from the baseline of survey)  
Begin and end stations for the project, bridges, bridge culverts and exceptions  
Reference points (if project layout sheet not included in plans set)

### **PLAN AND PROFILE - PROFILE VIEW**

Scale  
Appropriate existing utilities  
Bench mark information  
Preliminary profile grade line  
Equations  
Existing ground line with elevations at each end of sheet  
Begin and End Stations for the Project, bridges, bridge culverts and exceptions.

### **SPECIAL PROFILE**

Scale  
Ramp profile worksheet including nose sections  
Existing ground line of intersections  
Preliminary grade line of intersections  
Preliminary curb return profiles, if applicable

### **BACK-OF-SIDEWALK PROFILE (Worksheet)**

Scale  
Begin and end project stations  
Begin and end sidewalk stations  
Cross-street locations and elevations  
Drainage flow direction arrows  
Mainline equations  
Existing driveway locations and details

Superelevation details  
Back-of-sidewalk profile grades and vertical curve information  
Building floor elevations with offset distance left and right  
Gradeline notation: Specifically the numeric difference relative to roadway profile gradeline

### **INTERCHANGE DETAIL**

North arrow and scale  
Schematic of traffic flow and volumes  
Proposed bridge limits  
R/W lines  
Preliminary configuration and geometrics  
Quadrant Identification  
Ramp Labels

### **INTERSECTION LAYOUT**

North arrow and scale  
Existing topography (if applicable)  
Proposed R/W limits  
Length of turn lanes  
Taper lengths  
Existing Utilities  
Geometric dimensions (radii, offsets, widths)

### **CROSS SECTIONS\***

Scale  
Existing ground line  
Existing survey baseline elevations  
Station numbers  
Baseline of survey labeled  
Existing utilities  
Proposed template with profile grade elevations along mainline and cross-streets as necessary

### **TRAFFIC CONTROL PLANS**

Project specific  
Other worksheets as necessary to convey concept and scope.

### **LANDSCAPE PLANS**

Conceptual landscape plan

\*May require accompanying cross section pattern sheet

## 2.3.2.2 Requirements for Phase II Submittal

Unless otherwise directed by the district, the following elements are required for a Phase II set of plans.

### KEY SHEET

Index of sheets  
Contract plans and component plans list

### SUMMARY OF PAY ITEMS

Item numbers with descriptions (on 8 ½" x 11" paper until the project proposal has been created)

### DRAINAGE MAP - PLAN VIEW

Proposed structures with structure numbers  
Proposed storm sewer pipes  
Flow arrows along proposed ditches  
Retention/Detention ponds, pond number and area size  
Cross drains with pipe sizes and structure numbers  
Bridges/bridge culverts with begin and end stations  
Flood data (if applicable)

### DRAINAGE MAP - PROFILE VIEW

Ditch gradients including DPIs  
Final roadway profile grade line  
Mainline storm sewer pipes  
Mainline flow line elevations  
Mainline structures with structure numbers and pipes  
Bridge, Bridge Culvert  
Cross drains with pipe sizes, structure numbers and flow line elevation

### INTERCHANGE DRAINAGE MAP

Final geometrics including PC and PT  
Proposed structures with structure numbers  
Proposed storm sewer pipes  
Special ditches with DPI and elevation

### TYPICAL SECTIONS

Pavement Design

### PROJECT LAYOUT

Complete

### PLAN AND PROFILE - PLAN VIEW

Curb return numbers, station ties and elevations  
Proposed drainage structures with structure no.  
Proposed R/W lines  
Existing utilities  
Proposed side drain pipe requirements (including size) for access and intersections  
Final geometrics and dimensions including radii, station pluses, offsets, widths, taper/transition lengths, curve data  
General notes (if project layout sheet not included)  
Flood data if not shown elsewhere  
Limits of wetlands

### PLAN AND PROFILE - PROFILE VIEW

Final profile grades and vertical curve data  
Mainline storm sewer pipes  
Proposed special ditches  
Ditch gradients with DPI station and elevation  
Non-standard superelevation transition details  
High water elevations  
Existing utilities  
Mainline drainage structures with structure numbers  
Cross drains with structure number, size and flow line elevations

### **SPECIAL PROFILE**

Final intersection profile grades  
Final curb return profiles (if applicable)  
Superelevation diagrams as required  
Final ramp profile grades including nose sections  
Preliminary access and frontage road profiles (may contain one or more types of special profiles.)

### **BACK-OF-SIDEWALK PROFILE**

Complete

### **INTERCHANGE LAYOUT**

Curve data including superelevation and design speed  
Coordinate data, stationing and ties  
Access and/or frontage roads with dimensions and R/W  
Fence location  
Ramp identification

### **RAMP TERMINAL DETAILS**

Preliminary geometrics  
Radii, transition/taper lengths  
Ramp identification

### **INTERSECTION LAYOUT**

Limits of proposed construction along side roads  
Applicable notes  
Cross drains with structure numbers and pipe sizes  
Storm sewer pipes including sizes  
Final geometrics including dimensions, radii, offsets, station pluses and taper/transition lengths

### **DRAINAGE STRUCTURES**

Vertical and horizontal scale  
Roadway template with profile grade elevation  
Underground utilities  
Special sections at conflict points  
R/W lines (at critical locations)  
Storm sewer construction notes  
Flow arrows  
Applicable notes  
Structure numbers and location station along right side of sheet  
Drainage structures with numbers in numerical order, type, size, location and flowline elevations

### **OPTIONAL MATERIALS TABULATION**

Material type  
Structure number station and description  
Durability, cover requirements  
Optional culvert material application  
Culvert service life estimator  
Design service life

### **OUTFALL / LATERAL DITCH SYSTEM - PLAN VIEW**

North arrow and scale  
Roadway centerline  
Existing and/or survey ditch centerline  
Proposed ditch centerline with stationing  
Begin and end ditch stations  
Equations  
Ditch centerline intersection stations  
R/W lines  
Bearings of ditch and mainline centerlines  
Proposed storm sewer pipes  
Ditch PI stations with deflection angle left or right  
Proposed drainage structures with structure numbers  
Existing topography, drainage structures, utilities  
Limits of wetlands

**OUTFALL / LATERAL DITCH SYSTEM -  
PROFILE VIEW**

Bench mark information  
Scale  
Existing ground line  
Proposed ditch profile with grades  
Begin and end ditch stations  
High water elevations  
Proposed storm sewer pipes with size  
Existing Utilities  
Overland flow or overtopping elevations  
Proposed drainage structures with structure numbers  
Typical section can be placed in either plan or profile

**LATERAL DITCH CROSS SECTIONS**

Horizontal and vertical scale  
Existing ground line  
Station numbers  
Survey centerline and elevation  
R/W  
Begin and end ditch stations  
Begin and end excavation stations  
Earthwork quantities  
Existing utilities  
Total earthwork quantity in cubic yards (CY)  
Proposed template with ditch bottom elevation

**RETENTION/DETENTION POND DETAILS**

North arrow and scale  
Roadway centerline ties  
Proposed pond centerline with stationing  
Begin and end pond stations  
Side slopes, dimensions, and elevations  
R/W lines  
Berm, fence and gate locations  
Soil boring information  
Proposed pond drainage structures with structure numbers  
Existing topography, drainage structures, utilities  
Pond sections (2 perpendicular to each other)  
Pond Typical Section  
Limits of wetlands

**RETENTION/DETENTION POND CROSS  
SECTIONS**

Horizontal and vertical scale  
Existing ground line  
Station numbers  
Begin and end pond stationing  
Pond centerline and elevations  
R/W  
Soil borings  
Water table  
Extent of unsuitable material  
Earthwork quantities  
Existing utilities  
Proposed template with bottom elevation

**CROSS SECTION PATTERN**

North arrow and scale  
Interchange layout  
Access and frontage roads  
Mainline and ramp stationing  
Begin and end bridge stations  
Cross section location lines  
Ramp baselines with nomenclature and stationing

**ROADWAY SOIL SURVEY**

Soil data  
Project specific

**CROSS SECTIONS**

R/W  
Special ditch bottom elevations  
Equivalent stations for ramps and mainline  
Mainline equation stations  
Soil borings  
Water table  
Extent of unsuitable material  
Proposed template with profile grade elevation  
Earthwork Columns  
Begin and end stationing for project, construction and earthwork, bridge and bridge culvert  
Existing utilities affected by the template and where unsuitable materials are present

**STORMWATER POLLUTION PREVENTION PLANS (SWPPP)**

Narrative Description (with supplemental topographic maps, when used)

**TRAFFIC CONTROL PLANS**

Preliminary traffic control plan  
Detour plan  
Phasing plan  
R/W - existing and additional if required  
Existing Utilities

**UTILITY ADJUSTMENT**

All existing utilities highlighted

**SELECTIVE CLEARING AND GRUBBING**

Limits of construction by station and type of selective clearing and grubbing

**MITIGATION PLANS**

Project Specific

**MISCELLANEOUS STRUCTURES PLANS**

Retaining walls (Cast in place, proprietary, temporary) if required

**SIGNING AND PAVEMENT MARKING PLANS - KEY SHEET**

Financial Project ID  
(Federal Funds) notation, if applicable  
State Road Number  
County Name  
FDOT Project Manager's Name  
Begin/end stations & exceptions  
Station Equations (if location map is shown)  
Governing Standards & Specifications Date  
Engineer of Record  
Consultants name & address, if applicable

**SIGNING AND PAVEMENT MARKING PLANS - TABULATION OF QUANTITIES**

Project Specific

**SIGNING AND PAVEMENT MARKING PLANS - PLAN SHEETS**

North arrow and scale  
Basic Roadway Geometrics  
Begin/End Stations and Exceptions  
Station equations  
Conflicting utilities, lighting or drainage  
Pavement markings  
Sign locations  
Applicable pay items

**SIGNING AND PAVEMENT MARKING PLANS - SIGN DETAIL SHEETS**

GUIDE SIGN WORK SHEETS  
Project Specific

**SIGNALIZATION PLANS - KEY SHEET**

Financial Project ID  
(Federal Funds) notation, if applicable  
State Road Number  
County Name  
FDOT Project Manager's Name  
Begin/end stations & exceptions  
Station Equations (if location map is shown)  
Governing Standards & Specifications Date  
Engineer of Record  
Consultants name & address, if applicable

**SIGNALIZATION PLANS - TABULATION OF QUANTITIES**

Project Specific

**SIGNALIZATION PLANS - PLAN SHEET**

North arrow and scale  
Basic Roadway Geometrics  
Begin/End Stations and Exceptions  
Station Equations  
Conflicting utilities, lighting or drainage  
Signal Pole Location  
Type and location of loops  
Type and location of signal heads  
Pedestrian Signal  
Location of Stop Bars  
Location of Pedestrian Crosswalks  
Sheet Title  
Applicable pay items

**SIGNALIZATION PLANS - POLE SCHEDULE**

Pole location, number, type  
Pole dimensions  
Pay item number and quantity  
Joint use pole details, if applicable  
Foundation design

**SIGNALIZATION PLANS - INTERCONNECT/  
COMMUNICATION CABLE PLAN**

Placement of interconnect/communication cable  
Conflicting utilities, lighting or drainage  
Other project specific details

**ITS PLANS - KEY SHEET**

Financial Project ID  
(Federal Funds) notation, if applicable  
State Road Number  
County Name  
FDOT Project Manager's Name  
Begin/end stations & exceptions  
Station Equations (if location map is shown)  
Governing Standards & Specifications Date  
Engineer of Record  
Consultants name & address, if applicable

**ITS PLANS - TABULATION OF QUANTITIES**

Project Specific

**ITS PLANS - PLAN SHEETS**

Project Specific, but must include:  
North arrow and scale  
Basic Roadway Geometrics  
Begin/End Stations and Exceptions  
Station equations  
Conflicting utilities, lighting or drainage  
Applicable pay items

**ITS PLANS - DETAIL SHEETS**

Project Specific

**LIGHTING PLANS - KEY SHEET**

Financial Project ID  
(Federal Funds) notation, if applicable  
State Road Number  
County Name  
FDOT Project Manager's Name  
Begin/end stations & exceptions  
Station Equations (if location map is shown)  
Governing Standards & Specifications Date  
Engineer of Record  
Consultants name & address, if applicable

**LIGHTING PLANS - TABULATION OF QUANTITIES**  
Project Specific

**LIGHTING PLANS - POLE DATA AND LEGEND SHEET**

Each pole by number with location, arm length, mounting height and luminaire wattage noted.  
Design value for light intensities and uniformity ratios shown.  
Legend and sheet title

**LIGHTING PLANS - PLAN SHEETS**

North arrow and scale  
Basic Roadway Geometrics  
Begin/End Stations and Equations  
Station Equations  
Conflicting utilities, drainage, signal poles, etc.  
Sheet title  
Applicable pay items  
Pole symbols shown at correct station location and approximate offset

**LIGHTING PLANS - HIGH MAST**

Foundation detail sheets (project specific)  
Boring data sheets (project specific)  
Conflicting utilities, drainage, lighting

**LANDSCAPE PLANS - KEY SHEET**

Financial Project ID  
(Federal Funds) notation, if applicable  
State Road Number  
County Name  
FDOT Project Manager's Name  
Begin/end stations & exceptions  
Station Equations (if location map is shown)  
Governing Standards & Specifications Date  
Engineer of Record  
Consultants name & address, if applicable

**LANDSCAPE PLANS - TABULATION OF QUANTITIES**  
Project Specific

**LANDSCAPE PLANS – PLANT SCHEDULE AND DETAILS SHEET**

Applicable plant schedule and details

**LANDSCAPE PLANS - PLAN SHEETS**

Roadway and sidewalk plan  
Component plans features (signing, signalization, lighting, etc.)  
Plant placement by symbol  
Legend for plant symbols  
Existing utilities  
Limits of clear sight  
Canopy limits/location of existing vegetation  
Billboard view zones

**LANDSCAPE PLANS - IRRIGATION PLAN**  
(if applicable)

Type of system  
Location and size of pipes  
Type and location of heads

**LANDSCAPE PLANS - SPECIFICATIONS PLAN SHEET**  
Project specific

### **2.3.2.3 Phase III Plans Submittal**

Ordinarily, the only other remaining work to be done will be to comply with comments received as a result of the review. The Work Zone Traffic Control items paid for on a 'per day' basis shall be estimated and included in the Phase III submittal.

The FDOT construction department will make a biddability review and will establish construction duration as a part of the Phase III review after receiving the computation book. This information should be included in the Phase III review comments transmitted back to the EOR. The estimated pay items for Work Zone Traffic Control shall be revised as necessary based on the established construction duration.

All plan sheets and computation books are complete and the Financial Management (FM) system has been updated. Final drainage tabulations shall also be furnished for review.

Utility Joint Participation Agreement (JPA) Plans, consisting of a key sheet, and mainline plan-profile showing proposed utility horizontal and vertical locations, are also to be included in the Phase III submittal.

A "marked up" set of the plans and review comments shall be returned to the EOR for incorporation of the comments into the plans. When the review comments have been resolved and documented by the designer, the plans are ready to proceed to completion.

### **2.3.2.4 Phase IV Plans Submittal**

After all corrections noted in the Phase III submittal are complete and the cost estimate is complete, the plans are considered final.

## Chapter 3

### Key Sheet

3.1	General .....	3-1
3.2	Project Identification .....	3-2
3.2.1	Financial Project ID, Federal Funds, County Name and State Road Number .....	3-2
3.2.2	Fiscal Year and Sheet Number .....	3-3
3.2.3	Length of Project Box.....	3-3
3.3	Project Location Map .....	3-5
3.4	North Arrow and Scale .....	3-7
3.5	Component Plans in Contract Plans Set.....	3-8
3.6	Index of Sheets .....	3-9
3.7	Professional Responsibility .....	3-11
3.8	Governing Specifications and Standards .....	3-12
3.9	State Map.....	3-12
3.10	Railroad Crossing.....	3-13
3.11	Revisions.....	3-13
3.12	Design Standards Modifications.....	3-14

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## Chapter 3

### Key Sheet

#### 3.1 General

This is the first sheet in the contract plans. It describes the project, the contents of the plans, and identifies those responsible for preparing the plans. The key sheet cell can be found in the FDOT Engineering/CADD Systems Software. Levels and fonts for additional data can be found in the FDOT ***CADD Production Criteria Handbook***.

For key sheet example, see ***Exhibit KS-1***.

## 3.2 Project Identification

Background: On May 21, 1997, the State Highway Engineer, instructed District Secretaries on the implementation of the Financial Management System. This system replaces the Work Program Administration, the Job Cost Reporting and the Federal Project Accounting systems. Once implemented, all contract documents/sheets that historically had shown project or WPI numbers were to have the new project number on every sheet. Beginning March 16, 1998, a Financial Project ID was assigned to each old project, and from then on new projects have been assigned the Financial Project ID only. In his memorandum to the District Design Engineers dated April 22, 1998, the State Roadway Design Engineer requested that, starting with the plans packages mailed to Tallahassee for the January 1999 letting, the new number be printed on all sheets. On June 30, 1998, the Secretary instructed the Department to use the Financial Project ID in all project documents.

### 3.2.1 Financial Project ID, Federal Funds, County Name and State Road Number

The Financial Project ID is the main number identifying each individual project within the Department. On the key sheet, this number is located immediately under the heading "CONTRACT PLANS", as shown in the exhibits. Where Federal funds are involved, the words "(Federal Funds)" are to be placed under the Financial Project ID. The county name and the state road number will be included under the Financial Project ID. Also, the "county and roadway section number" associated with Straight Line Diagrams will be placed within parentheses to the right of the county name, as shown on **Exhibit KS-1**.

| Strung projects, those that are independently prepared but are to be let in the same construction contract, shall have the additional Financial Project IDs noted on the right side of the key sheet.

On projects which have one Contract plans set, but multiple Financial Project ID's, all of the Financial Project ID's are located immediately under the heading "CONTRACT PLANS" on the key sheet. However, on all other plan sheets, only the lead Financial Project ID is to be shown.

## 3.2.2 Fiscal Year and Sheet Number

The construction fiscal year to be entered in the fiscal year box on the bottom right corner is the second year in the fiscal year, i.e., enter 01 for fiscal year beginning July 2000 and ending June 2001. The key sheet of each component of the plans set will be numbered as the first sheet of that component.

## 3.2.3 Length of Project Box

Lengths of roadway, bridges, bridge culverts, exceptions, and net and gross lengths of the project shall be shown in a box in the center of the sheet below the location map. The length of the project is computed as follows:

1. Roadway = End Project - Begin Project - Exceptions - Bridges (not including bridge culverts) adjusted for Equations
2. Net = Roadway + Bridges
3. Gross = End Project - Begin Project (adjusted for Equations)

The roadway and bridge length shall be computed in feet and converted to miles, to three decimal places, without rounding off. The roadway and/or bridge mileage shall then be rounded so that their total equals the net length. The survey line should be used to compute the length of the project unless: the construction line is substantially different in length (100 feet or more), or the survey line is outside the right of way, or the survey line bridge length is different from the construction line bridge length. The use of the survey line will generally result in fewer equations on the key map.

If divided highways have significantly different lengths for the left and right roadways, the project length shall be based on the longer roadway. A note stating which roadway was used shall be placed adjacent to the project length box.

The "Begin Project" and "End Project" stations are the basis for computing the length. Begin and end construction stations are not to be used in computing the length of the project.

A length of project box is not required on component key sheets.

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### 3.3 Project Location Map

This map is placed in the center of the sheet and consists of a reproduced portion of one or more maps showing the project location. The map may be a county map or other appropriate map. County maps in raster format (\*.cal) are available from the Survey and Mapping Office on CD or can be individually downloaded by county through MicroStation or AutoCAD as a raster reference attachment. Information on the county maps is available at:

<http://www.dot.state.fl.us/surveyingandmapping/geographic.htm>

A utility to download the raster county map and clip out the project location area is provided in the **FDOT CADD Software**. Requests for county maps on CD should be in writing and include the county requested, the purpose for the use, the anticipated duration of the use, the Department of Transportation project manager's name and a CD upon which to copy the data. Requests should be directed to:

Florida Department of Transportation  
Survey & Mapping Office  
605 Suwannee Street, MS 5L  
Tallahassee, Florida 32399-0450  
(850) 414-7924

The intent of the location map is to provide enough information so that the project location is easily understood. This may make it necessary to show the Section, Township, Range and County lines together with Section, Township and Range numbers to make the location clear. City and urban limits should be shown where applicable. The begin milepost, correct to three decimal places, shall be shown under the begin project station.

Streets shall be designated by name and State Road number or U.S. Highway number, if appropriate. The name of the next incorporated city to which these roads lead shall be placed at the edge of the map. Roads and topography shall be indicated by standard symbols as shown in the **Design Standards, Index 002** and FDOT Engineering/CADD Systems Software.

Project location shall be shown by a heavy solid line of substantial width. It is sometimes advantageous to show station numbers at regular intervals, particularly with city street projects. The begin and end of projects, any station equations, begin and end of proposed bridges along the state project, bridge culverts and exceptions shall be stationed and flagged.

When several projects are covered by the same set of plans, the beginning and end of each project shall be indicated clearly by the Financial Project ID and stationing. The beginning of each project shall also be indicated by a milepost correct to three decimal places.

The scale of the location map should be chosen so that it will not interfere with other features on the key sheet. A common error is to position the location map on the sheet and then discover that insufficient space remains for the index of sheets, project title or the length of project box.

A location map is not required on component key sheets.

## **3.4 North Arrow and Scale**

The north arrow shall be placed on either side of the location map, preferably to the right. The map scale shall be shown directly below the north arrow. The scale shall be indicated by using a bar scale. The scale distance shall be shown between the ticks. The map shall be oriented so that the arrow will point toward the top of the sheet. If the arrow cannot be oriented to the top, then it must be oriented to point to the right.

### **3.5 Component Plans in Contract Plans Set**

A list of component plans included in the contract plans set shall be shown in the upper left corner. The order of listing shall be:

1. Roadway
2. Signing and Pavement Marking
3. Signalization
4. Intelligent Transportation Systems (ITS)
5. Lighting
6. Landscape
7. Architectural
8. Structures

If sheets covering items such as signing and pavement markings, signalization, ITS, lighting and landscape are included and numbered consecutively within the roadway plans, these are not to be shown as components of the contract plans set.

## 3.6 Index of Sheets

A complete index of roadway plan sheets shall be placed on the left side of the key sheet under the heading. When projects contain component plans, each plans set shall have an index of sheets on its respective key sheet.

Roadway plans sheets shall be assembled as follows:

1. Key Sheet
2. Summary of Pay Items
3. Drainage Map (optional)
4. Interchange Drainage Map
5. Typical Section
6. Summary of Quantities
7. Box Culvert Data Sheet (if **PSTDN55** design)
8. Summary of Drainage Structures
9. Optional Materials Tabulation
10. Project Layout (optional)
11. Roadway Plan-Profiles
12. Special Profiles
13. Back-of-Sidewalk Profiles (optional)
14. Interchange Layout
15. Ramp Terminal Details
16. Intersection Layout/Detail
17. Drainage Structures
18. Box Culvert Details (if **LRFD** design)
19. Outfall/Lateral Ditch Plan-Profiles
20. Outfall/Lateral Ditch Cross Sections
21. Special Details
22. Cross Section Pattern
23. Roadway Soil Survey

24. Cross Sections
25. Stormwater Pollution Prevention Plans (SWPPP)
26. Traffic Control Plans
27. Utility Adjustments
28. Selective Clearing and Grubbing
29. Signing and Pavement Marking Plans (when included as part of roadway plans)
30. Signalization Plans (when included as part of roadway plans)
31. ITS Plans (when included as part of roadway plans)
32. Lighting Plans (when included as part of roadway plans)
33. Landscape Plans (when included as part of roadway plans)
34. Mitigation Plans
35. Miscellaneous Structures Plans

### **3.7 Professional Responsibility**

The name of the Engineer of Record, Architect or Landscape Architect of Record and registration number shall be included on the right side of the sheet. For specific instructions on sealing plans see ***Volume I, Chapter 19***.

For plans prepared by a consulting firm, the name, address, consultant contract number, certificate of authorization number and vendor number of the firm shall be shown on the right side of the sheet.

The Department Project Manager's name shall be shown below the length of project box for consultant and Department prepared plans. For key sheets where length of project is not required, the Department Project Manager's name shall be shown in the same relative location on the sheet.

If shop drawings are anticipated for a project, the name(s) and address(es) of the Delegated Engineer(s) for shop drawing review(s) shall be shown on the right side of the sheet.

### **3.8 Governing Specifications and Standards**

The date of the governing ***Standard Specifications for Road and Bridge Construction*** and of the ***Design Standards*** shall be inserted in a note at the lower left corner of the key sheet.

### **3.9 State Map**

A small-scale state map shall be shown at the upper right portion of the key sheet. The location of the project shall be indicated thereon.

### **3.10 Railroad Crossing**

The location of any railroad crossing within the limits of construction will be identified on the key sheet as follows: DOT/AAR crossing number, railroad milepost, name of railroad, and the highway project station number.

### **3.11 Revisions**

The lead key sheet (usually roadway) shall show a complete record of all plans revisions. The component (such as roadway, structures, signing and pavement marking), the sheet numbers involved, and the date when the sheet was revised shall be listed.

A newly sealed lead key sheet is required when any sheet is revised.

Revisions shall be shown on the lower left corner of the key sheet in the “Revisions” area. Revisions to strung project sheets shall be listed here, under the respective Financial Project ID.

A Key Sheet Revisions Block shall be shown on the right side of each component key sheet that shall contain a record of all revisions particular to that sheet. It shall list the revision date, the initials of the person responsible for the revision and a brief description of the revision.

If the changes to a key sheet only involve notes in the Revisions area, no entry is made in the Key Sheet Revisions Block at the lower right corner. The Key Sheet Revisions Block is only used to record changes other than revisions notes.

### 3.12 Design Standards Modifications

**Interim Standards** shall not be attached to the Contract Plans Set. For all project lettings through June 2005, the lead key sheet shall show a complete list of all Interim Standards applicable to the project. The Index number, sheet number, and effective date shall be listed, and the Internet address shall be clearly defined. The Interim Standards information shall be shown on the lower left corner of the key sheet, below the Governing Specifications and Standards note, and above the Revisions area.

Beginning with the July 2005 letting, it will not be necessary to list the applicable Interim Indexes on the Key Sheet. Instead, a document entitled **Design Standards Modifications** will include a listing of all Interim Design Standards issued since publication of the applicable booklet, plus all changes and corrections to notes and text within the booklet that do not warrant the issuance of Interim Indexes (previously handled by Special Provision). The Design Standards Modifications documents will be dated, and posted on the same web site as the Design Standards. The Design Standards Modifications will typically be updated and posted in January and July, 6 months prior to the effective letting date. For example, **Design Standards Modifications** dated July 1, 2005 will be posted on the web site in January 2005, but will be effective beginning with the July 2005 letting. Special updates to the Design Standards Modifications posted in between January and July will only be issued when necessary to address changes of immediate concern. When this occurs, email notification will be sent to the Districts and registered Plans Preparation Manual holders. The applicable Design Standards Modifications and date, and Internet address shall be shown on the lower left corner of the Key Sheet, below the Governing Specifications and Standards note, and above the Revisions area. See **Exhibit KS-1**. Note that all Interim Indexes listed in the Design Standards Modifications document will be applicable.

**COMPONENTS OF CONTRACT PLANS SET**

- ROADWAY PLANS
- SIGNING AND PAVEMENT MARKING PLANS
- SIGNALIZATION PLANS
- INTELLIGENT TRANSPORTATION SYSTEMS PLANS
- LIGHTING PLANS
- LANDSCAPE PLANS
- ARCHITECTURAL PLANS
- STRUCTURE PLANS

EXAMPLE ONLY: CONTRACT PLANS SET  
MAY NOT CONTAIN ALL OF THE  
LISTED COMPONENTS/SHEETS.

A DETAILED INDEX APPEARS ON THE  
KEY SHEET OF EACH COMPONENT

**INDEX OF ROADWAY PLANS**

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2-2A	SUMMARY OF PAY ITEMS
3	DRAINAGE MAP
4-5	TYPICAL SECTIONS
6	TYPICAL SECTION DETAILS
7	SUMMARY OF QUANTITIES
8-14	BOX CULVERT DATA SHEETS
15-16	SUMMARY OF DRAINAGE STRUCTURES
17	PROJECT LAYOUT
18-22	ROADWAY PLAN-PROFILES
23-24	SPECIAL PROFILES
25	INTERSECTION LAYOUT/DETAIL
26-32	DRAINAGE STRUCTURES
33	LATERAL DITCH PLAN-PROFILES
34	LATERAL DITCH CROSS SECTIONS
35	SPECIAL DETAILS
36	ROADWAY SOIL SURVEY
37-47	CROSS SECTIONS
48	STORMWATER POLLUTION PREVENTION PLAN
49-52	TRAFFIC CONTROL PLANS
53-57	UTILITY ADJUSTMENTS
58-62	SELECTIVE CLEARING AND GRUBBING

GOVERNING STANDARDS AND SPECIFICATIONS:  
FLORIDA DEPARTMENT OF TRANSPORTATION,  
DESIGN STANDARDS DATED JANUARY 2004,  
AND STANDARD SPECIFICATIONS FOR ROAD AND  
BRIDGE CONSTRUCTION DATED 2004,  
AS AMENDED BY CONTRACT DOCUMENTS.

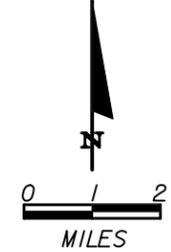
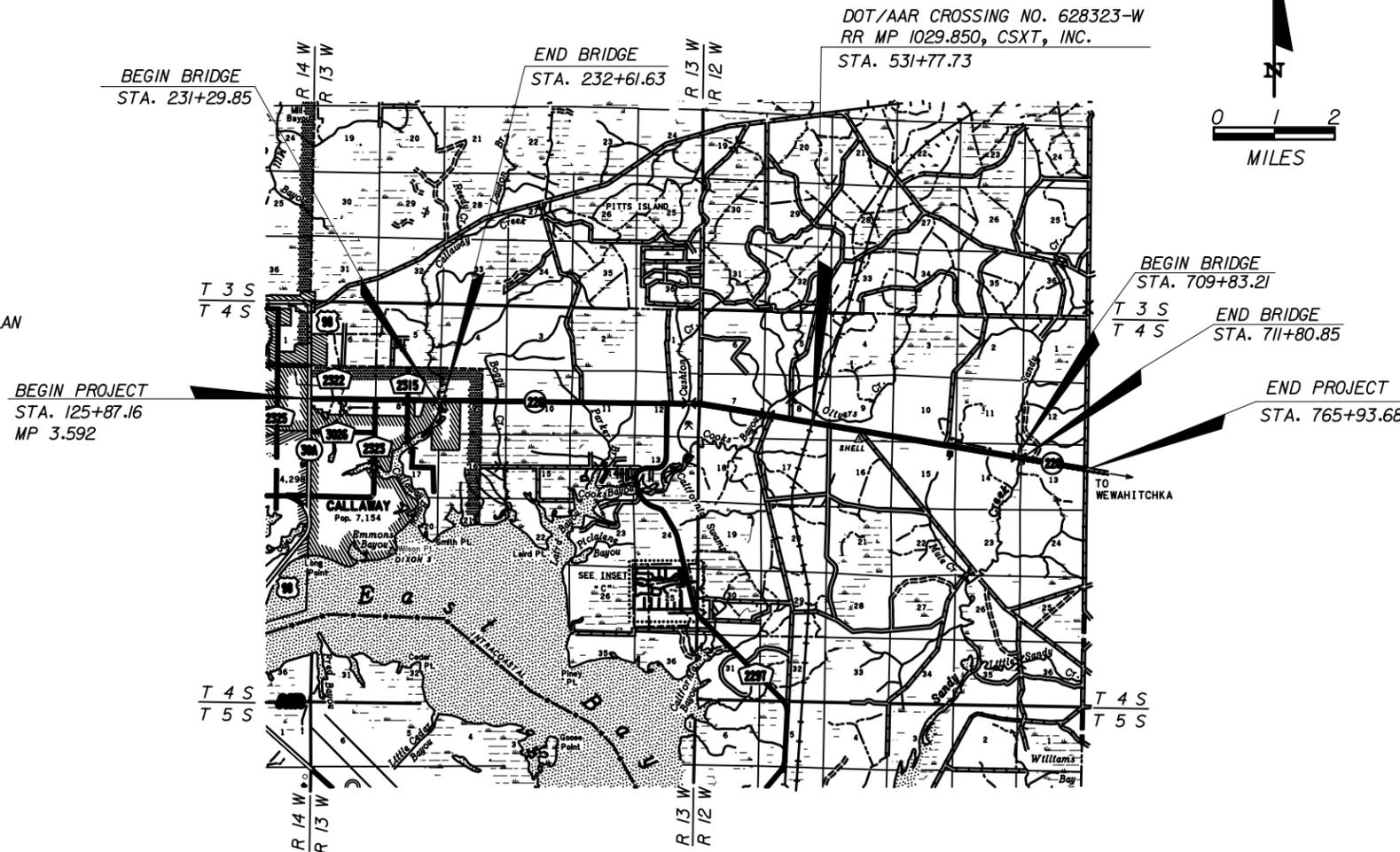
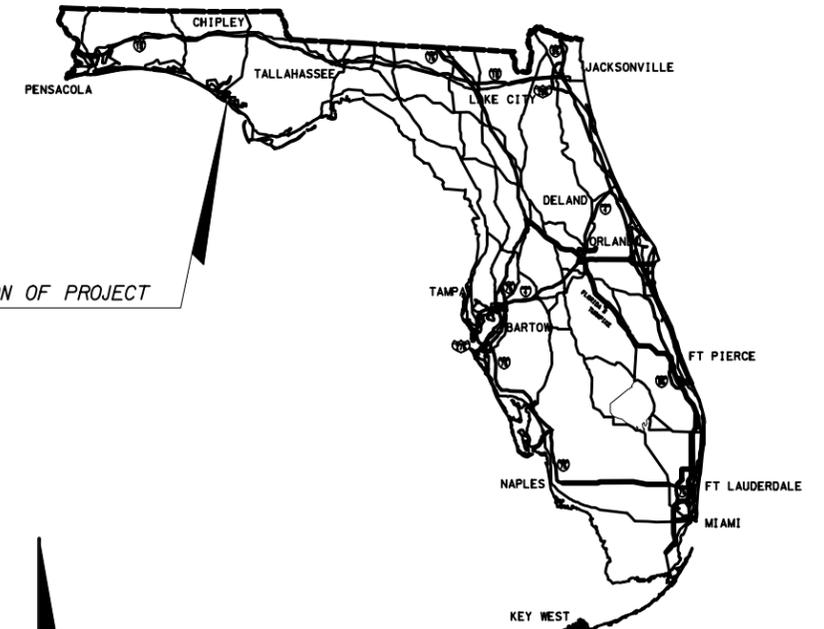
APPLICABLE DESIGN STANDARDS MODIFICATIONS: 7-1-05

For Design Standards Modifications click on  
"Design Standards" at the following web site:  
<http://www.dot.state.fl.us/rddesign/>

**STATE OF FLORIDA  
DEPARTMENT OF TRANSPORTATION**

**CONTRACT PLANS**

FINANCIAL PROJECT ID 000001-1-52-01  
(FEDERAL FUNDS)  
BAY COUNTY (46001)  
STATE ROAD NO. 220



ROADWAY SHOP DRAWINGS  
TO BE SUBMITTED TO:

NAME(S) AND ADDRESS(ES) OF  
ENGINEER(S) RESPONSIBLE FOR REVIEW  
OF SHOP DRAWINGS, WHEN REQUIRED.

PLANS PREPARED BY:

NAME, ADDRESS, CONTRACT NUMBER, VENDOR NUMBER  
AND CERTIFICATE OF AUTHORIZATION NUMBER OF  
THE CONSULTANT FIRM WHEN THE PLANS ARE  
PREPARED BY A CONSULTANT.

NOTE: THIS PROJECT TO BE LET TO CONTRACT  
WITH FINANCIAL PROJECT ID 000002-1-52-02.

NOTE: THE SCALE OF THESE PLANS MAY  
HAVE CHANGED DUE TO REPRODUCTION.

**EXHIBIT KS-1**  
Date: 1/1/05

- REVISIONS**
- FINANCIAL PROJECT ID 000001-1-52-01  
Roadway Sheets 1, 6, 7 & 13 (Revised 03-10-05)
  - Signing & Pavement Marking Sheets S-2 & S-3 (Revised 3-10-05)
  - Signalization Sheets T-1 & T-2 (Revised 11-30-04)
  - Roadway Sheets 14 & 33 (Revised 3-31-05)
  - Summary Of Pay Items (Revised 3-31-05)
  - FINANCIAL PROJECT ID 000001-1-52-04  
Roadway Sheets 1, 8 & 10 (Revised 3-31-05)
  - Structure Sheets B-1 & C-1 thru C-10 (Revised 11-30-04)

LENGTH OF PROJECT		
	LINEAR FEET	MILES
ROADWAY	63,677.10	12.060
BRIDGES	329.42	0.062
NET LENGTH OF PROJ.	64,006.52	12.122
EXCEPTIONS		
GROSS LENGTH OF PROJ.	64,006.52	12.122

KEY SHEET REVISIONS		
DATE	BY	DESCRIPTION
3-05	JBW	Revised sequence of contract plans.

ROADWAY PLANS  
ENGINEER OF RECORD: \_\_\_\_\_

P.E. NO. : \_\_\_\_\_

FISCAL YEAR	SHEET NO.

FDOT PROJECT MANAGER :

ELECTRONIC SIGNATURE NOTE WHEN SHEET IS ELECTRONICALLY SIGNED AND SEALED

## Chapter 4

### Summary of Pay Items

4.1	General.....	4-1
4.2	Summary of Pay Items Sheet.....	4-2

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## Chapter 4

### Summary of Pay Items

#### 4.1 General

The summary of pay items sheet is generated from information provided by the Engineer of Record (EOR) and input into TRNS\*PORT. In TRNS\*PORT, there are differences in producing the Project Summary of Pay Items and the Proposal Summary of Pay Items. Use the appropriate report, based on the project's phase:

For early phase reviews (up to Phase III, or until the proposal has been created), the Project Summary of Pay Items Report must be used (No proposal, no proposal report). If multiple projects are anticipated to be let together, the designer should be sure to print each project's Summary of Pay Items for review. These reports may be printed on standard 8.5" by 11" paper. It is not necessary to put in CADD sheet format for phase review submittals.

For later phase reviews (Phase III or after the proposal has been created), the Proposal Summary of Pay Items Report should be used. After the designer submits the report from the designer interface menu, the output will be sent to the CADD ftp site in 5-10 minutes.

The output shall be transferred to a graphics design file and placed on a standard formatted plan sheet available in the FDOT Engineering/CADD Systems Software. The TRNS\*PORT file must be established and kept current with the quantities listed in the plans. It is critical that any revisions to the TRNS\*PORT file be transferred to update the graphics design file. The TRNS\*PORT file is used to prepare the bid documents and must match the plans.

## 4.2 Summary of Pay Items Sheet

The summary of pay items sheet(s) show all items and quantities for all components (PES Categories) for the project, or projects, in a contract. CADD produced summary of pay items sheets are placed directly behind the lead key sheet and must include:

1. All the summaries for all component plans listed for the project.

These should be placed in the same order as the contract plans listed on the key sheet. They should be numbered consecutively. Alpha suffixes may be used for numbering to allow for the insertion of additional sheets without renumbering the Index of Sheets.

Note: Only the lead key sheet for the entire contract should contain reference to summary of pay items.

2. All projects let under this contract.

Projects that are let under the same contract should be combined in the same Proposal ID.

Summary of pay items notes may be included on this sheet if they do not fit on the summary of quantities sheet. For small projects, the summary or pay item sheet(s) may be combined with the summary of quantities sheet.

A summary of pay items sheet without quantities is required at the Phase II submittal, and a complete summary of pay items sheet with quantities is required at the Phase III and Phase IV submittals. Refer to **Chapter 2** for requirements of phase submittals.

For a list of standard pay item notes see **Chapter 7, Exhibit 7-1** of this volume.

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## Chapter 5

### Drainage Map and Bridge Hydraulic Recommendation Sheet

5.1	Drainage Map.....	5-1
5.1.1	Plan Portion .....	5-2
5.1.2	Profile Portion .....	5-3
5.1.3	Flood Data Summary Box .....	5-4
5.1.4	Interchange Drainage Map .....	5-4
5.2	Bridge Hydraulic Recommendation Sheet .....	5-5
5.2.1	Required Information on BHRS.....	5-5
5.2.1.1	Plan View .....	5-6
5.2.1.2	Profile View .....	5-6
5.2.1.3	Location Map, Drainage Map, and Existing Structures.....	5-7
5.2.1.4	Hydraulic Design Data, and Hydraulic Recommendations .....	5-7
Exhibits		
Exhibit 5-1	Drainage Map Notes .....	5-9

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## Chapter 5

# Drainage Map and Bridge Hydraulic Recommendation Sheet

### 5.1 Drainage Map

When a drainage map is required (see FDOT *Drainage Manual, Topic No. 625-040-002*) it shall be prepared and included in the project file. Inclusion of a drainage map in the contract plans set is optional at the district's discretion.

Preformatted drainage map sheet cells are located in the FDOT Engineering/CADD Systems Software. The upper (grid) portion of each sheet is used for plotting the project profile, which is optional at the discretion of the district. The standard grid pattern for the profile portion of the sheet is five lines per inch, both in the horizontal and vertical. This will accommodate most scales. An optional grid with four lines per inch is available. This sheet may be used if approved by the district.

Topography of the project area shall be located in the remaining portion of the sheet. Aerial photography may be used to develop a drainage map but must not be used in the contract plans set.

The horizontal and vertical scales of the profile should be such that the stations and elevations can be read directly from the grid without the use of a scale. The horizontal scale must be the same for both the plan and profile views. Recommended scales for facility types are as follows:

<u>Type of Facility</u>	<u>Horizontal Scale</u>	<u>Vertical Scale</u>
Interstate Urban	1" = 500'	1" = 5'/1"=10'
Interstate & Other Rural	1"=1000'/2000'	1" = 10'/1"=20'
Municipal & Other	1"=200'/500'	1"= 5'/1" =10'

## 5.1.1 Plan Portion

The plan portion shall comply with the following requirements:

1. Stationing shall be shown every 500 feet for scales of 1" = 100'/200', every 1000 feet for a scale of 1" = 500' and every 5000 feet for scales of 1" = 1000'/2000'. For additional information see **Figure 10.1** in **Chapter 10** of this volume.

Station equations and exceptions shall be shown. Begin and end stations of project, construction, bridge and bridge culverts shall also be shown.

2. Existing physical land features affecting drainage, such as lakes, streams and swamps, shall be clearly labeled by name and direction of flow. Past high water elevations and date of occurrence, if available, and present water elevations along with the dates the readings were taken shall be shown.

Drainage divides and other information (such as pop-off elevations and spot elevations) shall be shown, where applicable, to indicate the overland flow of water. Drainage areas on maps shall be shown in acres.

Inserts shall be used to show areas that are of such magnitude that the boundaries cannot be plotted at the selected scale.

3. Existing road numbers and street names, drainage structures with type, size, flow line elevations, flow arrows and any other pertinent data shall be shown. Refer to the FDOT Engineering/CADD Systems Software and the **Design Standards, Index No. 002** for correct symbols for existing drainage facilities. In a situation of limited space, all data relating to existing drainage structures and pipes may be compiled in a table format and shown in either the plan or profile portion of the sheet. Should the space limitations be such that a table will not fit within the plan or profile view, a supplemental drainage data sheet is acceptable.
4. Proposed drainage structures, pipes, outfall structures and retention/detention pond locations, shall be shown. Structures and pipes shall be noted by structure number, and ponds by pond number. Arrows shall be shown to indicate direction of flow along proposed ditches.
5. Section, Township, Range and county lines shall be indicated for rural and urban projects when occurring within the project limits.
6. A north arrow and scale shall be shown, preferably in the upper right corner of the plan view.
7. If the drainage map is to be included in the contract plans set, include Note No. 1 (see **Exhibit 5-1**).

## 5.1.2 Profile Portion

The profile portion, if shown, shall comply with the following requirements:

1. The recommended vertical scale for rural and urban projects is 1" = 5' in level terrain and 1" = 10' in rolling terrain. A scale of 1" = 20' may sometimes be used for rural projects through rough terrain to avoid numerous profile breaks. The profile can be broken for rolling terrain in urban areas. However, a scale of 1" = 20' should never be used at locations of proposed storm sewer systems.
2. Elevation datum shall be shown at each side of the sheet. In cases where the profile block is insufficient and excess space is available on the plan portion of the sheet, the profile block may be expanded.
3. The profile of the existing natural ground shall be plotted and labeled and the existing elevation noted at each end.
4. The proposed profile grade line shall be plotted. Percent of grade need not be shown. The PC, PI, and PT of vertical curves shall be plotted using their respective standard symbols; however, no data (station, elevation, length of curve) needs be noted. Begin and end project, bridge and bridge culvert stations, station equations and exceptions shall be flagged. Profile grade line elevations shall be shown at begin and end project stations and at the beginning and end of each additional drainage sheet.
5. Proposed cross drains shall be plotted and identified by structure number. Do not show skew or pipe slope in plotting, but plot to elevation and location at point of crossing the construction centerline.
6. For projects with storm sewer systems, only the mainline structure and pipes shall be shown. Laterals need not be shown. Each structure shall be flagged with its appropriate structure number, and flow line elevations noted for the incoming and outgoing pipes.
7. All high water elevations affecting base clearance or roadway grades shall be shown.

### 5.1.3 Flood Data Summary Box

The flood data shall be shown on the drainage map, either in the plan or in the profile portion. If the drainage map is not included in the plans the flood data shall be shown on the summary of quantities sheet or on the first plan-profile sheet.

Design, base and overtopping or greatest flood discharge and stage values are required for all cross structures (culverts and bridges), regardless of size, under the following conditions:

1. All new cross structures
2. All cross structures that are being modified (extended, new end section, replaced, etc.)
3. All cross structures that have a history of flooding or other hydraulic problems, even if the structure is not to be modified; or
4. Cross structures that are not being modified but are being impacted by the modification of another cross structure within the same drainage basin.

A "disclaimer" and definitions are required to avoid misuse and possible responsibility for changes in the flood information values over which the FDOT has no control (see **Exhibit 5-1**). A preformatted summary box with disclaimer and definitions is located in the FDOT Engineering/CADD Systems Software.

The project drainage engineer shall provide the information required to complete the box.

### 5.1.4 Interchange Drainage Map

If projects include interchanges or rest areas, a drainage map on a 1" = 200' or 1" = 500' scale shall be included. The purpose of this detail is to show the small areas needed to calculate pipe sizes for the tabulation of drainage structures within these special areas. Should major drains pass through one of these areas, a cross reference note should indicate the proper sheet which reflects the drainage area for that through-structure.

## 5.2 Bridge Hydraulic Recommendation Sheet

When a Bridge Hydraulic Recommendation Sheet (BHRS) is required (see FDOT ***Drainage Manual, Topic No. 625-040-002***), it shall be prepared on a preformatted sheet. The cell for this sheet is located in the FDOT Engineering/CADD Systems Software.

The inclusion of this sheet in the plans set is optional at the discretion of the district. When included in the plans, the BHRS shall be placed in the structures plans. If the BHRS is not included in the plans, sufficient details to show the location and extent of bottom and slope protection shall be contained in the plans.

Parallel (dual) bridges may be shown on one sheet, although a second sheet should be used, if necessary, to clearly convey the fit of the bridge to the stream bank. When two sheets are used, only the plan and profile information needs to be furnished on the second sheet.

A completed Bridge Hydraulic Recommendation Sheet is shown as ***Exhibit BHD-1***.

### 5.2.1 Required Information on BHRS

The preformatted BHRS is divided into the four areas listed below. The required information for each area is described in the following sections.

1. Plan View
2. Profile View
3. Location Map, Drainage Area and Existing Structures
4. Hydraulic Design Data, and Hydraulic Recommendations

### **5.2.1.1 Plan View**

1. Stationing, scale, and north arrow.
2. Existing topography (i.e., including existing bridge) and contours (i.e., show elevations). Sufficient detail shall be shown in the vicinity of the proposed bridge to depict how the structure will tie to natural ground.
3. Label the name of the water body (i.e., St. Johns River).
4. Arrows showing the direction of the flow.
5. Proposed bridge begin and end station.
6. Limits of riprap.

### **5.2.1.2 Profile View**

1. Stationing and scale.
2. One cross section which most represents the section at the proposed crossing.
3. Road profile for the proposed structure (i.e., stationing and elevation).
4. Proposed bridge with low member, and pier locations (when practical).
5. Abutment locations (i.e., toe of slope).
6. Flood elevations. For non-tidal crossings, the Normal High Water (NHW) and Design Flood elevations shall be shown. For tidal crossings, the Mean Higher High Water (MHHW) and Design Flood Stage elevations shall be shown.
7. Present water elevation with month, day and year of survey.

### **5.2.1.3 Location Map, Drainage Map, and Existing Structures**

1. A north arrow.
2. The range and township.
3. An arrow showing the project location.
4. A location map similar to that used on the key sheet for most projects. The map shall be of a scale so that the entire drainage area for the proposed structure is shown. (For projects with very large drainage areas, the map shall be of a scale that clearly shows the project location rather than a scale that shows the entire drainage area).

The drainage area boundaries shall be shown using a very heavy, broken line, with the area (in acres or square miles) shown within the boundary. The proposed structure location should be shown. Existing structures over the same water body and those structures that affect the hydraulics of the proposed structure should be located and numbered and corresponding existing structure information listed in the appropriate columns.

### **5.2.1.4 Hydraulic Design Data, and Hydraulic Recommendations**

The *Cross Drain Handbook* provides guidance for filling out this section.

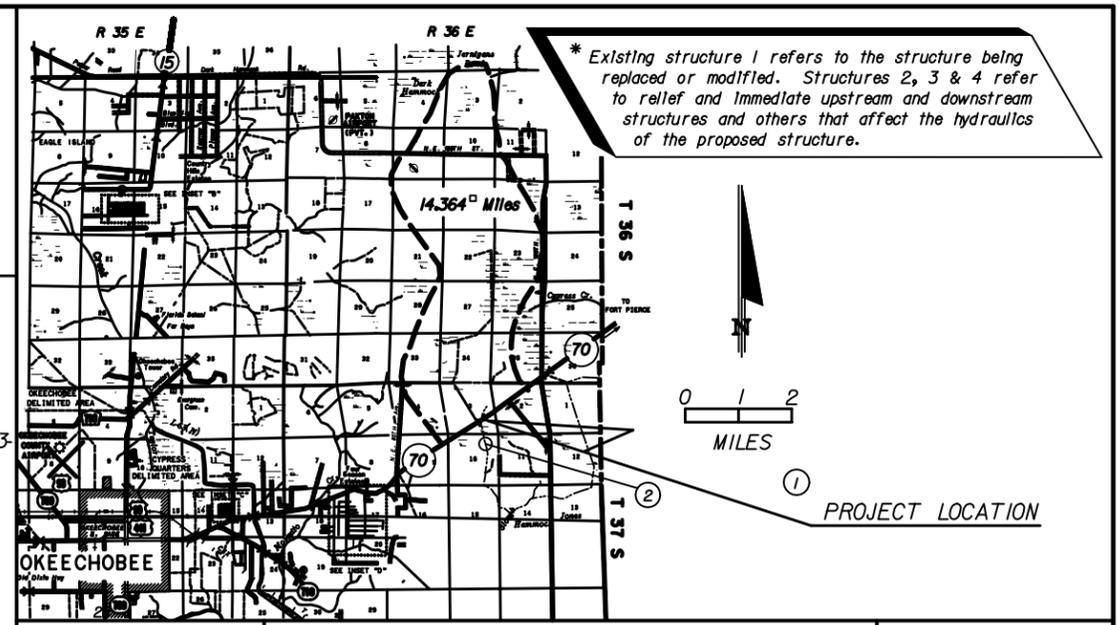
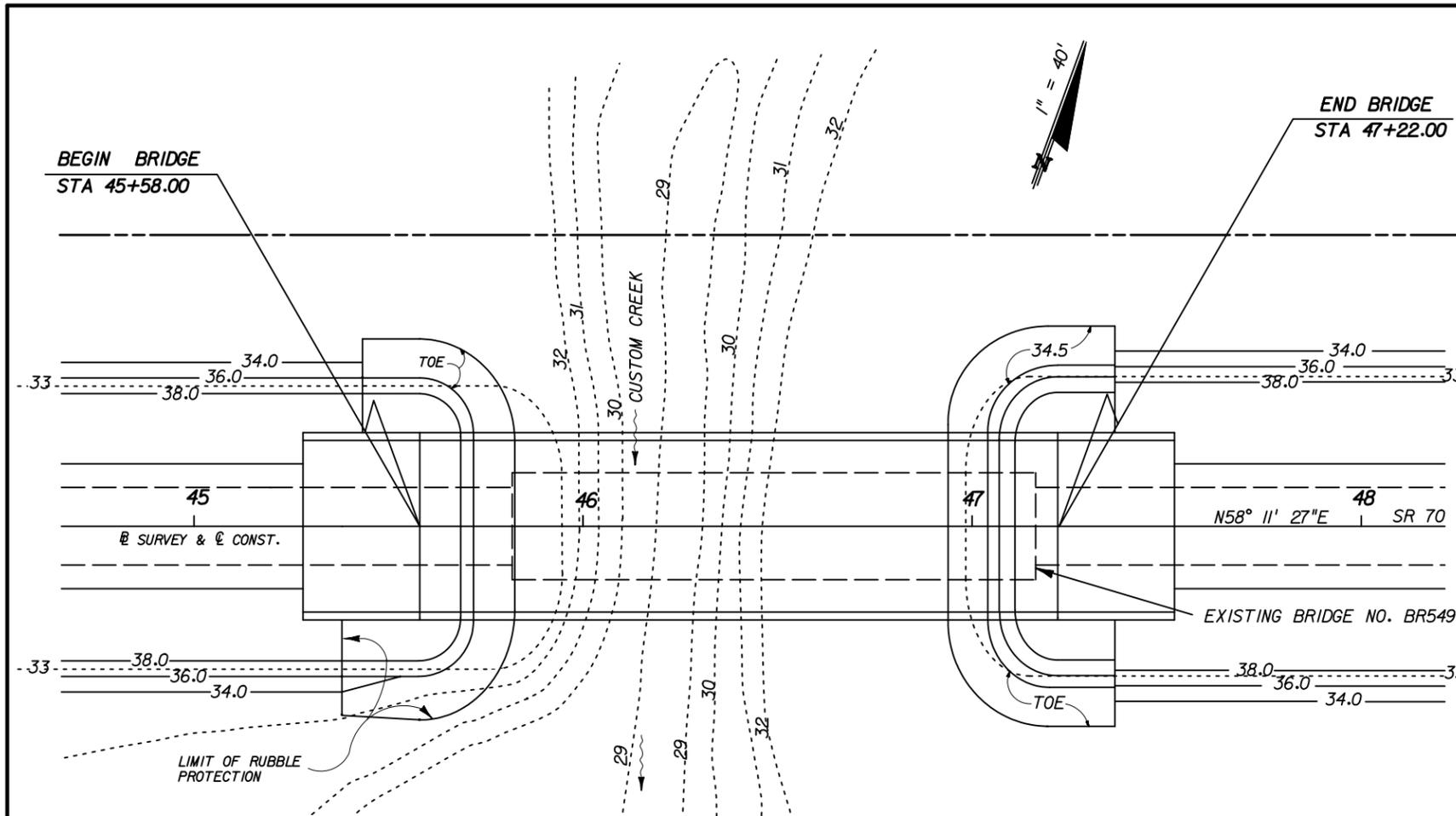
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### **Exhibit 5-1 Drainage Map Notes**

Below are standard notes which shall be placed on the drainage map as applicable.

1. (To be placed on the drainage map when it is to be included in the plans):  
*DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. This sheet is in the plans for documentation and to assist construction personnel with drainage concerns.*
2. (To be placed under Flood Data Box):  
Note: The hydraulic data is shown for informational purposes only, to indicate the flood discharges and water surface elevations which may be anticipated in any given year. This data was generated using highly variable factors determined by a study of the watershed. Many judgments and assumptions are required to establish these factors. The resultant hydraulic data is sensitive to changes, particularly of antecedent conditions, urbanization, channelization and land use. Users of this data are cautioned against the assumption of precision which can not be attained. Discharges are in cubic feet per second (cfs) and stages are in feet, NGVD, 1929 or NAVD 88, as appropriate.

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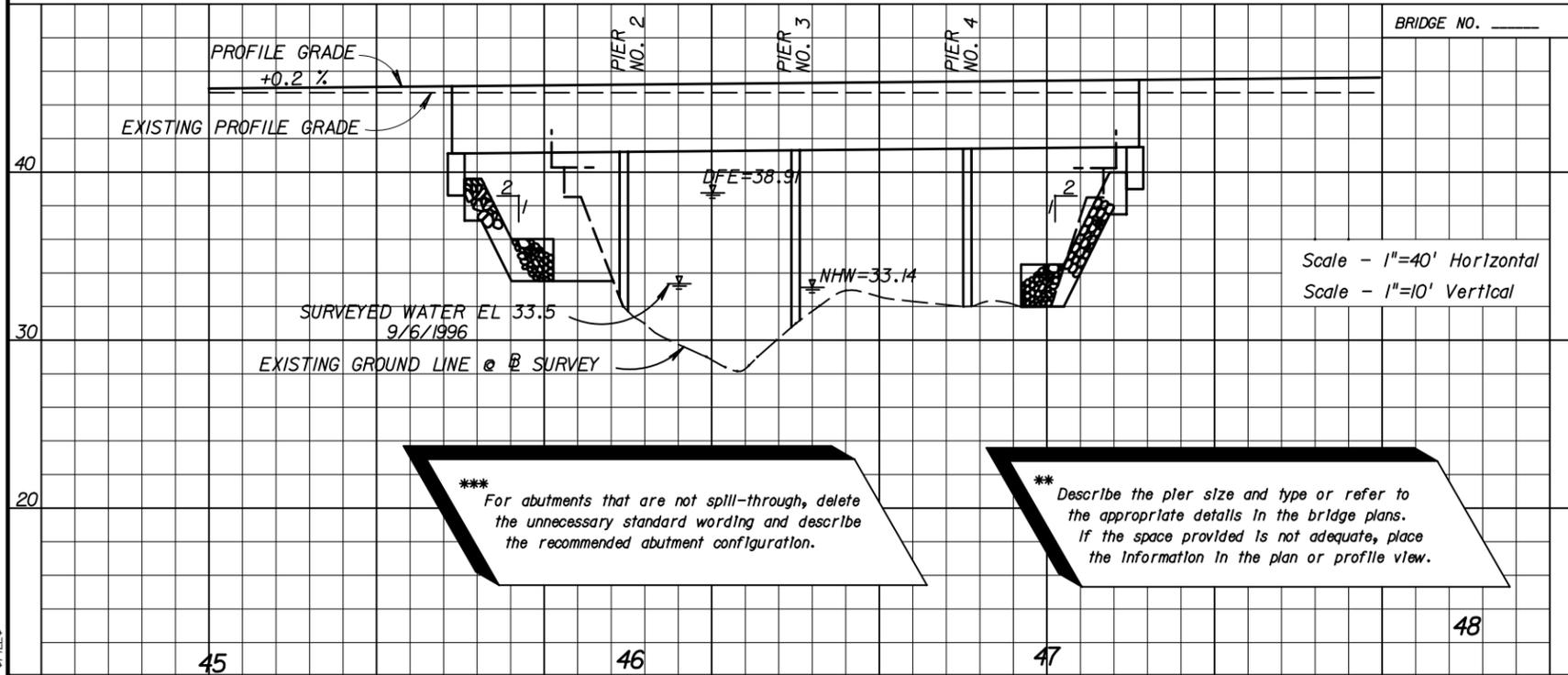
(REFERENCE)	* EXISTING STRUCTURES				PROPOSED STRUCTURE
	(1)	(2)	(3)	(4)	
FOUNDATION	Conc. Piles	Timber			Conc. Piles
OVERALL LENGTH	135	200			164 (rem. #1)
SPAN LENGTH	5 @ 27	20 @ 10			4 @ 41
TYPE CONSTRUCTION	Concrete	Timber			Concrete
AREA OF OPENING @ D.F.	1000	Unknown			1020
BRIDGE WIDTH	28'	Railroad (South)			44'
ELEV. LOW MEMBER	40.35	38.32			41.17

**HYDRAULIC DESIGN DATA**

**NOTE:** The hydraulic data is shown for informational purposes only to indicate the flood discharges and water surface elevations which may be anticipated in any given year. This data was generated using highly variable factors determined by a study of the watershed. Many judgements and assumptions are required to establish these factors. The resultant hydraulic data is sensitive to changes, particularly antecedent conditions, urbanization, channelization and land use. Users of this data are cautioned against the assumption of precision which cannot be obtained.

**TERMS:**  
**Design Flood:** Utilized to assure a desired level of hydraulic performance.  
**Base Flood:** Has a 1% chance of being exceeded in any given year (100 year frequency)  
**Overtopping Flood:** Causes flow over the highway, over a watershed divide, or thru emergency relief structures.  
**Greatest Flood:** The most severe that can be predicted where overtopping is not practicable.

WATER SURFACE ELEVATIONS:		N.H.W. (Non-Tidal)	33.14	M.H.W. (Tidal)	
CONTROL (Non-Tidal)				M.L.W. (Tidal)	
<b>FLOOD DATA:</b>		MAX. EVENT OF RECORD	DESIGN FLOOD	BASE FLOOD	
STAGE ELEV. NGVD (ft)	38.7 (rem. #2)	38.91	39.27	39.57	<input type="checkbox"/> OVERTOPPING or <input checked="" type="checkbox"/> GREATEST FLOOD
DISCHARGE (cfs)	unknown	3280	3950	4630	
AVERAGE VELOCITY (ft/s)	"	3.22	3.58	4.13	
EXCEEDANCE PROB. (%)	"	2	1	0.2	
FREQUENCY (yr.)	"	50	100	500	
<b>SCOUR PREDICTIONS FOR PROPOSED STRUCTURE DESCRIBED ABOVE:</b>					
PIER INFORMATION		LONG TERM SCOUR ELEV.	TOTAL SCOUR ELEVATION		
NUMBERS	* SIZE AND TYPE		WORST CASE < 100 yr. FREQ. (yr.)	100	WORST CASE < 500 yr. FREQ. (yr.)
2 & 3	24" Conc. Piles	N/A	18.4		16.4
4 (rem. #3)	24" Conc. Piles	N/A	27.6		25.6



\*\*\* For abutments that are not spill-through, delete the unnecessary standard wording and describe the recommended abutment configuration.

\*\* Describe the pier size and type or refer to the appropriate details in the bridge plans. If the space provided is not adequate, place the information in the plan or profile view.

**HYDRAULIC RECOMMENDATIONS**

- BEGIN BRIDGE STATION 45+58.00 END BRIDGE STATION 47+22.00 SKEW ANGLE 0°
- CLEARANCE PROVIDED: NAV: HORIZ. 39.0 VERT. 8.04 ABOVE EL. 33.14 DRIFT: HORIZ. 39.0 VERT. 2.26 ABOVE EL. 38.91
- MINIMUM CLEARANCE: NAV: HORIZ. 10.0 VERT. 6.0 ABOVE EL. 33.14 DRIFT: HORIZ. N/A VERT. 2.0 ABOVE EL. 38.91
- ABUTMENTS: BEGIN BRIDGE END BRIDGE

\*\*\* RUBBLE GRADE: Bank and Shore

SLOPE: 1:2

BURIED OR NON-BURIED HORIZ. TOE: Non-Buried

TOE HORIZ. DISTANCE: 10

LIMIT OF PROTECTION: 15' Lt., 20' Rt.

5. DECK DRAINAGE: Spread is contained in shoulder. Runoff captured by inlets at begin bridge.

**REMARKS:**  
 (1) Bridge lengthened to accommodate predicted channel migration to the west.  
 (2) Based on mark provided by local resident of 43 years.  
 (3) Due to predicted channel migration to the west and lack of meander cutoff, Pier No. 4 will not experience main channel scour depths.

**EXHIBIT BHD-1**  
 Date: 1/1/03

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

STATE OF FLORIDA  
 DEPARTMENT OF TRANSPORTATION

ROAD NO. COUNTY FINANCIAL PROJECT ID

**BRIDGE HYDRAULIC RECOMMENDATIONS**

SHEET NO.

\*\*\*\*\*SYTIME\*\*\*\*\*  
 \*\*\*\*\*DATE\*\*\*\*\*  
 \*\*\*\*\*SPECIFICATION\*\*\*\*\*  
 \*\*\*\*\*FILE\*\*\*\*\*

## Chapter 6

### Typical Sections

6.1	General .....	6-1
6.2	Mandatory Information .....	6-3
Exhibits		
Exhibit 6-1	Standard Notes for Typical Section Sheets .....	6-5

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## Chapter 6

# Typical Sections

### 6.1 General

Typical sections are detailed cross section depictions of the highway's principal elements that are standard between certain station or milepost limits. These sections are the basis for construction details and information shown on the various plan sheets throughout the plans package.

Typical sections should show typical conditions only. Non-standard conditions that prevail for short distances only should not be shown. Existing elements that are to be incorporated into the highway's final section are depicted in conjunction with the proposed elements.

When more than one typical section is necessary for a project, the station limits of each section shall be shown below the typical section title. Typical section stationing shall cover the entire project. Transitions from one typical to another shall be included in the stationing of one or the other typical section. Sheets that feature more than one typical section should read from the top down, with the sections in the order in which they occur within the project.

The hierarchy for typical sections shall be as follows:

1. Project mainline
2. Ramps and service roads (for projects which include an interchange)
3. Crossing side roads
4. Minor side streets

Half sections and details which supplement or support various typical sections should be placed on the same sheet as the typical section to which they apply. In the event that this is not possible, additional sheets for details should be placed behind the typical section sheet(s).

Half sections are necessary when changes occur that affect several typical section elements such as number of lanes, border width, ditch/drainage features, clearing and grubbing, R/W width, etc.

Details and partial sections are necessary for the clarification of construction techniques or sequence, and to show alternates, such as the placement of shoulder gutter in high fill areas, changes in sidewalk location, etc. Judgment will be necessary in making decisions about when and where details should be shown.

The Department Engineering/CADD Systems Software contains a number of typical sections that can be used and adjusted to suit the conditions of a particular project. Usually typical sections are not created to scale, but the horizontal dimensions should be proportionate.

For illustrations of various typical sections, see ***Exhibits TYP-1*** thru ***TYP-15***.

## 6.2 Mandatory Information

Typical sections for all projects shall include the following data:

1. Design speed for each typical section
2. Traffic data (description, date and 2-way AADT)
  - h. Current Year
  - i. Estimated Opening Year
  - j. Estimated Design Year
  - k. K, D and T factors. Distinguish between T(peak hour) and T(24 hour)

For skid hazard projects, only the current year or estimated opening year for traffic data (AADT) is required to be noted.

All traffic data shown shall be consistent with the data used for pavement design.

3. Cross Slopes
  - a. Cross slopes of roadway pavement, shoulder surfaces, sidewalks and bridge decks shall be expressed as a decimal part of a foot vertical per foot horizontal. These cross slopes shall be rounded to two decimal places, i.e., 0.02, 0.06. (See **Volume I, Chapter 2**).
  - b. Median and outer slopes shall be shown by ratio, vertical to horizontal, i.e., 1:4, 1:2. (See **Volume I, Chapter 2**).
  - c. Either feathering details or notes (or both) shall be shown when resurfacing without milling in urban curb and gutter sections is specified or when milling depth is less than the overlay thickness.
  - d. When cross slope correction is necessary, special milling and layering details showing the method of correction shall be shown in the plans. (See **Exhibits TYP- 9** thru **9B**).
4. Profile grade point shall be flagged when applicable.
5. Pavement construction shall be described in a clear, precise manner by indicating the LBR requirement and the thickness of the subgrade stabilization, subbase or base, as well as thickness for structural course, friction course and shoulder pavement. Use 4 inches for both base extension on rural sections and for stabilization extension on curbed sections.

Pavement structure information shall be obtained from the approved pavement design and shall be described in the order of construction, i.e. starting with bottom

layer and ending with friction course. Show pavement thickness descriptions for leveling, overbuild, structural course and friction course in inches (and fractions of an inch). The thickness shown should be to the nearest  $\frac{1}{2}$ " (except for FC-5 which is a standard  $\frac{3}{4}$ ").

6. Limits of grassing.
7. Sidewalk location and width.
8. Curb and gutter location and type (show Type "E" or "F", not the dimension).

On new construction curb and gutter projects which include Asphalt Base, Type B-12.5 Only, the asphalt curb pad shall be indicated on the typical section and a detail provided. (See **Exhibit TYP – 6A**)

9. Limits of clearing and grubbing, where applicable.
10. R/W, where applicable.
11. Template dimensions:

For widening projects, the existing pavement width shall be shown as a +/- dimension, and the base widening width shall be shown with an asterisk. Note 3, of **Standard Notes for Typical Section Sheets (Exhibit 6-1)**, shall be shown as near to this noted asterisk as possible.

NOTE: For typical sections with varying dimensions, the dimensions shall be clearly indicated on the plan-profile sheets.

12. Standard notes for typical sections are shown on **Exhibit 6-1**.

### **Exhibit 6-1 Standard Notes for Typical Section Sheets**

Below are standard notes that shall be shown on typical section sheets as applicable.

1. For details and limits of selective clearing and grubbing see \_\_\_\_\_.
2. (Under paved shoulders):  
At the contractor's option, this area may be constructed of base material at no additional compensation.
3. (On widening projects):  
Actual width of base widening may vary due to actual existing pavement width. Contractor may elect to place uniform width base widening strip at no additional cost to the Department.

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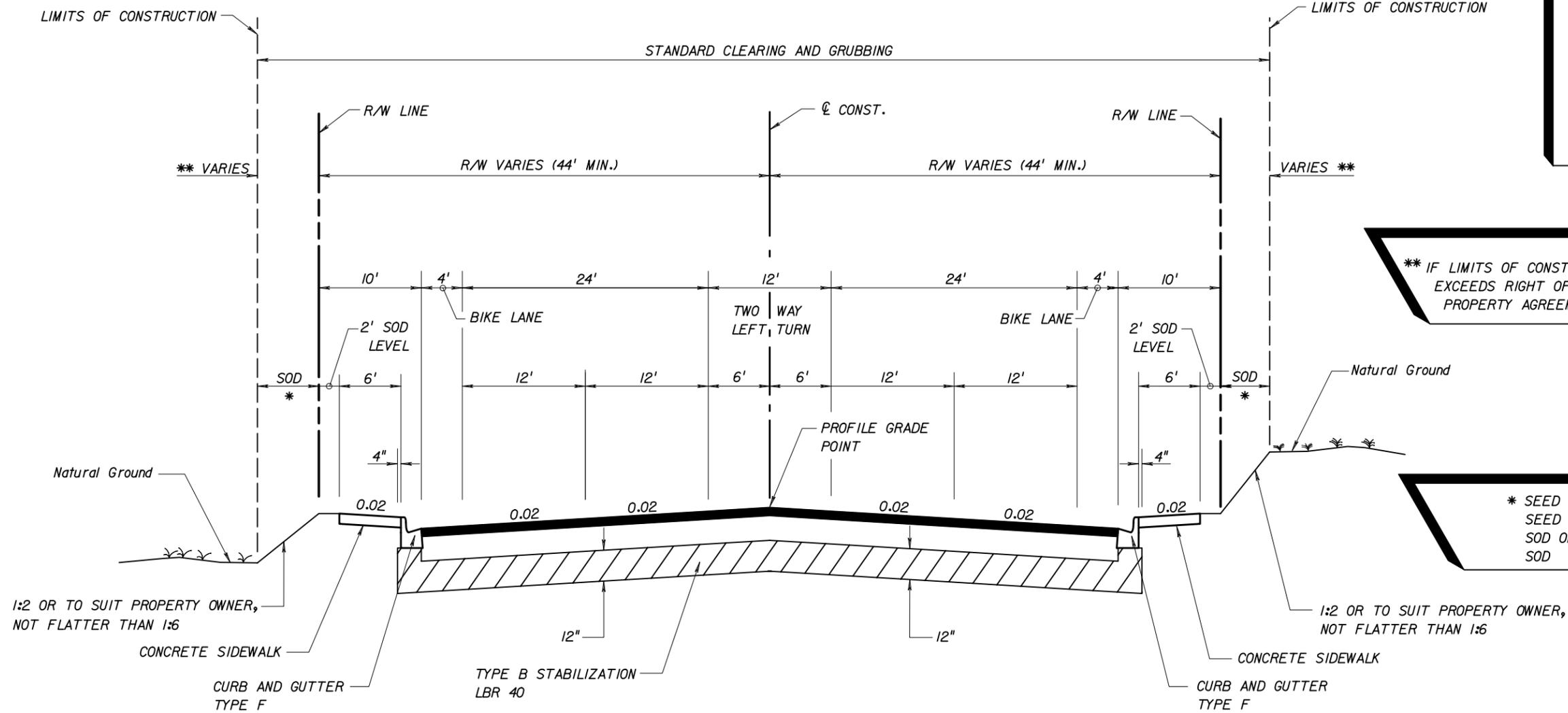




DESIGNATED BIKE LANES SHALL BE LABELED ON TYPICAL. UNDESIGNATED BIKE LANES SHOULD NOT BE LABELED ON TYPICAL.

5-LANE SECTIONS ARE TO INCLUDE SECTIONS OF RAISED OR RESTRICTIVE MEDIAN. SEE PPM TABLE 2.2.1.

5-LANE ARTERIAL/COLLECTOR NEW CONSTRUCTION UNDIVIDED URBAN WITH DESIGNATED OR UNDESIGNATED BIKE LANE MINIMUM RIGHT OF WAY DESIGN SPEED 40 MPH OR LESS WITH PROJECTED 20 YR. AADT OF 1500 OR GREATER



\*\* IF LIMITS OF CONSTRUCTION EXCEEDS RIGHT OF WAY, A PROPERTY AGREEMENT IS REQUIRED.

\* SEED SEED AND MULCH SOD OR SEED SOD

**TYPICAL SECTION  
SR 00 (DUVAL STREET)  
STA. 252+12.00 TO STA. 323+19.42**

**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 8 WITH TYPE SP STRUCTURAL COURSE (TRAFFIC B) (1 1/2") AND FRICION COURSE FC-12.5 (1 1/2") (RUBBER)

**TRAFFIC DATA**

CURRENT YEAR = 1998 AADT = 9900  
 ESTIMATED OPENING YEAR = 2000 AADT = 10600  
 ESTIMATED DESIGN YEAR = 2020 AADT = 14000  
 K = 6% D = 55% T = 2% (24 HOUR)  
 DESIGN HOUR T = 1%  
 DESIGN SPEED = 40 MPH

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR AND DESIGN YEAR. POSTED SPEED (MPH) IS OPTIONAL.

FOR STANDARD TYPICAL SECTION NOTES REFER TO EXHIBIT 6-1, THIS CHAPTER.

**EXHIBIT TYP-3**  
Date: 1/1/05

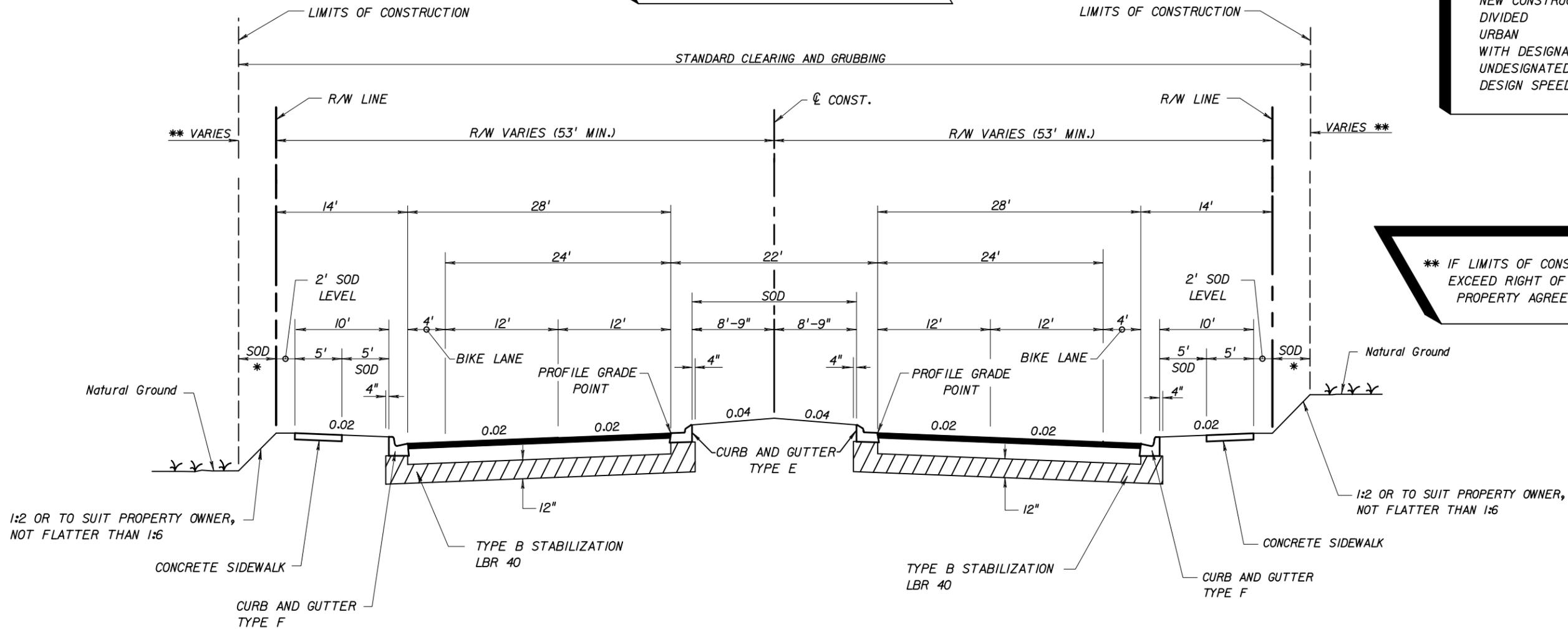
REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**TYPICAL SECTION**



DESIGNATED BIKE LANES SHALL BE LABELED ON TYPICAL. UNDESIGNATED BIKE LANES SHOULD NOT BE LABELED ON TYPICAL.

4-LANE  
ARTERIAL  
NEW CONSTRUCTION  
DIVIDED  
URBAN  
WITH DESIGNATED OR  
UNDESIGNATED BIKE LANE  
DESIGN SPEED 45 MPH OR LESS



\*\* IF LIMITS OF CONSTRUCTION EXCEED RIGHT OF WAY, A PROPERTY AGREEMENT IS REQUIRED.

**TYPICAL SECTION  
SR 00 (WILSON STREET)  
STA. 98+40.00 TO STA. 202+33.00**

**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 9 WITH  
TYPE SP STRUCTURAL COURSE (TRAFFIC B) (1 1/2")  
AND FRICTION COURSE FC-12.5 (1 1/2") (RUBBER)

**TRAFFIC DATA**

CURRENT YEAR = 1998 AADT = 22800  
ESTIMATED OPENING YEAR = 2000 AADT = 25800  
ESTIMATED DESIGN YEAR = 2020 AADT = 30600  
K = 6% D = 55% T = 2% (24 HOUR)  
DESIGN HOUR T = 1%  
DESIGN SPEED = 45 MPH

\* SEED  
SEED AND MULCH  
SOD OR SEED  
SOD

FOR STANDARD TYPICAL SECTION NOTES  
REFER TO EXHIBIT 6-1, THIS CHAPTER.

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR AND DESIGN YEAR. POSTED SPEED (MPH) IS OPTIONAL.

**EXHIBIT TYP-5**  
Date: 1/1/05

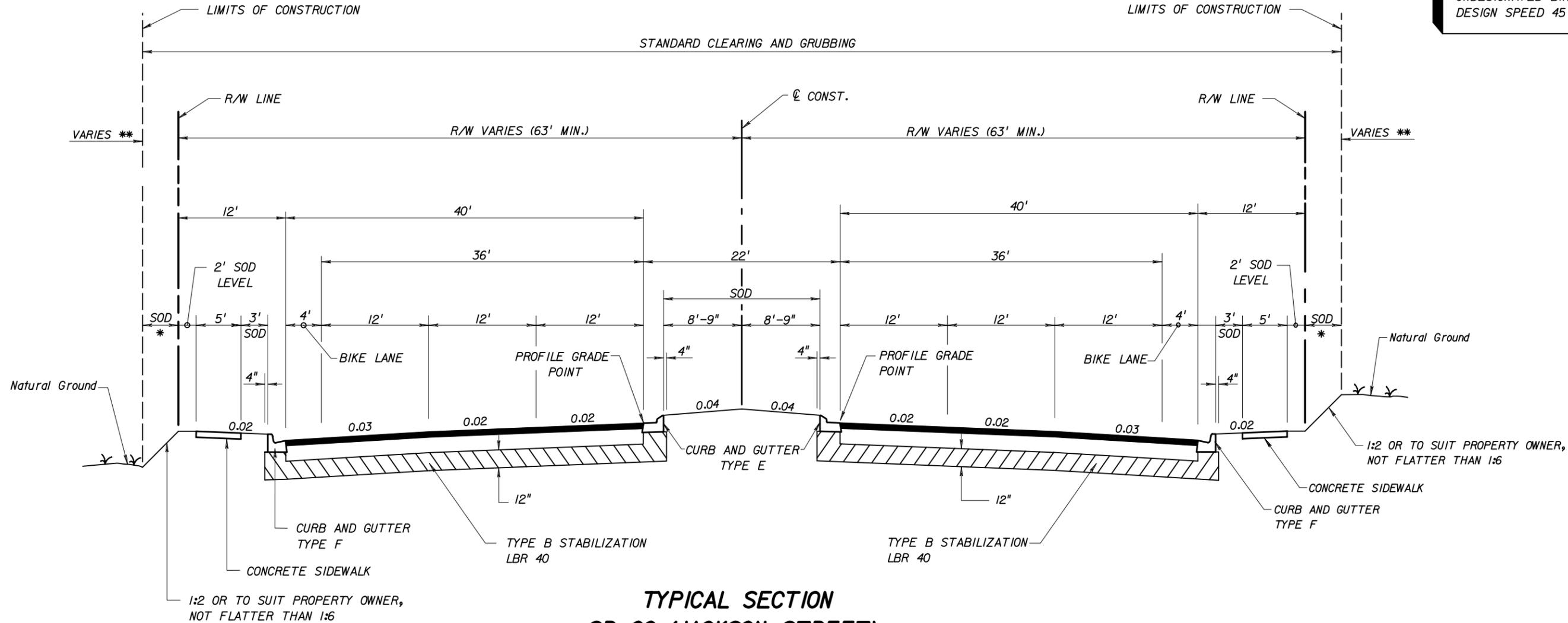
REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**TYPICAL SECTION**

DESIGNATED BIKE LANES SHALL BE LABELED ON TYPICAL. UNDESIGNATED BIKE LANES SHOULD NOT BE LABELED ON TYPICAL.

\*\* IF LIMITS OF CONSTRUCTION EXCEED RIGHT OF WAY, A PROPERTY AGREEMENT IS REQUIRED.

6-LANE  
ARTERIAL  
NEW CONSTRUCTION  
DIVIDED  
URBAN  
WITH DESIGNATED OR  
UNDESIGNATED BIKE LANE  
DESIGN SPEED 45 MPH OR LESS



**TYPICAL SECTION  
SR 00 (JACKSON STREET)  
STA. 101+21.00 TO STA. 221+44.00**

**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 9 WITH  
TYPE SP STRUCTURAL COURSE (TRAFFIC C) (2")  
AND FRICTION COURSE FC-12.5 (1 1/2") (RUBBER)

**TRAFFIC DATA**

CURRENT YEAR = 1998 AADT = 22800  
ESTIMATED OPENING YEAR = 2000 AADT = 25800  
ESTIMATED DESIGN YEAR = 2020 AADT = 30600  
K = 6% D = 55% T = 2% (24 HOUR)  
DESIGN HOUR T = 1%  
DESIGN SPEED = 45 MPH

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR AND DESIGN YEAR.

\* SEED,  
SEED AND MULCH,  
SOD OR SEED  
SOD

FOR STANDARD TYPICAL SECTION NOTES  
REFER TO EXHIBIT 6-1, THIS CHAPTER.

**EXHIBIT TYP-6**  
Date: 1/1/05

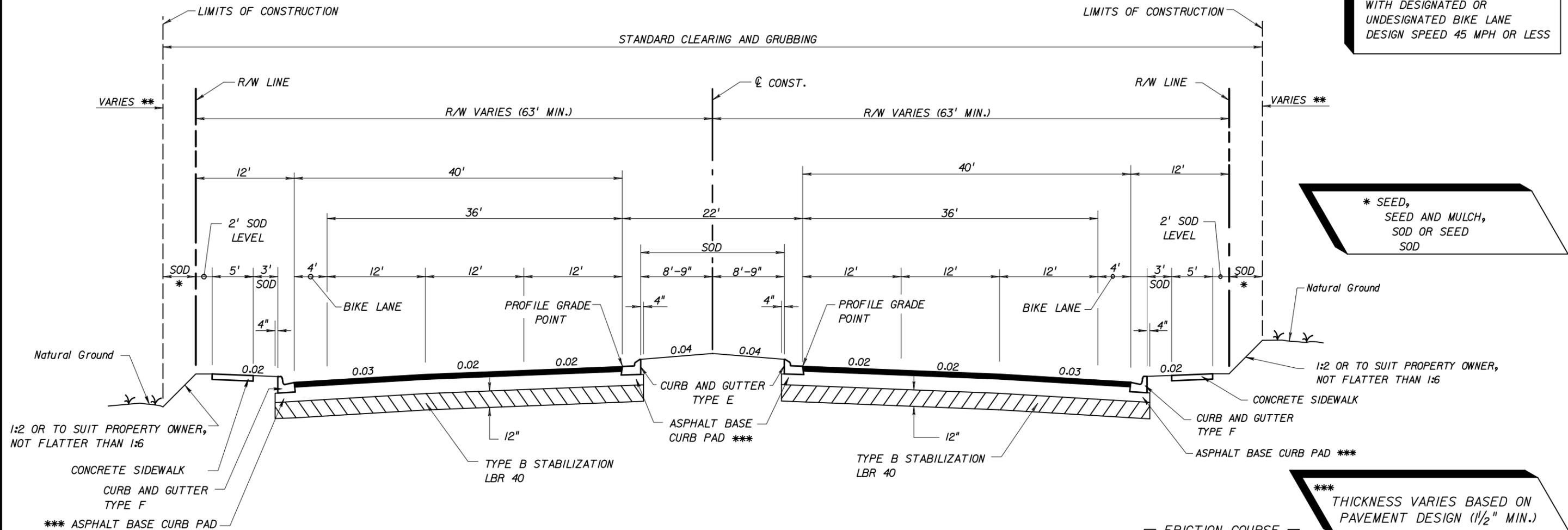
REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**TYPICAL SECTION**

DESIGNATED BIKE LANES SHALL BE LABELED ON TYPICAL. UNDESIGNATED BIKE LANES SHOULD NOT BE LABELED ON TYPICAL.

\*\* IF LIMITS OF CONSTRUCTION EXCEED RIGHT OF WAY, A PROPERTY AGREEMENT IS REQUIRED.

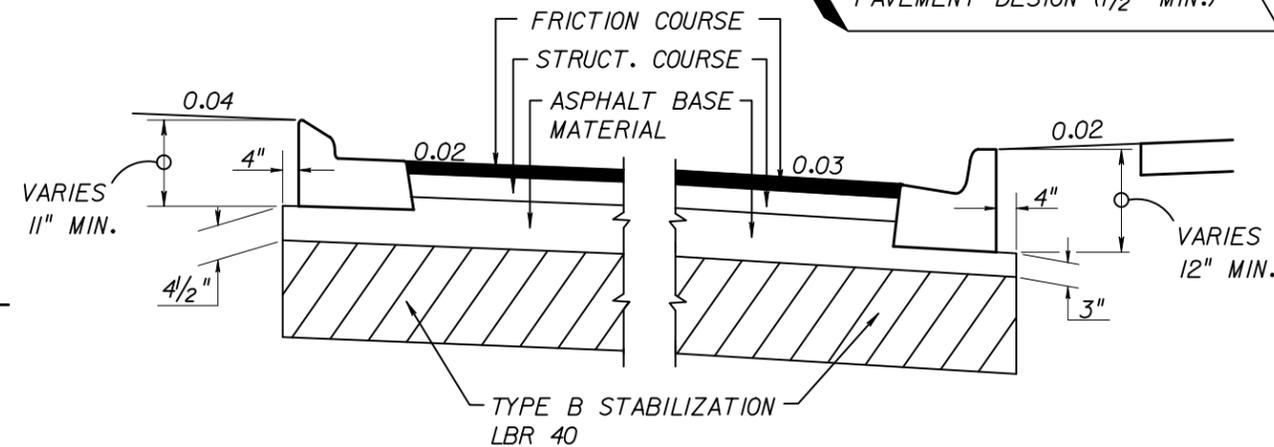
6-LANE ARTERIAL  
NEW CONSTRUCTION  
DIVIDED  
URBAN  
WITH DESIGNATED OR UNDESIGNATED BIKE LANE  
DESIGN SPEED 45 MPH OR LESS



**TYPICAL SECTION  
SR 00 (JACKSON STREET)  
STA. 101+21.00 TO STA. 221+44.00**

**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 9, TYPE B-12.5 (6") ONLY, WITH  
TYPE SP STRUCTURAL COURSE (TRAFFIC C) (3")  
AND FRICTION COURSE FC-12.5 (1 1/2") (RUBBER)



**DETAIL OF ASPHALT BASE CURB PAD**

**TRAFFIC DATA**

CURRENT YEAR = 1998 AADT = 22800  
ESTIMATED OPENING YEAR = 2000 AADT = 25800  
ESTIMATED DESIGN YEAR = 2020 AADT = 30600  
K = 6% D = 55% T = 2% (24 HOUR)  
DESIGN HOUR T = 1%  
DESIGN SPEED = 45 MPH

FOR STANDARD TYPICAL SECTION NOTES REFER TO EXHIBIT 6-1, THIS CHAPTER

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR AND DESIGN YEAR.

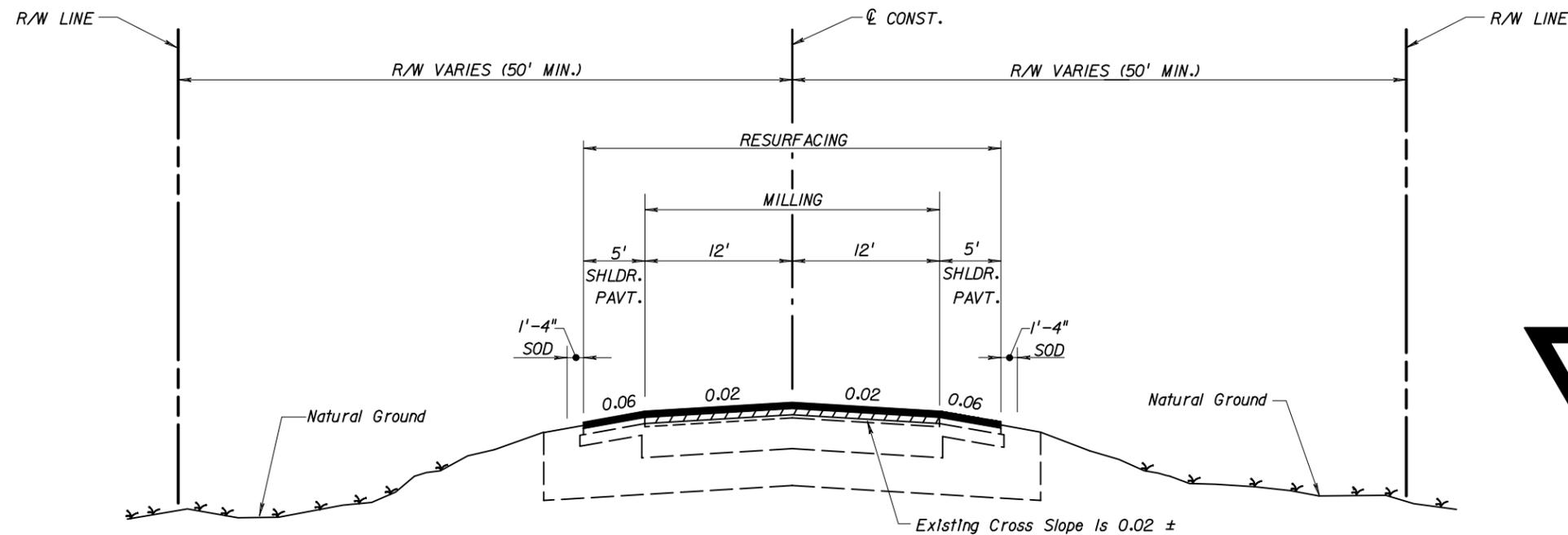
**EXHIBIT TYP-6A**  
Date: 1/1/05

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**TYPICAL SECTION**

DESIGNATED BIKE LANES SHALL BE LABELED ON TYPICAL, UNDESIGNATED BIKE LANES SHOULD NOT BE LABELED ON TYPICAL.

EXISTING  
2-LANE (2-WAY)  
ARTERIAL/COLLECTOR  
MILLING AND RESURFACING  
NO CROSS SLOPE  
CORRECTION REQUIRED  
UNDIVIDED  
RURAL  
(WITH DESIGNATED OR  
UNDESIGNATED BIKE LANE  
EXISTING)  
WITH PROJECTED 20 YR.  
AADT OF 1500 OR GREATER



SOME PROJECTS MAY REQUIRE SHOULDER WORK. WHEN REQUIRED THIS SHOULD BE IDENTIFIED ON THE TYPICAL SECTION SHEET.

FOR STANDARD TYPICAL SECTION NOTES REFER TO EXHIBIT 6-1, THIS CHAPTER.

**TRAFFIC DATA**  
**STA. 10+53.00 TO STA. 130+77.00**

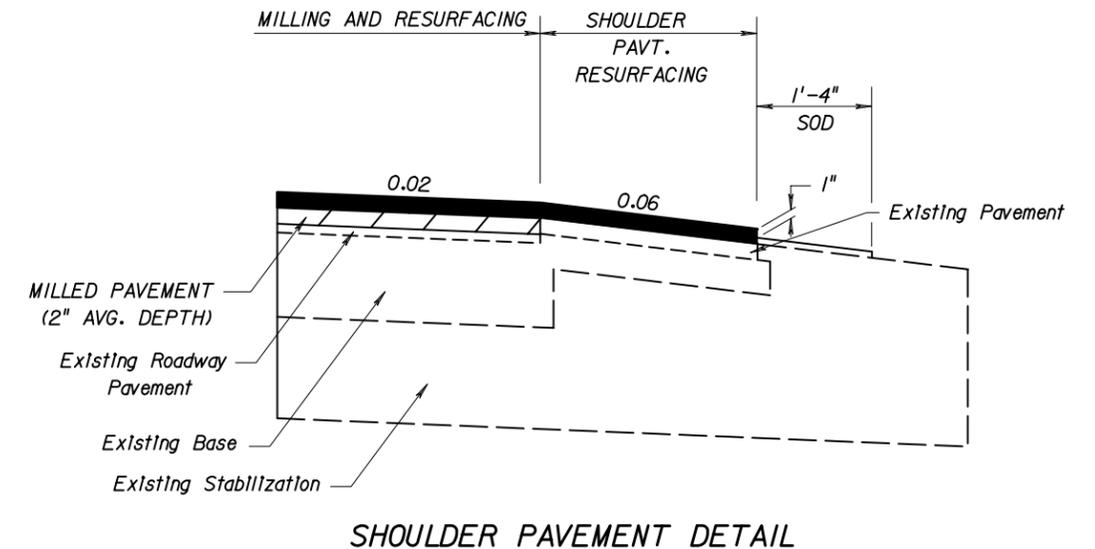
CURRENT YEAR = 1998 AADT = 9670  
ESTIMATED OPENING YEAR = 2000 AADT = 11900  
ESTIMATED DESIGN YEAR = 2010 AADT = 20200  
K = 10% D = 60% T = 7% (24 HOUR)  
DESIGN HOUR T = 3%  
DESIGN SPEED = 55 MPH

**TYPICAL SECTION**  
**SR 00**  
**STA. 10+53.00 TO STA. 130+77.00**  
**STA. 206+82.28 TO STA. 368+41.21**

**STA. 206+82.28 TO 368+41.21**

CURRENT YEAR = 1998 AADT = 6835  
ESTIMATED OPENING YEAR = 2000 AADT = 8600  
ESTIMATED DESIGN YEAR = 2010 AADT = 15100  
K = 10% D = 65% T = 7% (24 HOUR)  
DESIGN HOUR T = 3%  
DESIGN SPEED = 55 MPH

- MILLING**  
MILL EXISTING ASPHALT PAVEMENT (2" AVG. DEPTH)
- RESURFACING**  
TYPE SP STRUCTURAL COURSE (TRAFFIC B) (2")  
AND FRICTION COURSE FC-9.5 (1") (RUBBER)
- SHOULDER PAVEMENT RESURFACING**  
FRICTION COURSE FC-9.5 (1") (RUBBER)



TRAFFIC DATA IS REQUIRED TO BE NOTED FOR CURRENT YEAR, OPENING YEAR AND DESIGN YEAR.

**EXHIBIT TYP-7**  
Date: 1/1/05

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**TYPICAL SECTION**

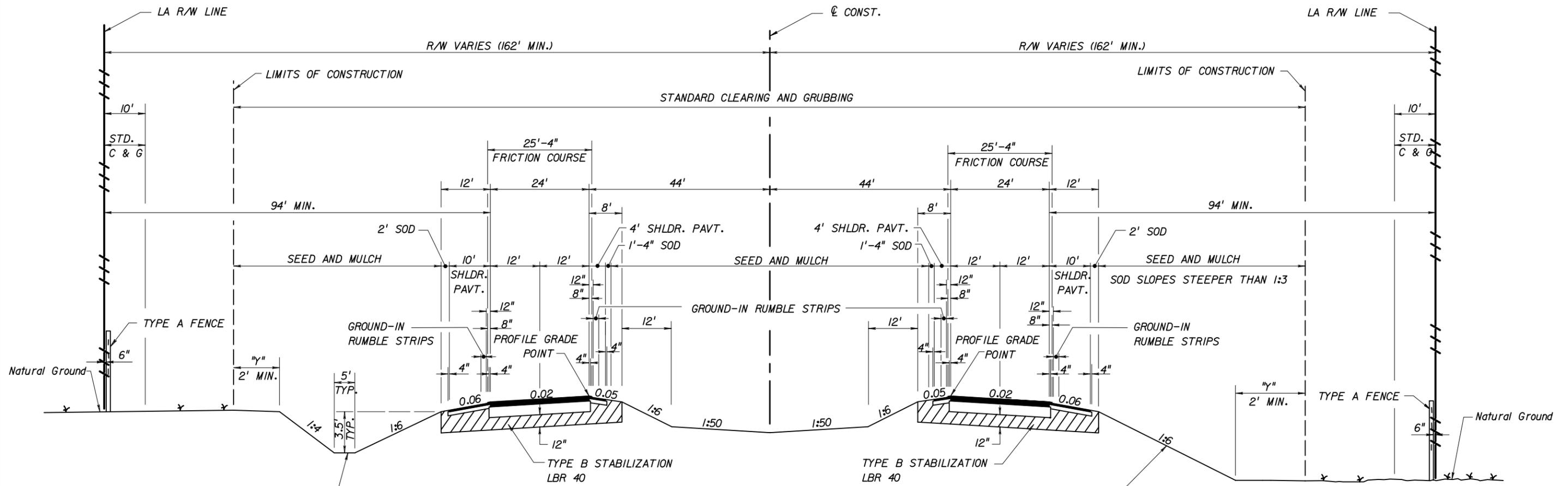












DEPTH AND WIDTH VARY  
SEE CROSS SECTIONS

1:6 FOR FILLS TO 5'  
1:6 TO EDGE OF CLEAR ZONE & 1:4 FOR FILLS 5' TO 10'  
1:6 TO EDGE OF CLEAR ZONE & 1:3 FOR FILLS 10' TO 20'  
1:2 (WITH GUARDRAIL) FILLS OVER 20'

**TRAFFIC DATA**

CURRENT YEAR = 1998 AADT = 22300  
 ESTIMATED OPENING YEAR = 2000 AADT = 23300  
 ESTIMATED DESIGN YEAR = 2020 AADT = 51500  
 K = 9 % D = 56 % T = 10 % (24 HOUR)  
 DESIGN HOUR T = 5 %  
 DESIGN SPEED = 70 MPH

TRAFFIC DATA IS REQUIRED TO BE NOTED FOR  
CURRENT YEAR, OPENING YEAR, AND DESIGN YEAR.  
POSTED SPEED (MPH) IS OPTIONAL.

FOR STANDARD TYPICAL SECTION NOTES  
REFER TO EXHIBIT 6-1, THIS CHAPTER

**TYPICAL SECTION  
SR 8  
STA. 567+25.67 TO STA. 1056+84.35**

**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 9 WITH  
 TYPE SP STRUCTURAL COURSE (TRAFFIC D) (2 1/2")  
 TYPE SP STRUCTURAL COURSE (TRAFFIC D) (1 1/2") (PG 76-22) AND  
 FRICTION COURSE FC-5 (3/4") (PG 76-22)

**MEDIAN SHOULDER PAVEMENT**

OPTIONAL BASE GROUP 1 WITH  
 TYPE SP STRUCTURAL COURSE (TRAFFIC D) (1 1/2")  
 TYPE SP STRUCTURAL COURSE (TRAFFIC D) (1 1/2") (PG 76-22) AND  
 FRICTION COURSE FC-5 (3/4") (PG 76-22)

**OUTSIDE SHOULDER PAVEMENT**

OPTIONAL BASE GROUP 1 WITH  
 TYPE SP STRUCTURAL COURSE (TRAFFIC B) (1 1/2") AND  
 FRICTION COURSE FC-5 (3/4") (PG 76-22)

NOTE:  
HEIGHT OF FILL IS THE VERTICAL DISTANCE  
FROM THE EDGE OF THE OUTSIDE TRAVEL LANE  
TO TOE OF FRONT SLOPE.

4 LANE  
INTERSTATE SYSTEM  
NEW CONSTRUCTION  
DIVIDED  
RURAL  
WITH PROJECTED  
20 YR. AADT OF 1500  
OR GREATER  
DESIGN SPEED  
70 MPH

"y" THE AREA DISTURBED BY  
CONSTRUCTION VARIES.

**EXHIBIT TYP-10**  
Date: 1/1/05

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**TYPICAL SECTIONS**

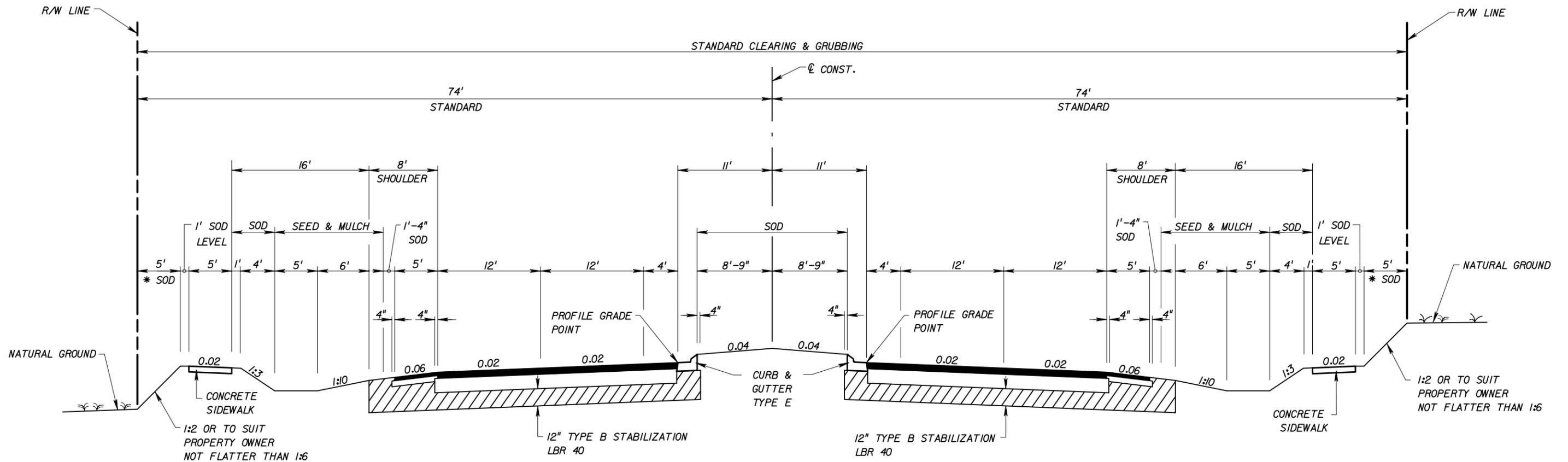






DESIGNATED BIKE LANES SHALL BE LABELED ON TYPICAL. UNDESIGNATED BIKE LANES SHOULD NOT BE LABELED ON TYPICAL.

4-LANE  
ARTERIAL  
NEW CONSTRUCTION  
DIVIDED  
SUBURBAN  
WITH DESIGNATED OR  
UNDESIGNATED BIKE LANE  
DESIGN SPEED 55 MPH OR LESS



**TRAFFIC DATA**

CURRENT YEAR = 1999 AADT = 22800  
 ESTIMATED OPENING YEAR = 2002 AADT = 25800  
 ESTIMATED DESIGN YEAR = 2022 AADT = 30600  
 K = 6% D = 55% T = 2% (24 HOUR)  
 DESIGN HOUR T = 1%  
 DESIGN SPEED = 55 MPH

**SUBURBAN TYPICAL SECTION  
 SR 00 (CODY ROAD)  
 STA. 100+40.00 TO STA. 225+50.00**

**NEW CONSTRUCTION**

OPTIONAL BASE GROUP 9 WITH  
 TYPE SP STRUCTURAL COURSE (TRAFFIC C) (3/2")  
 AND FRICTION COURSE FC-5 (3/4") (RUBBER)

**SHOULDER PAVEMENT**

OPTIONAL BASE GROUP 1 WITH  
 TYPE SP STRUCTURAL COURSE (TRAFFIC C) (1 1/2")  
 AND FRICTION COURSE FC-5 (3/4") (RUBBER)

SEED AND MULCH SLOPES  
 FLATTER THAN 1:3  
 \* SOD SLOPES 1:3 OR STEEPER

IF LANDSCAPING IS DESIRED, TREES SHALL BE  
 TYPES THAT WILL NOT HAVE AN EXPECTED  
 GROWTH GREATER THAN 4" IN DIAMETER  
 MEASURED 6" ABOVE THE GROUND.

**EXHIBIT TYP-14**  
 Date: 1/1/05

TRAFFIC DATA IS REQUIRED TO BE  
 NOTED FOR CURRENT YEAR, OPENING  
 YEAR AND DESIGN YEAR.  
 POSTED SPEED (MPH) IS OPTIONAL.

FOR STANDARD TYPICAL SECTION NOTES  
 REFER TO EXHIBIT 6-1, THIS CHAPTER.

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	

**SUBURBAN TYPICAL SECTION**



## **Chapter 7**

### **Summary of Quantities**

7.1	General.....	7-1
7.2	Item Quantity "Boxes" and Format .....	7-2
7.3	Box Culvert Data Sheet.....	7-3
 Exhibits		
Exhibit 7-1	Standard Notes for Summary of Quantities Sheet .....	7-5

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## Chapter 7

### Summary of Quantities

#### 7.1 General

The summary of quantities sheet shows individual summaries of guardrail, fence, turnouts, sodding, ditch pavement, side drains, mitered end sections, underdrains, and earthwork when applicable. The tabulation shall show location and quantities in the plan quantity column (P). The final quantity column (F) is reserved for construction and final estimates. As noted in **Chapter 4**, the necessary pay items and the quantities shall be shown on the summary of pay items sheet.

For examples of summary of quantities sheets see **Exhibits SQ-1 thru 3**.

## 7.2 Item Quantity "Boxes" and Format

The various "boxes" used for each type of summary are contained in the FDOT Engineering/CADD Systems Software. Each box is identified by the appropriate Form Number required for the Computation Book. The arrangement of these "boxes" on the sheet is dependent on the number used and the size each one must be to contain all of the necessary information.

On contracts with multiple Financial Project ID's or federal aid and non-federal aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

Standard notes (see **Exhibit 7-1**) shall be shown under the appropriate box.

Applicable pay item notes, listed in **Exhibit 7-1**, shall also be included on this sheet.

## 7.3 Box Culvert Data Sheet

The structural design of box culverts may be done by one of two computer programs. The first program (***PSTDN55***) designs the culvert based on the details shown on ***Index 290*** of the ***Design Standards***. When this is used, the program output (data sheets) showing the concrete and steel quantities shall be transferred to a graphics design file and placed on a normally formatted plan sheet. The plan sheet shall be placed in the contract plans directly behind the Summary of Quantities Sheet(s).

The second program is the ***LRFD Box Culvert Program***. When this is used, ***Index 290*** does not apply. The program generates detail plan sheets, with quantities, for constructing culverts. These sheets should be placed together, behind the drainage structure sheets in the contract plans.

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### **Exhibit 7-1 Standard Notes for Summary of Quantities Sheet Sheet 1 of 2**

Below are standard notes that should be used on the summary of quantities sheet, as applicable:

(Under Summary of Earthwork):

Earthwork has been calculated using the \_\_\_\_\_ base option. If another option is constructed, there shall be no revision to the earthwork quantities for which payment is made by plan quantity.

#### **Pay Item Notes**

1. 102- 1- Includes approximately \_\_\_\_\_ SY of Temporary Pavement.
2. 104- 10- 1 Based on replacement every 3 months.
3. 104- 13- 1 Based on replacement every 12 months.
4. 110- 86- All salvageable material designated to be delivered by the contractor shall be delivered to:  
(Provide address of nearest FDOT Maintenance Yard.)
5. 334- 1 Includes \_\_\_\_\_ TN for turnouts, connections to existing drives, streets, etc., as directed by the Engineer.
6. 400- 1- 15 Includes \_\_\_\_\_ CY for miscellaneous construction, as directed by the Engineer.
7. (For new construction projects with Asphalt Base, Type B-12.5 Only):  
520-1-7 or 520-1-10  
Cost of asphalt curb pad and additional curb thickness required to be included in the cost of curb and gutter.
8. 536- 73- (To be used for the removal of existing guardrail when FDOT Maintenance wants materials).  
Existing guardrail to be dismantled and stockpiled within the right of way in areas designated by the Engineer for removal by FDOT maintenance forces.
9. 538- 1- This is to include replacement of \_\_\_\_\_ panels, \_\_\_\_\_ regular posts and \_\_\_\_\_ special posts which have been determined to be non-salvageable. Additional posts and panels determined to be non-salvageable during resetting shall be paid for under 538-5 of the Specifications.

**Exhibit 7-1 Standard Notes for Summary of Quantities Sheet  
Sheet 2 of 2**

10. Temporary Grassing: When required by the project design, these items shall be included in the cost of the Permanent Grassing items. A pay item note should show the approximate quantities. For example:
  - 570- 1- Includes approximately \_\_\_\_\_ SY Seeding for temporary grassing.
  - 570- 2- Includes approximately \_\_\_\_\_ SY Seed and Mulch for temporary grassing.
  - 570- 3- Includes approximately \_\_\_\_\_ lbs Grass Seed (Permanent Type) for temporary grassing.
  - 570- 4- Includes approximately \_\_\_\_\_ Tons Mulch Material for temporary grassing.
  - 570- 5- Includes approximately \_\_\_\_\_ Tons Fertilizer for temporary grassing.
  - 570- 9- Includes approximately \_\_\_\_\_ Gallons Water for temporary grassing.
  - 570- 10- Includes approximately \_\_\_\_\_ lbs Grass Seed (Quick Growing) for temporary grassing.
  - 575- 1- Includes approximately \_\_\_\_\_ SY Sodding for temporary grassing.
11. 570- 5- Based on \_\_\_\_\_ applications.
12. 639- 2- 1 Payment shall be based on the linear feet of a single conductor.
13. The following pay item note should be shown in the Roadway Plans:
  - 710- The totals shown on the Summary of Roadway Pay Items are for painted pavement markings used for Maintenance of Traffic.







## **Chapter 8**

### **Summary of Drainage Structures and Optional Materials Tabulation**

8.1	Summary of Drainage Structures .....	8-1
	8.1.1 Sheet Setup and Data .....	8-2
8.2	Optional Materials Tabulation.....	8-4

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## Chapter 8

# Summary of Drainage Structures and Optional Materials Tabulation

### 8.1 Summary of Drainage Structures

The summary of drainage structures sheet shows the location, size, length, number and type of drainage structures used in a project. The sheet format is available in the FDOT Engineering/CADD Systems Software. Specific levels and fonts which shall be used are given in the FDOT CADD Production Criteria Guide.

For an illustration of the summary of drainage structures sheet, see ***Exhibit SDS-1a***.

## 8.1.1 Sheet Setup and Data

A summary of drainage structures shall be prepared and included in the plans. The structures shall be listed by structure number in numerical order. The location of each structure shall be identified by station along the construction centerline (**Exhibit SDS-1a**).

For cross drains, and storm sewer the summary of drainage structures shall be tabulated by structure number, providing the station, size, length and incidental quantities appropriate for the material detailed in the plans. Optional culvert material will be provided and a tabulation form shall be prepared and included (see **Section 8.2**).

Various drainage elements shall be shown in columns. This information shall be obtained from drainage structure sheets or plan-profile sheets. The order in which the elements are listed should be as follows:

1. Pipe Sizes for
  - a. Cross Drains
  - b. Storm Sewer
  - c. Gutter Drain
2. Curb Inlets
3. Manholes
4. Junction Boxes
5. Ditch Bottom Inlets
6. Gutter Inlets
7. Flared End Sections
8. Mitered End Sections
9. Sod
10. Class of Concrete
11. Reinforcing Steel
12. Riprap

The "Description" column shall be used to specify the type of structure, the outgoing pipe and the end treatment of that pipe, if applicable.

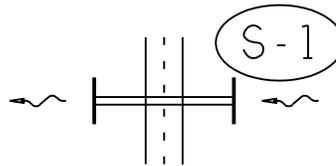
The remarks column shall contain all special notes pertaining to the structure. The "Final Quantity" line is for construction to use and shall be left blank.

On smaller projects the summary of quantities and the summary of drainage structures may be combined on one sheet.

It is recommended that structure numbers be established using the convention shown in the exhibits and described as follows:

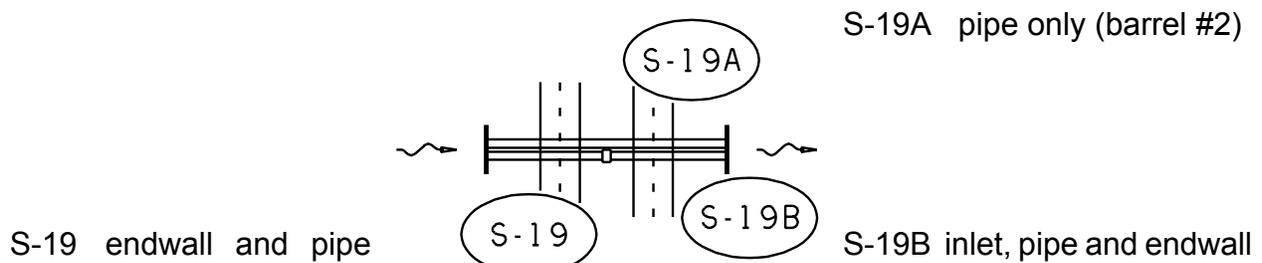
1. For simple cross drains, one structure number is appropriate for the inlet and outlet treatments and the pipe.

Example #1 (cross drain w/o median inlet)



2. For complex cross drains, it is suggested that the first and all intermediate structure numbers identify the hydraulically upper end treatment and pipe. The last structure number should identify the hydraulically upper end treatment, pipe and hydraulically lower end treatment.

Example #2 (Double pipe CD and median inlet)



## 8.2 Optional Materials Tabulation

An optional materials tabulation shall be prepared and included in the plans (see **Exhibits SDS-2a** and **SDS-3a**). The sheet format is available in the FDOT Engineering Systems Software.

As a minimum, the optional pipe material tabulation should include size, thickness or class, corrugation requirements, if necessary, and protective coating, if any. Additional information such as structure number, design service life (DSL), length, and flow line information may be included.

The general notes shown on the exhibits are also required.



**GENERAL NOTES**

1. The Contractor may use any of the optional pipe materials tabulated for a given structure. Only the material options tabulated for a given structure can be used.
2. Adjustment to the bid quantities, prices and payment will not be allowed due to increase or decrease in structure size, shape, length, width, depth or accessory construction necessary to accommodate the use of an optional pipe material other than the "plotted" option; likewise there will be no added or reduced compensation for structure alterations required to relieve utility conflicts which arise from the use of an optional material other than the "plotted" option.
3. Adjustment to the bid quantities, prices and payment will not be allowed due to increased or decreased excavation, bedding, borrow, backfilling, compaction, special installation requirements or disposal of excess materials due to use of any of the pipe optional materials. Likewise, adjustment in the quantities, prices and payment will not be allowed due to differences in end treatment size or types, pipe length, alternate jointing and connecting materials, saddles, cradles, filter fabrics, shoring or similar features due to the use of an optional material other than the "plotted" option.
4. If adjustments are required due to plan errors or omissions or authorized field changes, the "plotted" material and not the material elected by the Contractor would be used to establish new pay quantities.
5. The Contractor shall notify the Department in writing as to which optional pipe materials he chooses to use at the preconstruction conference. Once identified the Contractor may not change pipe material selected without the approval of the Engineer.
6. Pipe shapes other than round (Elliptical/Arch) are summarized and paid for using equivalent round pipe diameter.

THIS EXAMPLE SHOULD BE USED WHEN PIPE FLOW LINES, AND/OR SIZES FOR INDIVIDUAL OPTIONS ARE NOT THE SAME (SEE STRUCTURE NO. 14) OR WHEN NUMEROUS EXCEPTIONS OCCUR.

STR. NO.	DSL YEARS	SIZE (Inches)	PLOTTED	MATERIAL & THICKNESS	FL	FL	AS BUILT	REMARKS
1	100	18	X	RCP CLASS II				
2	100	18	X	RCP CLASS II				
3	100	15	X	RCP CLASS II SRAP	7.0			
4	100	36	X	RCP CLASS II SRSP, 12 GA. SRAP, 12 GA. SRASP, 16 GA.	5.7			
5	100	15	X	RCP CLASS II SRAP	7.7			
6	100	36	X	RCP CLASS II SRSP, 12 GA. SRAP, 12 GA. SRASP, 16 GA.	6.4	5.7		
7	100	36	X	RCP CLASS II	6.5	6.4		
8	100	42	X	RCP CLASS II SRAP SRSP	7.9	7.7		
9	100	30	X	RCP CLASS II SRAP, 16 GA. SRSP, 16 GA.	6.8	6.5		
10	100	18	X	RCP CLASS II SRAP, 16 GA. SRSP, 14 GA. SRASP, 16 GA.	7.6	7.2		
11	100	18	X	RCP CLASS II SRAP, 16 GA. SRSP, 14 GA. SRASP, 16 GA.	8.0	7.6		
12	100	24	X	RCP CLASS III				ENDWALL
13	100	24x38 35x24	X	ERCP CLASS II ASPA, 14 GA.	10.4	10.3		
14	50	30	X	RCP CLASS III SRASP 14 GA. SRAP, 14 GA. CPE PVC	6.0	5.9		
		36		CAP, 16 GA.	5.9	5.8		
		36		CSP, 16 GA. BIT. COATED	5.9	5.8		
14A	50	19x30 28x20	X	ERCP CLASS III ASPA 14 GA.	5.9	5.8		

**EXHIBIT SDS-2a**  
Date: 1/1/04

REVISIONS						STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			<b>OPTIONAL MATERIALS TABULATION</b>	SHEET NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
								- - -		



# Chapter 9

## Project Layout

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9.2	Alignment Sheet Sequence.....	9-2
9.3	Survey Reference Points .....	9-3
9.4	General Notes .....	9-4

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## **Chapter 9**

# **Project Layout**

### **9.1 General**

The project layout sheet (or sheets) shows the horizontal alignment and plan or plan-profile sheet sequence and numbering for the project. This is an optional sheet, to be included in the plans set at the discretion of the district. The project layout sheet can prove to be of great advantage for large or complicated projects involving large interchanges with a number of diverging routes. If included in the plans set, this sheet should also show all survey reference points and list all general notes applicable to the project.

The layout sheet shall be prepared on a standard plan format sheet in the FDOT Engineering/CADD Systems Software. Scale shall be such that clarity and legibility are preserved. North arrow and scale shall be shown at a point of maximum visibility on the sheet. For large, complicated projects, more than one sheet may be required to clearly depict all required information. Appropriate match lines shall be shown if more than one sheet is required.

## **9.2 Alignment Sheet Sequence**

Complete project alignment with baseline of survey and/or centerline of construction shall be shown. Edge of pavements shall be shown if scale permits. Outlines of the plan, or plan-profile sheets shall be superimposed on the alignment to depict the sheet sequence with relation to the alignment stationing. Each sheet outline shall contain the appropriate plan sheet number. The order of plan/plan-profile sheet numbering shall be as follows:

1. Mainline (for widely separated roadways, the right roadway in the direction of stationing takes precedence)
2. Crossroads
3. Ramps
4. Frontage roads
5. Access roads

Beginning and ending stations for project, construction and ramps shall be flagged and labeled, including equations and/or exceptions.

### **9.3 Survey Reference Points**

Generally, survey reference points should be shown on the project layout sheet just beneath the alignment sheet sequence plan or where other space allows. Baseline survey and reference points, with all ties, shall be clearly indicated. Complete length of survey baseline between two consecutive reference points need not be shown. Each reference point shall be clearly labeled, beginning at the first reference point within the limits of the project, and progressing in the direction of stationing. Usually, reference points need not be drawn to any particular scale, but distances and angles shown shall be proportionate. Care should be taken to ensure that clarity and legibility are maintained.

## 9.4 General Notes

When the layout sheet is included in the plans set, applicable general notes should be included on the layout sheet instead of the first plan-profile sheet to help simplify the plan-profile sheets.

For a list of general notes, refer to ***Exhibit 10-1*** in ***Chapter 10*** of this volume.

## Chapter 10

### Roadway Plan and Roadway Plan-Profile

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#### Exhibits

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## Chapter 10

### Roadway Plan and Roadway Plan-Profile

#### 10.1 General

The roadway plan sheet shows the project's complete horizontal alignment. The plan-profile sheet shows the project's complete horizontal and vertical alignments. Various roadway elements such as pavement width, medians, paved shoulders, curbs, drainage elements, tapers, turn provisions, and intersecting roadways, are also shown on these sheets.

Roadway plan and roadway plan-profile sheets shall be prepared on standard formatted sheets that are contained in the FDOT Engineering/CADD Systems Software. Plotting should typically be done at a horizontal scale of 1" = 40' or 1" = 50' for urban jobs. For rural jobs, the scale should typically be from 1" = 100' or 1" = 200' horizontally, depending on the project specific details.

If a project layout sheet is not included in the plans set, provision shall be made on the first plan-profile sheet to show applicable general notes. Refer to **Exhibit 10-1** for a list of general notes.

## 10.2 Roadway Plan Portion

### 10.2.1 Centerline

The baseline survey and/or centerline of construction should be centered in the plan portion of the sheet, with stationing running from left to right. When alignment includes horizontal curves, the centerline should be positioned on the sheet to avoid breaks or match lines (except at the beginning or end of the sheet).

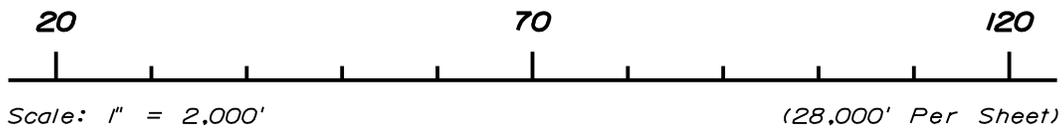
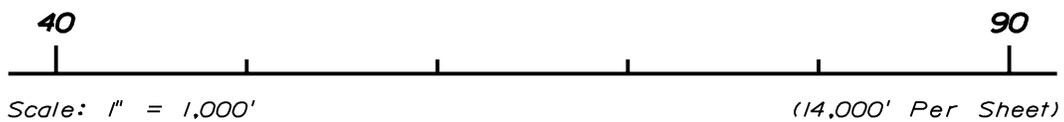
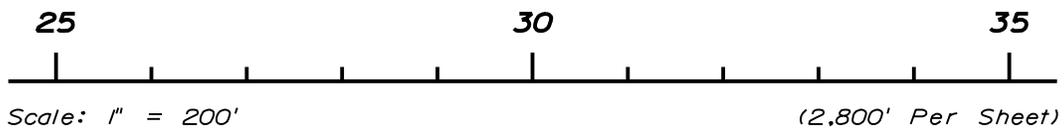
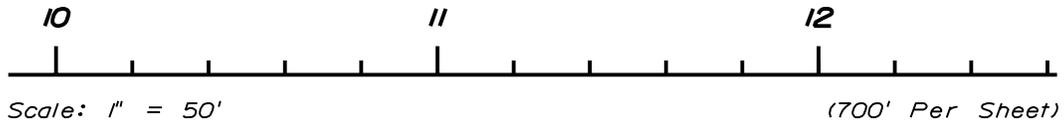
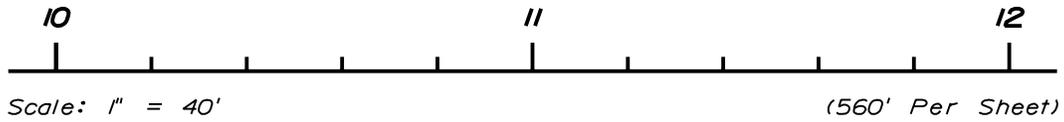
A "tick" mark shall be placed on the upper side of the centerline at every station. In addition, intermediate ticks shall be placed as shown in **Figure 10.1**. Intermediate ticks should be about half the length of those at each station.

Station numbers should be placed close to tick marks for scales up to and including 1" = 50' and outside the R/W lines for smaller scales.

In cases where the construction centerline does not coincide with the survey baseline, the construction centerline shall be identified with complete alignment data and ties to the survey baseline. However, the construction centerline need not be shown when it is uniformly offset from the survey baseline for the entire length of the project, and is shown on the typical sections. All station equations shall be included. These include equations occurring on the survey baseline and those equating the survey baseline and construction centerline.

A north arrow and scale shall be shown at a point of maximum visibility, preferably in the upper right portion of the plan view.

**Figure 10.1 Centerline Station Numbering and Tick Marks**



## 10.2.2 Horizontal Curves

PC and PT points of horizontal curves shall be indicated by small circles. Short radial lines shall be drawn from these points and identified. PI's shall be noted by the use of a small triangle with a short section of tangent on either side. Care must be taken in the clipping of plan sheets to properly orient the horizontal curves within the plan view. In cases where the curve extends over more than one sheet, the curve data shall be repeated on each sheet showing the curve.

Complete curve data shall be shown for each horizontal curve using the following format:

### **CURVE DATA**

- PI (Station)
- $\Delta$  (Delta Angle with Direction)
- D (Degree of Curve)
- T (Tangent Length)
- L (Length of Curve)
- R (Radius Length)
- PC (Station)
- PT (Station)
- e (Superelevation Rate)

### **10.2.3 Existing Topography**

All existing topography shall be shown. Existing roads, streets, drives, buildings, underground and overhead utilities, walls, curbs, pavements, fences, railroads, bridges, drainage structures and similar items shall be plotted and labeled. Streams, ponds, lakes, wooded areas, ditches and all other physical features shall also be shown.

All existing utilities shall be shown on the plan and noted by an appropriate symbol (see the ***Design Standards, Index 002*** and the FDOT Engineering/CADD Systems Software for standard symbols). If the type of utility is unknown it should be labeled as such. Existing gasoline storage tanks within limits of topographical survey shall be located and illustrated.

## 10.2.4 Reference Data

Bearings, in the direction of stationing, shall be shown for all tangent sections.

Station equivalencies, angles with mainline centerline and/or bearings in the direction of stationing of the crossroad shall be shown for all roads and streets intersecting or crossing the project.

All the survey reference points shall be shown (if layout sheet is not included in plans set) at locations removed from the centerline.

If section lines or city limits are encountered within the limits of the project, the intersection shall be tied by station and angle/bearings to the baseline of survey.

## 10.2.5 Construction and Project Limits

Proposed construction and project limits shall be indicated in the plans. The limits to be flagged and stationed are:

1. Begin and end of project, and begin and end of construction where construction limits are other than project limits. If plans cover more than one project, the limits of each shall be clearly identified by station and Financial Project ID. Limits identification shall be shown both in plan and in profile.

It is the responsibility of the Engineer of Record (EOR) to set the project and construction limits. If the plans cover more than one project or are part of a corridor improvement, the project limits should be at the beginning of the full typical sections, with any construction (transitions, etc.) outside these limits being within the construction limits. Examples of types of work that may fall within construction limits but outside project limits are feathering, friction course, guardrail, drainage work and signing and marking work.

2. The limits of project breakdown necessary for separation of length and quantities for federal aid and non-federal aid projects.
3. The limits of each type of construction classification where more than one type is involved, such as, new construction, resurfacing, bridge work, widening, and milling.
4. The begin and end of exceptions and equations.

## 10.2.6 Drainage Structures and Bridges

Proposed cross drain pipes and box culverts shall be indicated in the plan by a symbol and identified by a drainage structure number. Cross drain pipe sizes and lengths shall be shown. (Box culvert lengths shall be shown on the drainage structure sheets).

Box culverts (single or multiple) of 20 feet total span or more between inside faces of end supports, measured along the center of the roadway, shall be designated as bridge culverts and shall be identified by both a bridge number and a drainage structure number. The beginning and ending stations (outside wall to outside wall) shall be flagged.

Proposed bridges and approach slabs shall be shown by simple outline. Bridges shall be identified by bridge number and their beginning and ending stations noted by station flags. The beginning and ending stations of approach slabs shall be noted.

A short section of lateral ditch/outfall centerline shall be shown, when appropriate, on the roadway plan-profile sheet, together with a note referring to lateral ditch/outfall sheets for details.

The proposed drainage system is indicated by showing storm sewer pipes with a single line, and the outline of inlets, manholes and junction boxes. The outline of structure bottoms may be shown at the designer's discretion. The pipe size and length between structures shall be given. Structure numbers shall be provided for inlets, manholes, junction boxes and special structures.

## 10.2.7 Plan Layout

1. Right of way lines shall be shown. Right of way shall be dimensioned only if the applicable typical section shows a varying dimension from the baseline or centerline. Dimensions of the R/W line shall be from the centerline or baseline, if survey and construction lines are parallel; otherwise it shall be dimensioned from the construction centerline.
2. The showing of detailed information regarding median openings or intersections should be avoided when they are of a type that can be detailed and grouped on a separate sheet. When this is the case, median openings and intersections shall be identified by station location.
3. At locations along the alignment where traveled way dimensions change, or begin to change, the station and dimensions of the traveled way shall be shown.

4. Curb, curb and gutter, traffic separators, sidewalks, curb ramps, retaining walls, etc. shall be shown. Driveways shall be shown as required by **Volume I, Section 1.8**.
5. Stations of return points shall be shown in tabular form or shown on the plan, unless shown on an intersection detail sheet. Offsets shall also be shown, if not governed by a typical.
6. Station of radius points of traffic separator or median curb at median openings shall be shown in the plan. Elevation of these points shall also be shown if not shown in the intersection details sheet or unobtainable in plans.
7. Control radii for traffic turns that set median nose locations shall be indicated, unless shown on the intersection detail sheet.
8. Station of end of curb and gutter at side street intersections (when end is not at a return point) shall be shown with proposed gutter grade elevation of these points.
9. Limits of pavement and grading at side street intersections shall be indicated.
10. When incidental construction extends beyond the right of way lines, construction easements or license agreements may be required and should be shown on the plan sheets.
11. Limits of wetlands shall be shown based on permit or regulatory requirements.
12. All utilities shall be shown in the plan. All major utilities that have been field verified (see *Quality Level "A" locates*, **Volume I, Chapter 5**) shall be labeled in accordance with the following symbol:

$V_{vh}$  = Verified Vertical Elevation and Horizontal Location

13. All traffic monitoring sites on or within one-half mile of the project shall be identified with the following notation:

Traffic Monitoring Site Number (XXXX)

Roadway Identifying Number (RCI Section #) Milepost (XX.XXX)

Site includes vehicle detectors in roadway and pedestal, pole or base mounted cabinet, buried cable, and solar power unit on right of way.

Inquiries about monitoring sites should be addressed to the Traffic Data Section Manager of the Transportation Statistics Section, Office of Planning.

## 10.3 Roadway Profile Portion

### 10.3.1 General Data

Preformatted plan-profile sheets are located in the FDOT Engineering/CADD Systems Software. The grid portion of each sheet is used for plotting the project profile. The standard grid pattern for the profile portion of the sheet is five lines per inch, both in the horizontal and vertical. This will accommodate most scales. An optional grid with four lines per inch is available. This sheet may be used if approved by the district.

The horizontal scale for the profile portion of the sheet shall be the same as that used for the plan portion. Station limits of the profile shall correspond to those of the plan portion of each sheet. Station numbers shall be placed across the bottom of the sheet just above the title block. Intervals for profile stations shall be the same as those in the plan view.

Vertical elevation datum selected shall be such that the profile will not crowd either the upper or lower limits of the profile format. A general guideline is the vertical scale should be 10% of the horizontal grid. Elevation datum shall be shown on both the left and right sides of the sheet in the space provided adjacent to the grid.

The existing ground line profile shall be shown and labeled. Existing ground line elevations shall be noted vertically, just above the station numbers at each end of the sheet only.

All high water elevations affecting base clearance or roadway grades shall be shown and labeled.

Benchmark data shall normally be given just below the upper margin of the profile portion. However, if space permits, it may be placed in the plan portion just above the upper profile margin at the appropriate corresponding station. Refer to **Exhibit PP-2** for correct format.

Station equations and exceptions shall be shown. Begin and end stations of project, construction, bridge and bridge culverts shall also be shown.

## 10.3.2 Vertical Alignment

The proposed profile grade shall be shown and labeled. Vertical curve PC's and PT's shall be indicated by small circles and PI's by a small triangle with short sections of tangent shown on each side. Percents of grade to 3 significant decimal places shall be shown on the tangent line (trailing zeros need not be shown). Vertical lines shall be extended from the PC and PT points and a dimension line placed between these lines indicating the length of the vertical curve. The PC and PT stations and elevations shall be indicated on the vertical lines.

For vertical curves, the profile grade elevations shall be given on even stations and at appropriate intervals. The elevations shall be placed between the dimension line and the grade line. The curve length, dimension lines and the profile grade elevations shall be placed above the grade line for sag vertical curves and below the grade line for crest vertical curves. The dimensions and elevations shall be placed reasonably near the grade line whenever possible. The PI station and elevation shall be noted, lettered vertically above the PI symbol for crest curves and below for sag curves.

The profile grade elevation of the beginning and ending station of each sheet shall be shown vertically just above the grade line, except when the beginning or ending station on the sheet is on a vertical curve.

## 10.3.3 Grades

Percents of grades to 3 decimal places shall be indicated for each tangent section on every sheet (trailing zeros need not be shown). When two tangent grades intersect and no vertical curve is required the PI station and elevation shall be labeled vertically, using the same criteria as for vertical curves.

## 10.3.4 Superelevation and Special Profiles

For non-standard superelevated sections of the project, the begin and end superelevation stations should be indicated on the profile with a note:

"For Superelevation details see Special Profiles Sheet"

Other special profiles that cannot be clearly shown on the plan-profile sheets shall be referenced in a similar manner to non-standard superelevated sections. For additional information regarding special profiles see **Chapter 11** of this volume.

### **10.3.5 Other Profile Features**

For rural construction projects, special ditches shall be indicated in the profile and labeled. Percent of ditch grade and a beginning or ending ditch PI with elevation and station plus shall be shown. For multi-lane divided projects, three special ditch grades (right and left roadway ditches and median ditch) sometimes occur at the same location. In such cases it may be advantageous to show the median ditch at a convenient location on the sheet with a separate elevation datum.

Uniform ditches of non-standard depth should be indicated by a dimension line in the lower portion of the grid and noted as a special ditch with location and depth, or they should be indicated by flagging the DPI's at each end with station elevation and side. Standard depth ditches are not shown.

Special gutter grades shall be shown in profile for cases where the gutter grades are not controlled by the typical section and no "special profiles" are included in the plans set.

Prolongations of gutter profile grades across street intersections shall be included on plan-profile sheets if an inlet is not provided before the intersection.

Storm sewer pipe, inlets and manholes along the main line shall be shown. Pipes shall be noted by size. Proposed structures may be shown by structure number only. Flow line elevations shall be shown for all pipes entering and leaving the structure.

Proposed cross drain pipes and culverts shall be plotted. The section shall be shown at the correct location and elevation of the proposed structure crossing the centerline of construction. Cross drains shall be identified by structure number only.

Where the project overpasses a road or railroad, the cross section template of the road/railroad under the bridge shall be shown at the appropriate location in profile.

Except for transverse utilities, no underground utilities shall be shown in profile.

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## **10.4      General Notes for Roadway Plan and Roadway Plan-Profile Sheets**

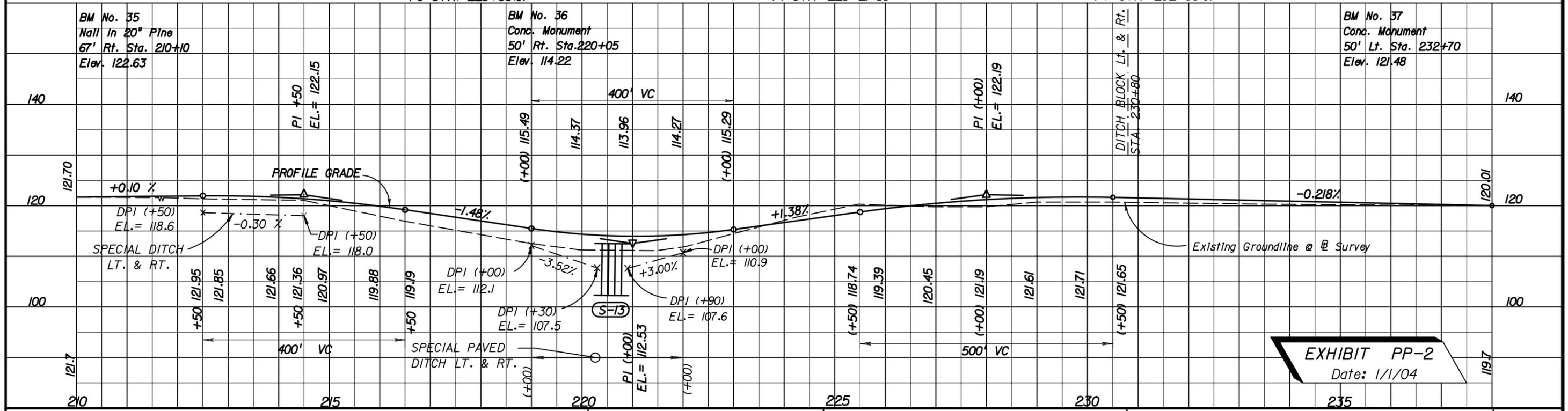
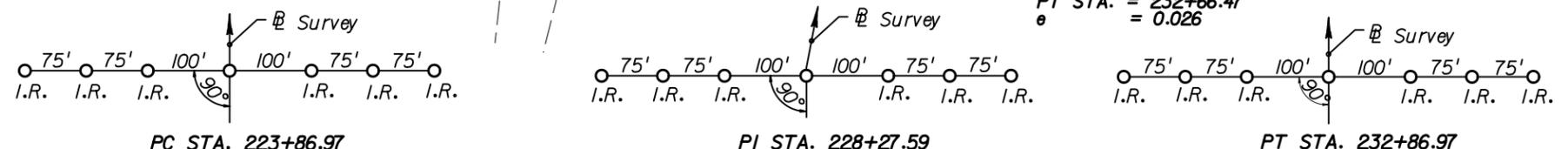
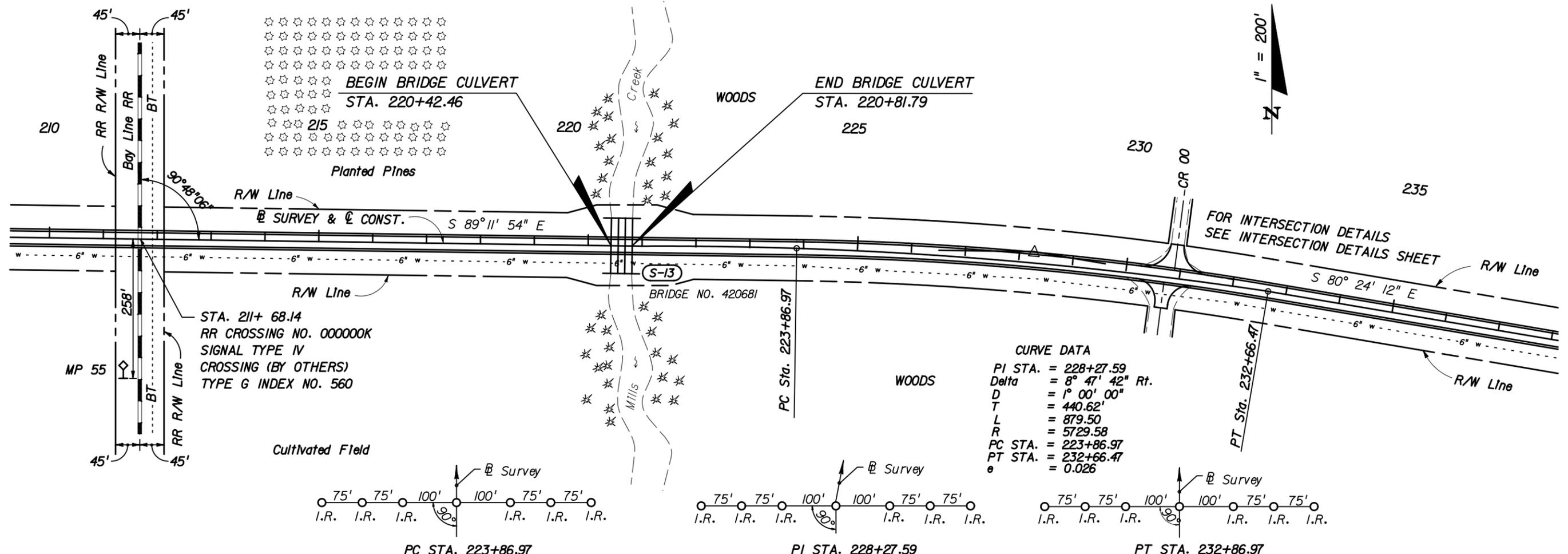
General notes for the project shall be placed on the left portion of the first plan-profile sheet if a project layout sheet is not included in the plans set, otherwise, they shall be included on the layout sheet. See ***Exhibit 10-1*** for a list of General Notes required.

### **Exhibit 10-1 General Notes for Roadway Plan and Roadway Plan-Profile Sheets**

The bench mark datum used for the plans (whether NGVD 29, NAVD 88 or other) shall be noted in the first General Note. Other notes are as follows:

1. Buildings to be removed by others, unless otherwise noted.
2. Existing drainage structures within construction limits shall (be removed/remain) unless otherwise noted.
3. (When there are no utility adjustment sheets in the plans, the notes shown in **Exhibit 20-1** shall be included here as part of the general notes).
4. (If there are no drainage structure sheets in the plans, the following notes shall be included in the general notes, if applicable):
  - a. Special attention is directed to the fact that portions of some drainage structures extend into the stabilized portion of the roadbed and extreme caution will be necessary in stabilization operations at these locations.
  - b. (To be used when there are cross drain pipe and/or storm sewer pipe and optional materials are provided for one or both):

Some/All of the drainage structures have optional culvert materials. When optional materials are allowed, one of the optional materials has been used as the basis of the pay quantities. The material selected as the basis of pay quantities is identified on the Tabulation of (Cross Drain, Storm Sewer, or Cross Drain/Storm Sewer) Optional Materials Sheet. All options are described and design and installation information for each option is provided on this sheet.
5. Any public land corner within the limits of construction is to be protected. If a corner monument is in danger of being destroyed and has not been properly referenced, the Engineer should notify the District Location Surveyor, without delay, by telephone.
6. Existing driveways within the limits of this project are to be replaced at the same location and width, unless otherwise shown in the plans.



**EXHIBIT PP-2**  
Date: 1/1/04

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

<b>STATE OF FLORIDA</b>		
<b>DEPARTMENT OF TRANSPORTATION</b>		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

**PLAN-PROFILE**

SHEET NO.

\*\*\*\*\*DISPECIFICATION\*\*\*\*\*

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# Chapter 11

## Special Profiles

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11.3	Curb Returns .....	11-2
11.4	Ramps .....	11-3
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11.7	At-Grade Railroad Crossings .....	11-6

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# Chapter 11

## Special Profiles

### 11.1 General

The special profiles sheet shows profiles of pavement edges or gutter flow lines. Special profiles occur at street intersections, ramp termini, curb returns, railroad crossings and roadway or bridge sections requiring special superelevation details. Vertical transitions between roadways and bridges may also require special profiling. All of these areas require special analysis and design to ensure a safe, efficient, well drained, and smooth roadway/bridge system. The special profiles sheet shall show details at close intervals and at a scale large enough to clearly identify all construction details within these areas.

### 11.2 Intersections

In addition to normal profile grade lines, supplemental profiles and sections at intersections may be necessary to define edge of pavement profiles. Sections showing pavement surface elevations shall be shown for nose points and other critical locations. It is important to develop accurate profiles and sections at locations of curbed channelization to ensure proper drainage.

When plan-profile format is used for intersection details, the profile's horizontal scale shall be the same as that for the plan portion. A vertical scale of 1" = 2' for the profile portion is recommended as it enables intermediate elevations to be determined from the profile with reasonable accuracy. The existing ground line and/or curb line shall be as called for in the FDOT CADD Production Criteria Guide.

For intersections detailed on a plan only format, the profile and sections shall be shown on a separate grid sheet. The standard cross section sheet, available in the FDOT Engineering/CADD Systems Software, should be used. This sheet features a standard grid of five lines per inch, both in the vertical and horizontal. The vertical scale can be altered to ten lines per inch by utilizing a toggle feature in the CADD software.

For street intersections of municipal projects, a scale of 1" = 20' horizontally and 1" = 2' vertically, or 1" = 50' horizontally and 1" = 5' vertically is recommended.

## 11.3 Curb Returns

Curb return profiles show the profiles of the gutter flow line from the PC to the PT point of the return at an intersection.

Curb return profiles shall be shown on a grid format. They shall be included in the plans set if the required information cannot clearly be shown on the plan-profile sheet or intersection detail sheet, or if extreme grades are involved, rendering the standard curb return profiles (***Index 303*** of the ***Design Standards***) inadequate.

Standard scale used should be 1" = 20' horizontally and 1" = 2' vertically. Other scales may be used provided all construction details are clearly and legibly shown. Each return profile shall be identified and its PC and PT stations shown. Elevations should be shown at appropriate intervals and low and high spots shall be identified by location and elevation.

## 11.4 Ramps

Ramp profile grades shall be developed along the baseline of each ramp. A profile of the edge of the pavement opposite the baseline shall also be shown. These profiles shall be shown on a grid format. Data required to be shown shall be similar to that required for roadway profile (**Chapter 10** of this volume).

Recommended scales for ramp profiles are: 1" = 20' horizontally and 1" = 2' vertically, or 1" = 40' or 50' horizontally and 1" = 4' or 5' vertically.

Sections at nose points are required. They may be shown using a scale of 1" = 20' horizontally and 1" = 2' vertically.

## 11.5 Spline Grade

Intersections of ramp pavement with mainline pavement and other sections of pavement within special superelevated zones need special attention, not only during the design phase of the project, but also during construction. Hence, all construction details pertaining to these areas should be clearly and accurately shown in the plans.

Spline grades are often used to show the interconnection and interrelation of the edges of pavement with the mainline edge of pavement. This profile proves to be especially helpful if the mainline pavement is superelevated or within the superelevation transition zone.

A spline grade shall show the elevations at intervals of 20 to 100 feet, depending on the scale. Elevations shall be shown for the outer edge of mainline pavement and inner and outer edges of the ramp pavement at the nose areas.

Grades of the three pavement edges shall be shown on a grid format. Recommended scales are: 1"=20' horizontally, 1"=2' vertically, or 1"= 40' or 50' horizontally and 1"= 4' or 5' vertically.

Grades of each pavement edge shall be joined by smooth splines or simple curves. The three grade profiles shall be clearly labeled and all equality stations indicated. Nose stations shall be flagged and labeled. Scale shall be indicated in close proximity of the profile and shall be clearly visible.

## 11.6      **Superelevation**

The standard superelevation details (***Indexes 510*** and ***511*** of the ***Design Standards***) may be used for projects which include simple curves. For projects which include reverse curves, or compound curves, or any other situation requiring special superelevation not covered in the standards, the superelevation diagram shall be shown in the plans. Special profile details may be used to design superelevation on multilane facilities, when a simple diagram will not be sufficient.

Complete profile grade line and right and left edges of pavement within the superelevation zone shall be shown on the grid format. A scale of 1"= 20' horizontally and 1"= 2' vertically is recommended for clarity. The begin and end superelevation stations shall be labeled and indicated by a solid vertical line at the appropriate station. A horizontal dimension line shall be utilized to indicate a section in full superelevation.

## **11.7 At-Grade Railroad Crossings**

In addition to normal profile grade lines, supplemental profiles for at-grade railroad crossings may be necessary to define lane lines, edges of pavement, and/or gutter flow lines. It is important to develop accurate profiles to ensure proper drainage.

For at-grade railroad crossings that cannot be adequately detailed on the plan-profile sheets, the profiles shall be shown on a separate grid format. A horizontal scale of 1" = 20' and a vertical scale of 1" = 2' are recommended.

## **Chapter 12**

### **Back-of-Sidewalk Profiles**

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12.2	Sheet Setup.....	12-2
12.3	Required Information.....	12-3

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## Chapter 12

### Back-of-Sidewalk Profiles

#### 12.1 General

Back-of-sidewalk profiles are used to establish the profile grade and therefore play an important role in plan preparation, especially if the project site is located in a built-up urban area. Profiles help ensure the constructability of the project within the right of way without excessive disturbance or rework of adjoining properties. Back-of-sidewalk profiles are also used for checking of stormwater trapped behind the sidewalks and as a major input for establishing centerline grade profiles.

Grades shown on this sheet are at the back of the proposed sidewalk, and grades shown on roadway plan-profile sheets are at the profile grade line (PGL) denoted on the typical section.

The inclusion of the back-of-sidewalk profiles in the plans set is optional - at the discretion of the district. Work sheets may be required with phase reviews.

## **12.2 Sheet Setup**

Back-of-sidewalk profiles shall be prepared on standard cross section format. For simple projects which do not involve many cross streets or driveways, the sheet may be divided horizontally to maximize usage. Stationing shall progress from left to right and top to bottom. Match lines shall be stationed. Care should be taken to preserve clarity and legibility.

## 12.3 Required Information

Profiles for use in establishing back-of-sidewalk grades consist of existing profiles along the back edge of each proposed sidewalk. The existing profiles shall be shown so as to distinguish between the profiles for the right and left sidewalk, and in accordance with the ***FDOT CADD Production Criteria Handbook***.

The standard scales are 1" =100' horizontally and 1" =5' vertically. This combination works well for projects having few locations where back-of-sidewalk grades would be critical. It may be advantageous to use a vertical scale of 1" = 2' and a horizontal scale of 1" = 50' for projects located in business and commercial areas, or where greater clarity is required. Elevation datum shall be shown on both sides of the sheet, with station numbers below the profile.

Limits of existing pavement, such as parking areas and drives, which should be matched as closely as possible, shall be identified on all sidewalk profiles. The centerline for each intersecting street and driveway shall be indicated with a vertical line at the proper station and the street name and station noted. Intersecting streets and driveways on the right shall be shown below the profile, and those on the left above the profile.

At each station, as well as locations of significant drainage, arrows shall be drawn to indicate the slope of ground at the outer edges of the sidewalk.

Drainage arrows shall be placed below the profile line for the right profile and above the profile line for the left profile. Arrows pointing outwards from the profile indicate drainage away from the project, while arrows pointing inwards indicate drainage to the project.

Floor elevations for buildings shall be indicated by a horizontal line drawn at the floor elevation between the building limits. The numeric elevation shall be shown, as well as the offset (distance and side) from centerline of project to the face of the building. Entrances to buildings, elevations of top of existing major utilities (as defined in ***Chapter 5 of Volume I***), and water table elevation may be shown when appropriate.

Once the proposed back-of-sidewalk profile has been developed, percents of grade, PI stations and elevations shall be shown. Vertical curves, if any, shall be dimensioned. Elevations along vertical curves are not required. Stations for begin and end project, exceptions, and back-of-sidewalk special profiles shall be flagged and labeled. Mainline station equations within the limits of the sidewalk profile shall also be flagged and labeled.

The difference in elevation between the profile grade and back-of-sidewalk profile grade shall be noted on the sheet. Superelevation notes, if applicable, shall also be noted on the sheet.

## Chapter 13

### Intersection and Interchange Details/Layouts

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## **Chapter 13**

### **Intersection and Interchange Details/Layouts**

#### **13.1 General**

These sheets provide layouts and details for intersections and interchanges, with consideration for turning and weaving movements of vehicular traffic. For a safe and efficient roadway system (including provisions for bicycles and pedestrians), these areas must be designed with special attention to channelization, turning movements, signalization, drainage and vertical alignment. The various design details shall be shown explicitly for accurate construction.

Intersection and interchange layout sheets shall show all necessary details and geometric controls/access management features, including channelization, tapers, turn lanes, special drainage, and grading. The sheets shall be prepared on a standard plan format using a scale large enough to show details clearly and legibly.

## 13.2 Intersections

Intersection details shall be shown on separate plan sheet format if they cannot be shown clearly on the plan-profile sheet format.

In cases of simple, nonsignalized intersections covering relatively small areas, regular plan-profile format may be used. The intersection layout shall be placed, using an appropriate scale, in the plan portion, and the necessary profile grades in the profile portion.

For larger, more complicated intersections involving channelization, signalization or tapered connections, the layout shall be placed on a standard plan format. Match lines should be used when more than one sheet is required.

The profiles shall be presented separately on a grid format. (See **Chapter 11 - Special Profiles**).

Existing topography need not be shown on these details if it is shown elsewhere in the plans. Information given is generally the same as in the plan portion. Pavement edges, R/W lines, curb and gutter, channelizing and median curbs, driveways, drainage structures, pavement dimensions, radii and appropriate notes shall be included.

All intersection layouts shall be dimensioned, stationed adequately, and shall include all pertinent construction notes and alignment data. Design speed data shall be given when appropriate. Widths of turning lanes and turning paths shall be checked for possible encroachments or conflicts.

A north arrow and scale shall be shown at a point of maximum visibility on the plan. The scale used shall be sufficient to cover all necessary details, preferably 1" = 40'. The scale shall not be smaller than 1" = 50'.

## 13.3 Interchanges

### 13.3.1 Geometric Layout

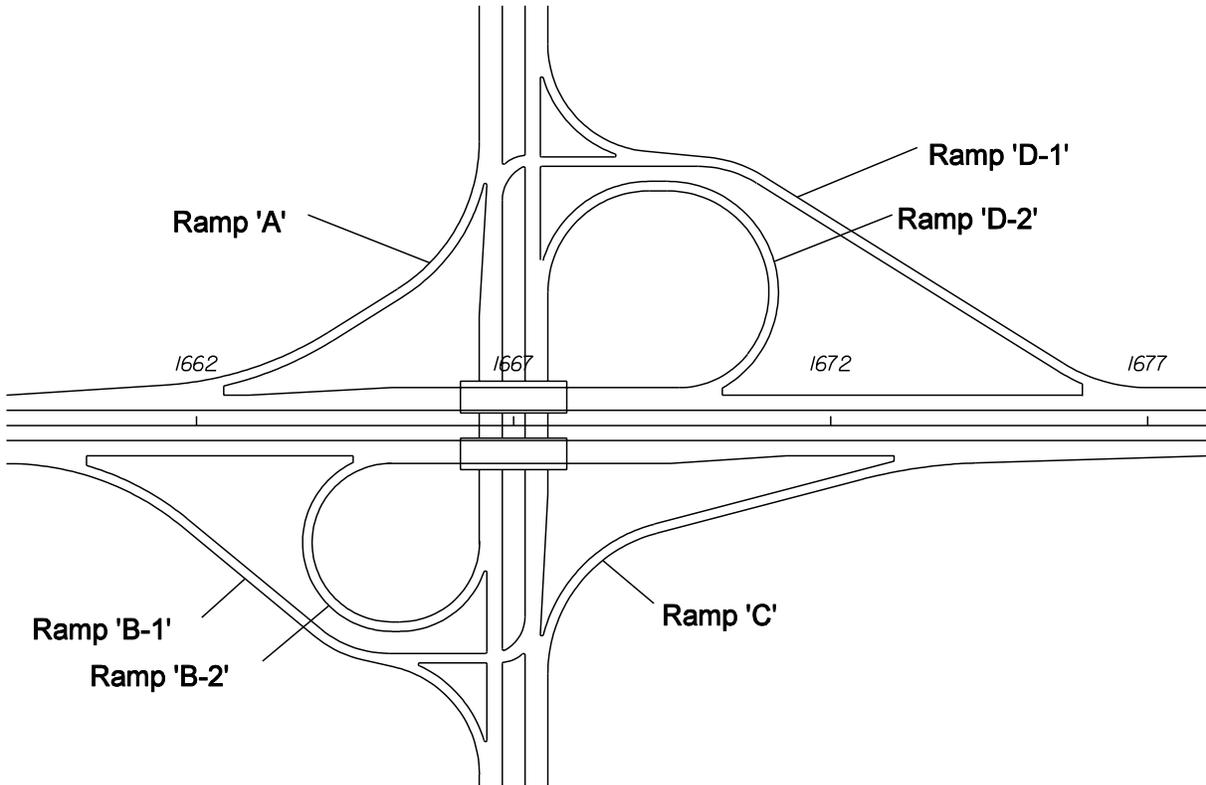
Interchange layouts shall be prepared on a standard plan format. The entire interchange shall be placed on one sheet when possible, using a scale not smaller than 1" = 400'. In cases of large cloverleaf or directional interchanges, more than one sheet may be required. Appropriate match lines shall be shown.

Layouts shall be dimensioned and completely stationed, with all alignment data and construction notes included. All curves shall be assigned a number and curve data presented in a tabular form. It is preferred that the tabular curve and coordinate data be placed on the same sheet as the interchange layout.

Interchange ramps shall be identified by the use of letters or a combination of letters and numbers. The recommended practice for assigning ramp names is as follows:

1. Ramps in the first left quadrant along mainline stationing should be assigned first. Name assignments shall progress in a counterclockwise direction around the interchange (see **Figure 13.1**). For projects with two or more interchanges, continue name assignments with the next letter and in same counter clockwise direction noted above.
2. Ramp baselines are usually located on the right edge of the pavement with relation to the direction of traffic, and shall be clearly indicated. Stationing of ramps should be in the same direction as the project.

**Figure 13.1 Interchange Layout**



A topographic worksheet for all interchanges is required and will be considered as the preliminary layout of the interchange. This worksheet shall be prepared on a standard plan format on a scale not smaller than 1" = 400'. The following information shall be shown:

1. All topography, such as existing roads, property lines, utilities, buildings, driveways, etc.
2. Preliminary interchange geometrics and proposed right of way limits.
3. Drainage right of way and easements.
4. Proposed reconstruction of the crossroad, and all access roads and frontage roads within the interchange.
5. Frontage roads should be assigned a unique alpha or numeric designation to avoid confusion with ramp nomenclature.
6. Contours, unless the terrain is relatively flat.
7. Traffic diagram with AADT, DHV, K, D and T values.
8. The length of speed change lanes.

9. Design speed for ramps and crossroads.
10. Proposed bridge limits.
11. Pavement transitions.
12. Limits of construction along the crossroad.

The contract plans set shall include the following interchange sheets:

1. Interchange geometric layout.
2. Interchange drainage map.
3. Interchange topographic map.
4. Interchange cross section pattern sheet.
5. Ramp terminal details.
6. Ramp cross sections.

### **13.3.2 Ramp Terminal Details**

Details of ramp terminals with mainline and crossroads shall be shown on separate plan sheets. The scale used shall not be smaller than 1" = 50'. Standard scale 1" = 40' is preferred. Complete details of the terminal shall be shown including:

1. Curve data.
2. Station equality and horizontal tie to mainline or crossroad at critical ramp locations.
3. Turning radii, taper/transition lengths, curb/curb and gutter (if any).
4. Channelization (if any).
5. Ramp and crossroad intersection station and angle.
6. Median nose data (if any).
7. Limits of construction.
8. R/W.
9. Limited Access R/W and fence location.
10. Drainage structures.
11. Spot elevations (as needed).
12. Roadway dimensions.
13. Station pluses and offsets.

### **13.3.3 Cross Section Pattern Sheet**

The cross section pattern sheet shows the entire interchange layout including frontage and access roads, if any, with location and extent of proposed cross sections. This information is of special importance for projects involving new interchanges located in rural, undeveloped areas. Information to be shown shall include:

1. North arrow and scale.
2. Interchange layout.
3. Access and frontage roads (if any).
4. Centerline construction and baseline survey.
5. Ramp base lines.
6. Stationing along mainline, crossroads, ramps, access and frontage roads.
7. PC and PT points by symbol.
8. Bridge outline.
9. Cross section pattern.

This sheet shall be prepared on a standard plan format. The scale shall be such that the complete interchange is shown on one plan sheet, with care taken to ensure clarity and legibility. Normal scale is 1" = 400'. North arrow and scale shall be located at a point of maximum visibility.

## Chapter 14

### Drainage Structures

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# Chapter 14

## Drainage Structures

### 14.1 General

Drainage structure sheets show the drainage structures, their location, cross section, flow line elevations of all weirs or slots, top of grates, culverts and top of manhole elevations, and similar data. Drainage structure sheets also show the vertical relationships of the entire drainage system. During the process of design/placement of the drainage structures, potential conflicts with existing or proposed utilities shall be identified and resolved early, thereby avoiding costly time delays during the construction phases.

All projects require the plotting of drainage structures. When only cross drains are to be constructed or modified, drainage structures may be plotted on the cross section sheets. Otherwise drainage structures should be plotted on separate drainage structure sheets, utilizing the cross section sheet cell available in the FDOT Engineering/CADD Systems Software (see *Exhibit DS-2*).

### 14.2 Required Information

The existing ground line for rural projects shall be shown at the location of the structure, with the existing elevation placed immediately below the ground line at the survey baseline. No existing structures shall be shown except those to be incorporated into the proposed drainage system or otherwise modified. These shall be shown and their flow line elevations noted. Where storm sewers run laterally or diagonally across the project, the drawing should show the pipe cover.

The roadway template and proposed structures shall be shown, with the proposed profile grade elevation placed above the grade point. The structure shall be located by station and offset to the centerline of construction. Flow line information shall be provided at each structure and at each culvert end. Structures are to be plotted in detail according to the applicable index of the *Design Standards*, with walls, grates, tops, pipes, etc. shown.

Cross drain sections shall include the size and length for each proposed structure.

Sections for skewed cross drains shall be depicted along the centerline of the structure. Clear zone distances are to be measured at right angles to the traffic lane for all structures.

All structure locations should be checked and R/W shown where the R/W may have potential impact on construction of a structure.

For each drainage structure, all necessary information shall be shown by note, including, as appropriate: size, end treatment and flow lines, as well as structure, index and station number. The note shall be placed as close to the structure as possible, preferably below the plotted structure. Elevations shall be given for manhole tops, and ditch bottom inlet grates and slots. Grate elevations for shoulder gutter and edge of pavement elevations for curb and gutter inlets shall be shown.

Alternate "G" or other special grate treatment shall be included with the inlet note. Additional details, such as special bedding, 36" manhole rings, etc., shall be indicated. Flow direction arrows shall be shown.

Material options shall be shown on the Optional Material Tabulation Sheet. (See **Exhibits SDS-2a** and **SDS-3a** at the back of **Chapter 8** of this volume).

If existing structures are to be filled and/or plugged and are to remain in place, they should be shown in the plans with an appropriate note.

Applicable notes to be shown on the first drainage structure sheet are given in **Exhibit 14-1**.

## 14.3 Utility Conflicts

All major underground utilities, as defined in **Chapter 5** of **Volume I**, shall be plotted in conjunction with the structures so that conflicts may be detected during design, and to alert construction forces of potential conflicts.

In the case of longitudinal pipes, a section should be plotted for each location of a crossing of any major underground line.

Utilities that have been verified (Quality Level "A" locate) shall be noted and plotted to scale in the appropriate locations on the Drainage Structure Sheets, Cross Section Sheets and bridge foundation plans. These utilities should be labeled with the following symbol:

$V_{vh}$  = Verified Vertical Elevation and Horizontal Location

## 14.4 Sheet Setup

Structures should be plotted as sections along the centerline of the structure. They should be shown on a standard cross section format with the sections spaced sufficiently apart to avoid overlapping of structures or notes. Beginning at the bottom of the sheet, the sections should be shown successively by stations and should be numbered sequentially, from the beginning to the end of the project. The structure number and location station should be shown near the right border of the sheet.

If a structure must be shown out of order, a note shall be placed in the correct sequence, referring to the sheet where the structure is shown. The scale shall be the same as that used for roadway cross sections, with the centerline of construction placed near the center of the sheet.

### **Exhibit 14-1 Drainage Structure Notes**

These notes, when required, are to be placed on the first drainage structure sheet.

1. Special attention is directed to the fact that portions of some drainage structures extend into the stabilized portion of the roadbed and extreme caution will be necessary in stabilization operations at these locations.
2. (To be used when there are Cross Drain Pipe and/or Storm Sewer Pipe and optional materials are provided for one or both):

Some/All of the drainage structures have optional culvert materials. When optional materials are allowed, one of the optional materials has been used as the basis of the pay quantities. The material selected as the basis of pay quantities is identified on the Tabulation of (Cross Drain, Storm Sewer, or Cross Drain/Storm Sewer) Optional Materials Sheet. All options are described and design and installation information for each option is provided on the Tabulation of Optional Materials Sheet.

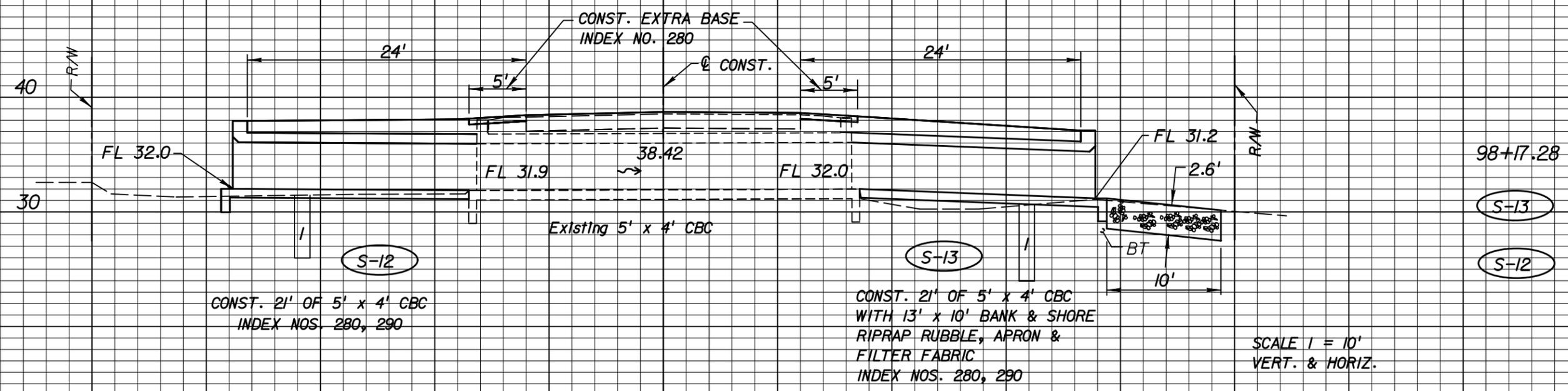
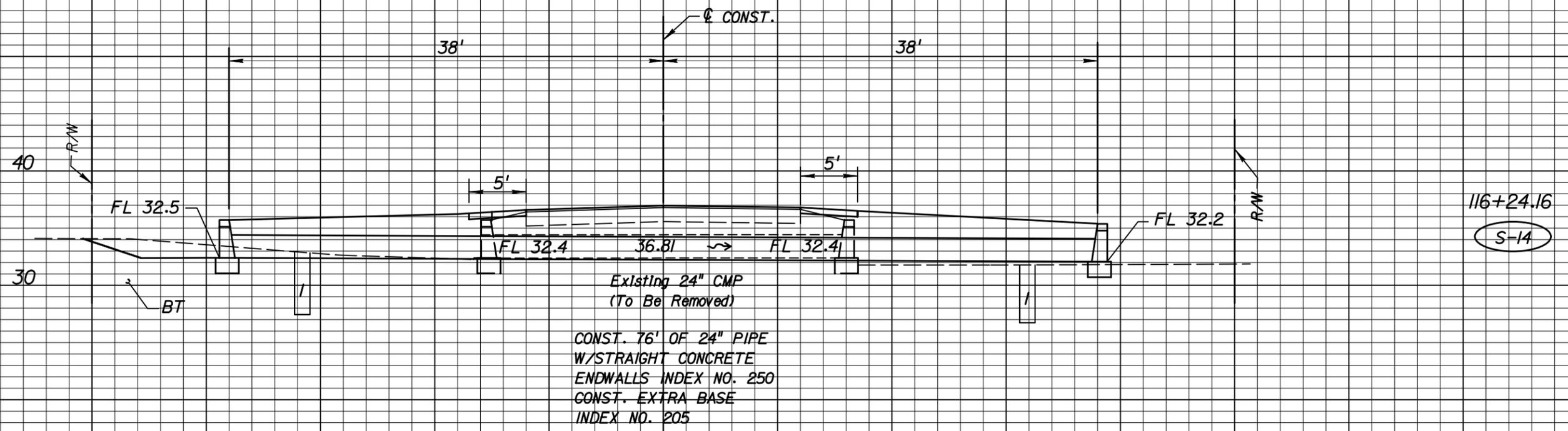


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DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

<b>DRAINAGE STRUCTURES</b>	SHEET NO.  
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## Chapter 15

### Lateral Ditch/Outfalls, Retention/Detention and Mitigation Areas

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## Chapter 15

# Lateral Ditch/Outfalls, Retention/Detention and Mitigation Areas

### 15.1 General

Drainage systems that convey stormwater from the roadway may be made up of many components such as inlets, manholes, pipes, ditches, and retention/detention areas. Usually, these systems require additional right of way and/or easements.

Mitigation areas, although not usually a component of the highway drainage system, may have drainage components in them.

If space permits, drainage components adjacent to the roadway may be shown on the roadway plan-profile sheets. Drainage components not adjacent to the roadway may require separate plan view sheets. In either case, profile views and/or cross sections may also be needed to provide enough detail to construct the components.

Plans for drainage components can generally be grouped into three categories:

1. Lateral ditch/outfalls
2. Retention/detention areas
3. Mitigation areas

## 15.2 Lateral Ditch/Outfall

Lateral ditch plans and profiles shall be prepared on a standard plan-profile format using a horizontal scale of 1" = 100'. However, if storm drain construction is proposed for a portion of the ditch, a scale of 1" = 40' or 1" = 50' may be used.

### 15.2.1 Plan Portion

Data presentation in the plan portion shall be oriented so that the lateral ditch/outfall centerline is parallel to the long side of the sheet. Information shall be shown in a manner similar to that described in **Chapter 10, Roadway Plan and Roadway Plan-Profile**.

Right of way (or easement) alignment data and topography shall be shown in the plan portion. An alignment tie between the lateral ditch/outfall and the project shall also be shown. The north arrow and scale shall be placed at the proper location on the sheet (refer to **Chapter 10** of this volume).

### 15.2.2 Profile Portion

The profile portion shall be prepared in the same manner as the profile portion of the roadway plan-profile sheets (**Chapter 10**). Existing ground line profiles, high water elevations, underground utilities, benchmark information and elevation datum shall be shown as described for roadway plan-profiles.

Where the lateral ditch/outfall survey baseline does not follow the flow line of the existing ditch or channel, the existing ditch or channel profile shall be shown with a broken line and identified.

If storm drain construction is proposed along a lateral ditch/outfall, the proposed structures shall be plotted on the drainage structures sheets, or in the lateral ditch/outfall profile. Structures shown in the profile will include flow line, structure numbers, pipe or culvert sizes, and utilities (if applicable).

The normal water elevation of the receiving system shall be indicated and labeled.

### 15.2.3 Typical Section

A typical section showing the width of proposed clearing and grubbing, right of way, ditch bottom width and side slopes shall be shown on the lateral ditch plan and profile sheet. This section does not need to be to scale, but shall be dimensionally proportionate. If the width of clearing and grubbing is variable for a lateral ditch/outfall, the various widths and their respective station limits shall be noted below the typical section.

### 15.2.4 Ditch Cross Sections

Lateral ditch cross section sheets are included in the plans. These sheets show the right of way required, the extent of clearing and grubbing required and the amount of earthwork.

Lateral ditch cross sections shall be prepared in a manner similar to that of roadway cross sections (**Chapter 18** of this volume). The scale, generally, should be 1" = 10', vertical and horizontal. Regardless of the horizontal scale used, the vertical scale shall always be 1" = 10'.

Often it is possible to place two or more columns of ditch cross sections on one sheet. They shall be plotted with the stationing progressing from the bottom of the sheet to the top, and from left to right.

Usually, soil surveys are made along the lateral ditch only when a large amount of material is expected to be excavated.

Guidance given in **Roadway Cross Sections (Chapter 18)** shall be applicable equally to lateral ditch cross sections.

## **15.3 Retention or Detention Areas**

### **15.3.1 Pond Detail Sheet**

The retention or detention pond, including the outlet structure, is usually the end point of the drainage system for a particular project. The retention/detention pond detail sheet shall show the pond in plan view, with station and offset ties to the project centerline of construction. The plan view shall also include the following:

1. Locations of pond sections.
2. Side slopes and base dimensions.
3. Bottom and top elevations.
4. Location of maintenance berm.
5. Fence and gate locations.
6. Right of way.
7. Pond drainage structures with structure numbers.
8. Soil boring locations, and
9. Any other necessary data pertaining to the pond.

The pond sections shall show the bottom width and elevation, side slopes, normal water depth, if applicable, as well as soil borings. A minimum of two (2) sections, taken in directions perpendicular to each other, shall be shown.

## 15.3.2 Typical Section

A typical section is required when the pond sections do not represent the *typical* design features of the pond. Following is a list of appropriate information to be shown on the typical section:

1. Limits of clearing and grubbing
2. Typical side slopes
3. Bottom and top elevations
4. Details of maintenance berm
5. Fence location
6. Right of way
7. Water level information
8. Vegetation requirements

The typical section does not need to be to scale, but shall be dimensionally proportionate. It should be shown on the pond detail sheet, if room allows, or on a separate sheet when necessary.

## 15.3.3 Pond Cross Sections

Pond cross sections shall be prepared in a manner similar to that for roadway cross sections (**Chapter 18** of this volume). As with lateral ditches, the standard scale is 1" = 10' vertical. The standard horizontal scale is also 1" = 10', although another scale may be used if necessary.

If material is to be excavated from the pond the data from the soil survey sheet shall be shown on the cross sections.

Guidance given in **Roadway Cross Sections (Chapter 18)** shall be applicable to pond cross sections.

## **15.4 Mitigation Areas**

If construction details for mitigation areas are included in the plans, follow the requirements for retention/detention areas.

# Chapter 16

## Special Details

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# Chapter 16

## Special Details

### 16.1 General

Special details sheets are usually included in the plans set if the project contains areas that require special attention to some construction elements. Construction details that are not covered in the ***Design Standards*** booklet or elsewhere in the plans set shall be shown on the special details sheet.

This sheet shall be prepared on a standard plan format. Any convenient scale may be used, provided the information shown is clear and legible. Details shown shall be clear, legible, labeled, completed in all respects and should be adequately cross-referenced in the plans set.

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## **Chapter 17**

### **Soil Survey**

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## **Chapter 17**

### **Soil Survey**

#### **17.1 General**

The soil survey sheet, essentially a soil test analysis sheet, depicts the various types of soils encountered within the limits of the project. This sheet also shows the classification, mechanical properties and recommended usage of those soils. A preformatted CADD sheet can be found in the FDOT Engineering/CADD Systems Software.

Soils having identical characteristics shall be assigned to the same stratum and group for identification and recommendation purposes. The test analysis sheet shall be signed by the responsible Engineer.

## **17.2 Roadway Soil Survey**

### **17.2.1 Method of Compilation and Presentation**

Upon completion of the proposed typical section, and after placing alignment, proposed grades and existing utilities on the plan-profile sheets and preliminary sections, prints of these sheets shall be utilized for determining the location and depth of borings for the sampling of soils for testing and classifications. These classification and test results, including pH, resistivity, sulfides and chlorides shall be shown on the test analysis sheet. Date and weather conditions at the time of sampling shall also be shown. Refer to **Exhibit SS-1** for an example of soil survey sheet.

After completion of soils testing, the boring data shall be shown on cross sections by columns approximately 1/4 inch wide below the ground line at test sample locations. Stratum limits and numbers shall be shown inside the column. This information shall be transmitted to the appropriate responsible materials engineer for verification. One hard copy of the soils information, including cross sections with soils information, shall be retained in the Soils Engineer's Record.

## **17.3 Other Soil Surveys**

Soil surveys other than those for roadway plans are required for various plans components. Included in these are soil surveys/borings for retention/detention ponds, overhead sign structures, high mast poles and traffic signal mast arms.

Soil survey sheets generated for such components are generally located in the plans set with the other details and information for each component. Requirements for the soil survey sheets are similar to those prepared for the roadway soil survey, showing such things as the location of test holes, various strata encountered, soil properties, classification and recommended usage.

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## Chapter 18

### Roadway Cross Sections

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# Chapter 18

## Roadway Cross Sections

### 18.1 General

Cross sections depict the existing ground conditions, including all manmade features, as sections perpendicular to the respective stations along a survey baseline or construction centerline. The proposed cross-sectional outline of the new facility with all its functional elements is also shown on cross sections. Standard cross section sheets shall be used for showing roadway cross sections. The preformatted sheet cell is located in the FDOT Engineering/CADD Systems Software. This sheet features a standard grid of five lines per inch, both in the vertical and horizontal. The vertical scale can be altered to ten lines per inch by utilizing a toggle feature in the CADD software.

The recommended vertical scale is 1" = 10'. The horizontal scale shall be such that the entire roadway R/W is shown on the sheet (generally 1" = 10' or 1" = 20'), but shall not be smaller than 1" = 40' horizontal. If the entire R/W cannot be shown on one sheet, more sheets may be utilized and appropriate match lines shall be shown with referenced sheet numbers. The scale shall be shown at the bottom right corner of the sheet above the title box.

### 18.2 Required Information

Existing ground lines shall be shown and the existing elevation at the centerline shall be noted just below the ground line at the centerline. The station number of the section shall be indicated opposite the ground line on the right side of the sheet and location baseline of survey indicated along the top and bottom of the sheet. Lines parallel to the baseline of survey should show station equivalencies to the baseline of survey.

The surface, as well as the below ground portions of existing features such as pavements, curbs and sidewalks, shall be shown.

Existing parallel underground utilities which lie within the horizontal limits of the project shall be shown along with verification notation for those locations which have been verified. Utilities that have been verified should be labeled as shown in **Section 14.3** of this volume. Small distribution or service lines need not be drafted.

Soil data and water table shall be shown on cross sections as described in **Section 17.2.1** of this volume. If it is determined that an organic or plastic material must be removed below the finished grading template, the lower limits of removal of organic or plastic material will be shown to determine the area and volume of subsoil excavation.

The proposed roadway template shall be shown. The proposed profile grade elevation shall be placed vertically or at an angle to the horizontal, just above the profile grade line. Special ditch elevations shall also be shown.

Station equations shall be shown, even though a cross section may not be plotted at that point. For ramp cross sections equivalent mainline stations shall also be shown.

The right of way limits shall be symbolically shown for each cross section.

The begin and end stations for project, construction, exceptions, bridge/bridge culvert and the toe of slope under the bridge shall be shown. The beginning and ending earthwork stations shall be shown.

On projects with grade separations, intersections, interchanges, etc., the earthwork shall be totaled on the last cross section sheet for each of the above and noted as to the station in which the earthwork is included on the project cross sections. Earthwork quantities shall be indicated in the appropriate columns on the right side of the sheet. Earthwork summaries shall be shown on the last cross section sheet of each roadway, ramp, etc. The grand total shall be tabulated in the Summary of Earthwork and shown on the Summary of Quantities Sheet.

The order of assembling the cross sections in the plans set shall be:

1. Mainline
2. Side streets
3. Ramps

## 18.3 Sheet Set Up

Cross sections shall be shown on a standard preformatted cross section sheet (available in the FDOT Engineering/CADD Systems Software) with stations increasing from the bottom to the top of the sheet. Usually, only one column of sections shall be placed on a sheet.

The interval selected for showing sections on the cross section sheet will vary according to project specific factors. For new construction and reconstruction, the normal interval for cross sections is 100 feet for rural projects and 50 feet for urban projects. These intervals may also be appropriate on RRR projects, depending on the variability of earthwork along the project. Other factors that may influence the frequency of cross sections include the presence of intersections, extent of driveway and turnout construction or reconstruction, ADA related work, drainage improvements, etc.

Sections shall be centered on the sheet with the survey baseline or the construction centerline placed vertically in the center. In cases where additional lanes are to be constructed adjacent to existing lanes, centering the sections will depend upon the location of the survey line and the side on which the new construction is to be placed. Sections shall be oriented such that the complete ultimate section will be approximately centered on the sheet. When the centerlines of construction and survey are not parallel, the distance between the two at each cross section shall be shown.

As many sections as possible shall be placed on a sheet with sections being spaced to avoid overlapping. The soil profile should be checked for possible unsuitable material below existing ground which may cause overlapping of sections.

When right of way is narrow enough and a horizontal scale of 1" = 20' is used, two columns of cross sections may be placed on a sheet. Cross section placement progresses from the left to the right as well as from the bottom to the top of the sheet. The sheet shall be set up to provide earthwork columns for each column of sections.

For additional information on cross sections see ***Volume I, Chapter 3.***

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## Chapter 19

### Work Zone Traffic Control

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## Chapter 19

### Work Zone Traffic Control

#### 19.1 General

A Traffic Control Plan (TCP) will accompany all plans for a construction project. The TCP is the final document that summarizes the considerations and investigations made in the development of a comprehensive plan for maintaining traffic through a work zone.

The TCP is used to describe the actions to be taken by the contractor to minimize traffic impacts while conveying traffic safely through a work zone. The traffic control plans may include, but are not limited to, general notes, phase notes, phase typical sections, phase plan-profile sheets, special details, and temporary cross sections.

#### 19.2 Required Information

Specific traffic control plans are required on all projects. The information provided on the traffic control plans may consist of nothing more than notes and references to the **Design Standards, Series 600** or may be as elaborate as detailed individual phase layouts using profile sheets and interchange and intersection layout sheets. Information shall be provided to inform the contractor of the following:

1. location of the centerline, pavement edge, curb line, shoulder;
2. placement of temporary pavement markings;
3. lane configurations;
4. locations of work zone signs and any other temporary work zone traffic control devices (including variable message signs, advanced warning arrow panels, barriers, crash cushions, temporary signals, etc.);
5. layouts and placement of channelizing devices;
6. work to be accomplished during the individual phases of construction,
7. lane closures and other restrictions that apply;
8. regulatory speed limits for each phase;
9. project specific requirements such as school zones, railroads, waterborne vessels, etc.

When a project requires more than one phase of construction, the traffic control plans should address each individual phase. MOT quantities should be tabulated by phase in the traffic control plans or shown in the computation book.

## **19.3 Levels of Complexity to be Anticipated for Traffic Control Plans**

The following guidelines have been developed to assist in determining the level of detail and complexity that may be required for a project.

### **19.3.1 Level I**

**Application** - Simple projects where method of construction is straight forward. (Examples: RRR, Enhancements, Resurfacing, Minor Widening).

#### **Components of the TCP**

1. General Notes (including references to the applicable indexes in the **Design Standards**)
2. Phase Typical Section(s)
3. Special Details - MINIMAL - where unique situations for the project exist

### **19.3.2 Level II**

**Application** - Moderately complex Construction projects, such as reconstruction of roadways. (Examples: Urban or rural widening projects, Projects with Diversions or Detours)

#### **Components of the TCP**

1. General Notes
2. Phase Notes (including references to the applicable indexes in the **Design Standards**)
3. Phase Typical Section(s)
4. Detailed plan sheets (when an index in the **Design Standards** does not apply)
5. Cross Sections as determined necessary (Example: diversions, temporary drainage, temporary bridge structure)
6. Special Details - As necessary for constructability (Example: temporary drainage, slope requirements due to diversions, temporary signalization, railroad work, etc.)

### **19.3.3 Level III**

**Application** - Complex projects.

#### **Components of the TCP**

1. General Notes
2. Phase Notes (including any references to the applicable standard indexes)
3. Phase Typical Section(s)
4. Detailed Plan Sheets
5. Cross Sections
6. Special Details may include - Temporary Drainage; Temporary Signalization; Intersection Details; etc.

## 19.4 Format

TCP=s will be prepared on standard plan sheet format. A scaled drawing is not always required; however, clarity and legibility are critical. When scaled drawings are required, the scale shall not be less than 1" = 100' for plan sheets and 1" = 40' for special details. Levels, fonts and line weights shall be in accordance with the ***FDOT CADD Production Criteria Handbook***.

Tools are available in FDOT Engineering/CADD Systems Software to assist in the development of Traffic Control Plans.

## Chapter 20

### Utility Adjustments

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## **Chapter 20**

### **Utility Adjustments**

#### **20.1 General**

The purpose of utility adjustment sheets is to provide coordination between the contractor and the affected utility companies. These sheets show the contractor the approximate locations of existing, proposed and relocated utilities, and thus aid the contractor in avoiding possible conflicts or damage to the utilities involved.

## 20.2 Required Information

Locations of all existing and proposed utilities within the project limits shall be shown on the plans.

All proposed and relocated utilities shall be clearly shown on the plan using lines and standard utility symbols, and shall be labeled (see **Index No. 002** of the **Design Standards** and the **FDOT CADD Production Criteria Handbook**). Disposition of all existing utilities that are not to remain in place and in service shall be clearly indicated: for example "To Be Removed", "To Be Adjusted", "To Be Relocated", etc. The disposition of existing utilities that are to remain in place and in service need not be labeled. All proposed utilities shall be appropriately labeled.

Applicable general notes shall also be shown on the first utility adjustment sheet (see **Exhibit 20-1**).

## 20.3 Sheet Format

The utility adjustment sheets shall be prepared from CADD files generated for the plan or plan-profile sheets, and only the plan portion should be shown. Levels, fonts and line weights shall be in accordance with the ***FDOT CADD Production Criteria Handbook***.

Information and graphic data that is not necessary for utility adjustment sheets may be removed by turning off the appropriate level(s) on which the data is stored. This will help ensure that information pertinent to utility adjustments is more easily seen. However, the utility adjustment sheets shall show the following information as a minimum:

1. Baseline and/or centerline of survey.
2. Curb and gutter or edge of pavement.
3. Drainage structures (existing and proposed).
4. Right of way lines.
5. Station numbers.
6. Street names.
7. Location of existing utilities. All major utilities that have been field verified (see *Quality Level "A" locates, Volume I, Chapter 5*) shall be labeled in accordance with the following symbol:

$V_{vh}$  = Verified Vertical Elevation and Horizontal Location

At the District's option, a table of field verified utilities containing the following information can replace the profile view on each sheet:

$V_{vh}$ No.	Utility Description	Station	Offset	Existing Ground Elevation	Top Elevation	Comments

8. Disposition of existing utilities that are not to remain in place and in service.
9. Location of new or relocated utilities.

### Exhibit 20-1 General Notes for Utility Adjustments

The following notes shall be placed on the first Utility Adjustment Sheet. (If there are no utility adjustment sheets in the plans, these notes shall be included in the General Notes shown on **Exhibit 10-1**).

1. The location(s) of the utilities shown in the plans (including those designated  $V_v$ ,  $V_h$  and  $V_{vh}$ ) are based on limited investigation techniques and should be considered approximate only. The verified locations/elevations apply only at the points shown. Interpolations between these points have not been verified.
2. Existing utilities are to remain in place unless otherwise noted.
3. Utility Owners:

#### Companies

#### Telephone Numbers

(Note: If there is a traffic-monitoring site on the project or within one-half mile of the construction, the Transportation Statistics Office in Tallahassee shall be added to the list of utility owners. The contact person is the Traffic Data Section Manager. Refer to **Chapter 10, Section 10.2.7, Item No. 13** for plan requirements involving traffic-monitoring sites).

## **Chapter 21**

### **Selective Clearing and Grubbing**

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## **Chapter 21**

### **Selective Clearing and Grubbing**

#### **21.1 General**

Selective clearing and grubbing plans show the extent and type of clearing operation required within the project right of way limits. This information may be shown on the plan-profile sheet, if no substantial clutter of the sheet results. Otherwise, selective clearing and grubbing shall be shown on a separate plan sheet.

## 21.2 Required Information and Sheet Set Up

When separate selective clearing and grubbing sheets are required, they shall be shown on a standard plan format. Complete existing topography shall be shown together with centerline of construction with stationing, R/W lines and limits of construction. The type of selective clearing and grubbing operation to be performed shall be clearly shown by symbol (refer to **Section 21.3**).

A north arrow and graphic scale shall be placed at a point of maximum visibility on the sheet. Any convenient scale may be used provided clarity and legibility are preserved. However, it is recommended that the selective clearing and grubbing plans be prepared at the same scale as the roadway plan-profile sheets. Appropriate match lines shall be used when necessary.

For an illustration of a selective clearing and grubbing sheet, see **Exhibit SCG-2**.

## 21.3 Standard Symbols and Notes

The amount and type of notes required for selective clearing and grubbing will vary depending on the project. It may be desirable to provide a separate detail sheet in the plans to display the notes, symbols and details that are applicable to the project. An example of such a sheet is given in ***Exhibit SCG-1***.

All areas that are not included in one of the selective clearing and grubbing categories, as shown on the detail sheet or elsewhere in the plans, shall be standard clearing and grubbing.

Undesirable exotic pest plants, including Australian Pine, Brazilian Pepper, Malaleuca and Chinese Tallow trees, as well as Cogon grass should be labeled to be totally removed, regardless of size or location within the project limits.

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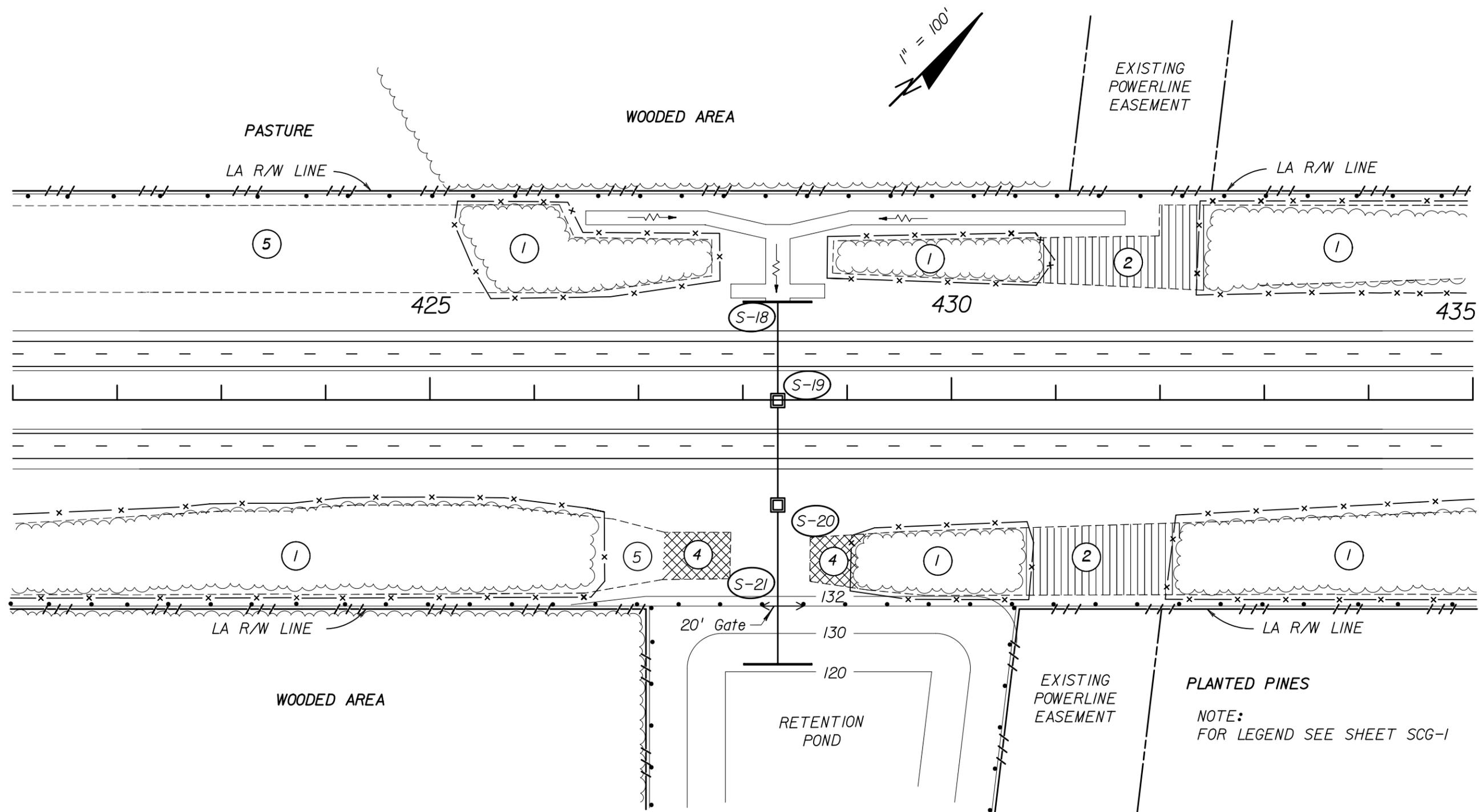


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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID

**SELECTIVE CLEARING AND  
GRUBBING**

SHEET NO.

## **Chapter 22**

### **Miscellaneous Structures Plans**

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## Chapter 22

### Miscellaneous Structures Plans

#### 22.1 General

Miscellaneous structures not included in the bridge plans shall be included in the appropriate component plans. This includes box culvert details, high mast lighting supports, traffic mast arm supports, signal strain poles, overhead sign supports, rest area structures or buildings, barrier walls (traffic or sound), retaining walls and toll facilities.

For guidelines on structural detailing, refer to the ***Structures Detailing Manual (Topic No. 625-020-200)***.

## **22.2 Approach Slabs**

As of the July, 1999 letting, approach slab details sheets are included in the structures plans. However, some roadway elements may need to be carried onto the approach slab, and in these cases special attention must be given to clarifying in the plans which elements are to be included as part of the roadway.

The stabilization required under the approach slabs shall be paid for using the standard roadway pay item and the quantity included in the roadway plans. In addition, roadway elements such as guardrail, earthwork, sidewalks, approach slab surfacing, etc., which are part of the roadway approaches to the bridge and which interface with the approach slabs areas, will also be included and paid for in the roadway quantities.

## 22.3 Retaining Walls (Cast in Place, Proprietary, Temporary)

When cast in place retaining walls other than standard gravity walls are required, complete design and construction details, including pay items and quantities are required in the contract plans. The same is true for steel or concrete sheet piles for either permanent or temporary retaining walls.

Proprietary walls are handled differently than cast in place, steel and concrete sheet pile retaining walls. A set of control plan details must be developed for retaining walls. (See **Chapter 30, Volume I** for a discussion concerning the requirements for control plan details).

On projects with bridges the control plan details shall be included in the bridge plans. When there are no bridge plans the control plan details shall be included in the appropriate component plans. Examples of control plan details are included as exhibits at the back of this chapter.

Standard drawings from the preapproved wall companies are included in the **Design Standards** (available as Interim Index Drawings).

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WALL No. 1A

PGL Flyover Station	Exposed Face of Wall 1A Offset from PGL Flyover (ft.)	Top of Coping Elevation @ Wall 1A (ft.)
13+55.00	34.958	224.600
13+75.00	34.958	224.969
14+00.00	34.958	225.503
14+25.00	34.958	226.116
14+50.00	34.958	226.809
14+75.00	34.958	227.583
15+00.00	34.958	228.436
15+25.00	34.958	229.370
15+50.00	34.958	230.383
15+75.00	34.958	231.477
16+00.00	34.958	232.650
16+25.00	34.958	233.904
16+50.00	34.958	235.390
16+75.00	34.958	236.848
16+88.92	34.958	237.615
16+93.50	34.958	-

WALL No. 2A

PGL Flyover Station	Exposed Face of Wall 2A Offset from PGL Flyover (ft.)	Top of Coping Elevation @ Wall 2A (ft.)
26+78.83	34.958	-
26+85.08	34.958	239.246
27+00.00	34.958	238.327
27+25.00	34.958	236.948
27+50.00	34.958	235.569
27+75.00	34.958	234.191
28+00.00	34.958	232.812
28+25.00	34.958	231.433
28+50.00	34.958	230.055
28+75.00	34.958	228.676
29+00.00	34.958	227.297
29+25.00	34.958	226.058
29+50.00	34.958	224.927
29+75.00	34.958	223.891
30+00.00	34.958	222.950
30+25.00	34.958	222.109
30+50.00	34.958	221.525
30+70.00	22.958	221.121

WALL No. 3

SR 61 Construction Station	Exposed Face of Wall 3 Offset from SR 61 Construction (ft.)	Top of Coping Elevation @ Wall 3 (ft.)
265+20.00	69.708	212.650
265+40.00	69.708	212.210
265+42.48	69.708	212.160
265+60.00	68.550	211.810
265+80.00	67.227	211.400
266+00.00	65.905	211.000
266+20.00	64.582	210.590
266+40.00	63.260	210.190
266+60.00	61.938	209.780
266+80.00	60.615	209.380
267+00.00	59.293	209.010
267+20.00	57.970	208.670
267+23.96	57.708	208.610
267+40.00	57.708	208.330
267+60.00	57.708	208.030
267+80.00	57.708	207.770
268+00.00	57.708	207.550
268+20.00	57.708	207.350
268+40.00	57.708	207.210
268+60.00	57.708	207.090
268+80.00	57.708	207.010
269+00.00	57.708	206.970
269+20.00	57.708	206.970
269+40.00	57.708	207.010
269+60.00	57.708	207.090
269+80.00	57.708	207.210
270+00.00	57.708	207.350
270+20.00	57.708	207.550
270+40.00	57.708	207.770
270+60.00	57.708	208.030
270+80.00	57.708	208.330
271+00.00	57.708	208.670
271+20.00	57.708	209.050
271+25.00	57.708	209.150

WALL No. 1C

PGL Flyover Station	Exposed Face of Wall 1C Offset from PGL Flyover (ft.)	Top of Coping Elevation @ Wall 1C (ft.)
10+90.00	6.958	225.647
11+00.00	6.958	225.486
11+25.00	6.958	225.139
11+50.00	6.958	224.872
11+75.00	6.958	224.685
12+00.00	6.958	224.578
12+25.00	6.958	224.551
12+50.00	6.958	224.604
12+75.00	6.958	224.737
13+00.00	6.958	224.950
13+25.00	6.958	225.243
13+50.00	6.958	225.616
13+75.00	6.958	226.069
14+00.00	6.958	226.603
14+25.00	6.958	227.216
14+50.00	6.958	227.909
14+75.00	6.958	228.683
15+00.00	6.958	229.536
15+25.00	6.958	230.470
15+50.00	6.958	231.483
15+75.00	6.958	232.577
16+00.00	6.958	233.750
16+25.00	6.958	235.004
16+50.00	6.958	236.323
16+75.00	6.958	237.648
16+88.92	6.958	238.477
16+93.50	6.958	-

WALL No. 2C

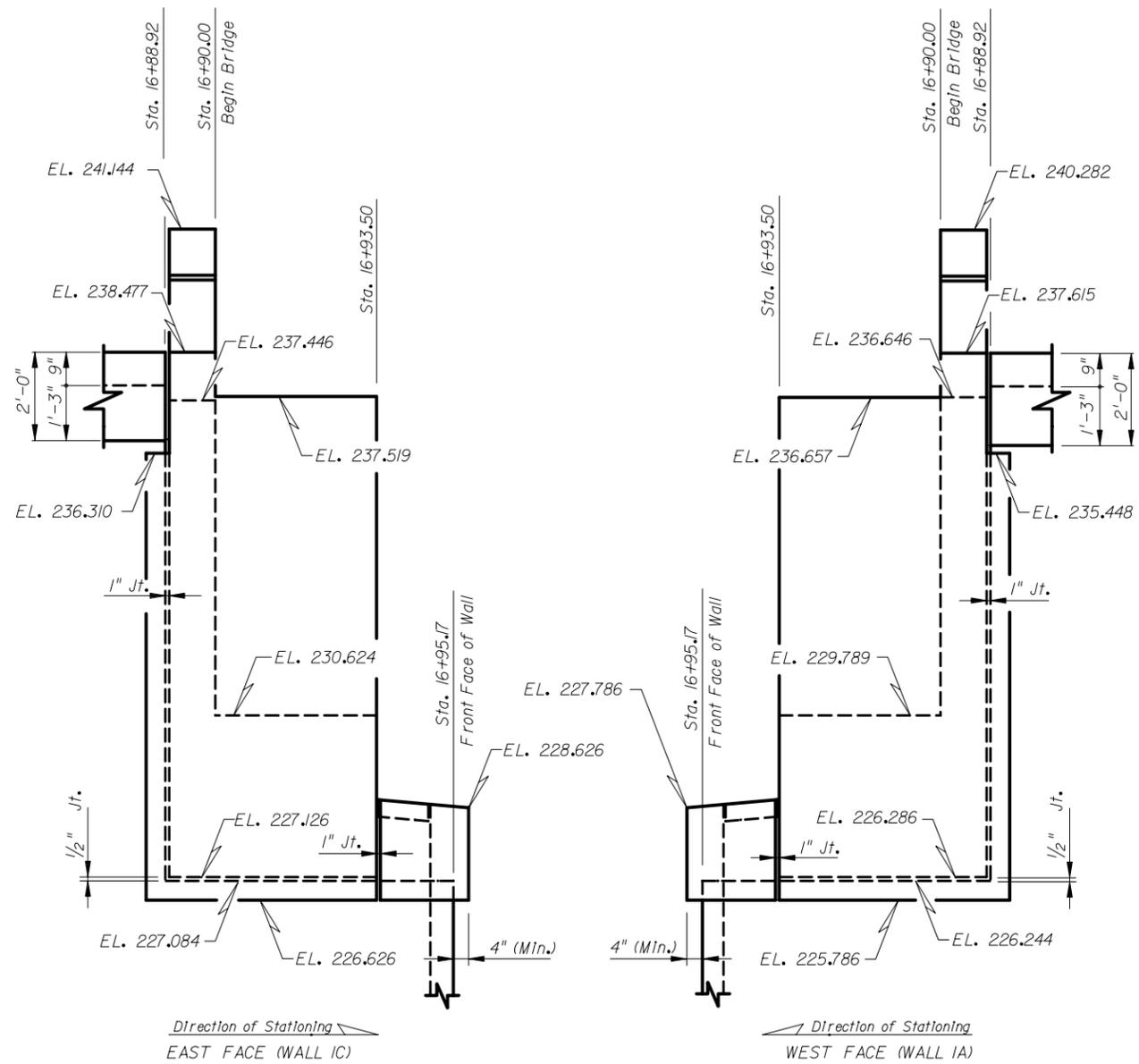
PGL Flyover Station	Exposed Face of Wall 2C Offset from PGL Flyover (ft.)	Top of Coping Elevation @ Wall 2C (ft.)
26+78.83	6.958	-
26+85.08	6.958	238.015
27+00.00	6.958	237.310
27+25.00	6.958	236.055
27+50.00	6.958	234.804
27+75.00	6.958	233.554
28+00.00	6.958	232.314
28+25.00	6.958	231.102
28+50.00	6.958	229.890
28+75.00	6.958	228.678
29+00.00	6.958	227.466
29+25.00	6.958	226.258
29+50.00	6.958	225.127
29+75.00	6.958	224.091
30+00.00	6.958	223.150
30+25.00	6.958	222.307
30+50.00	6.958	221.656
30+70.00	18.958	221.201

NOTES:

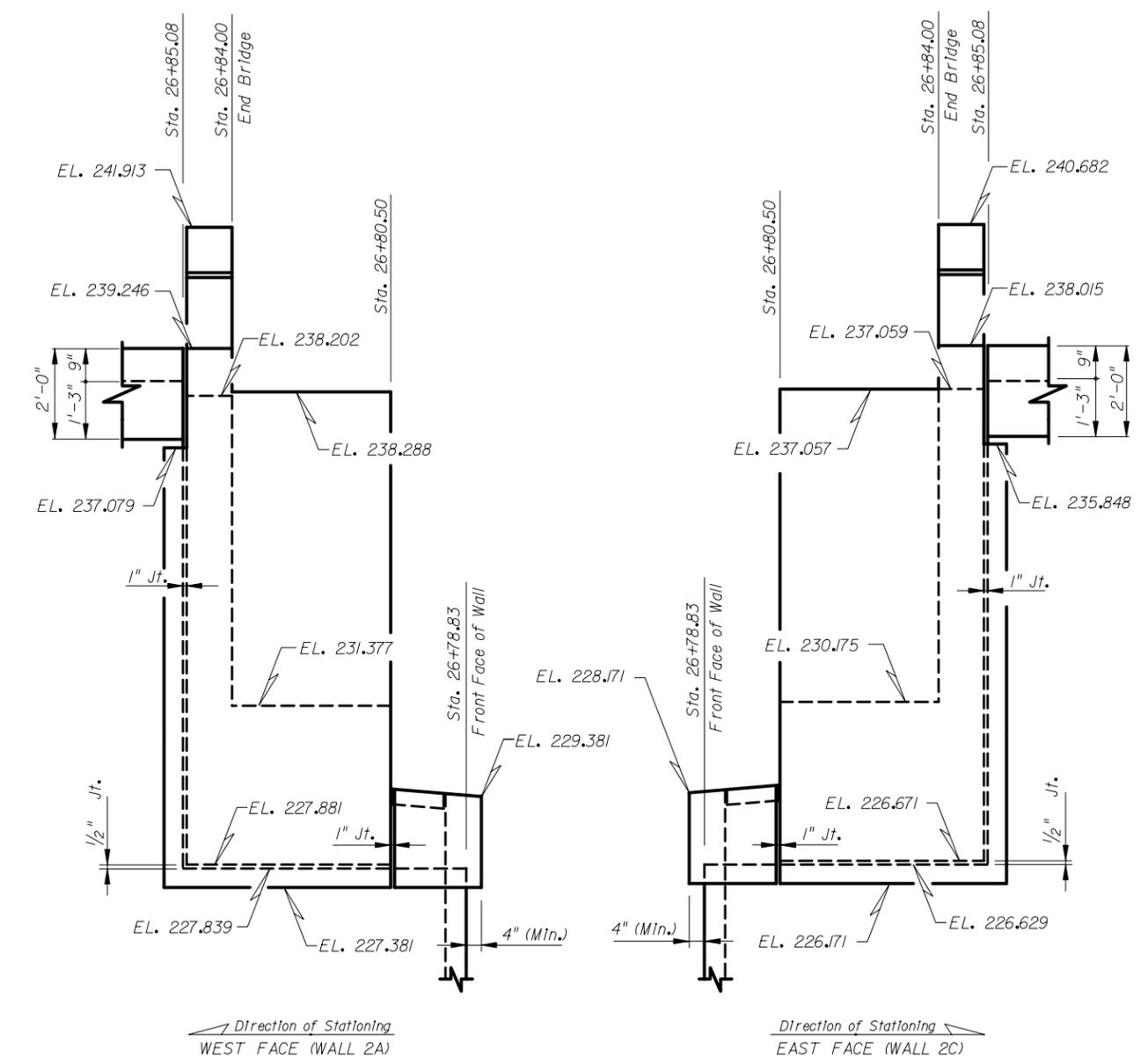
- Offsets are given to the exterior face of the proprietary wall (See Sheet W-1 for detail).
- Top of Coping Elevation detail shown on Sheet W-1.
- For existing and proposed ground elevations for all walls, see Sheets W-2 thru W-5.

**EXHIBIT CP-4**  
Date: 1/1/03

REVISIONS						ENGINEER OF RECORD			SHEET TITLE		
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	FLORIDA DEPARTMENT OF TRANSPORTATION			PROPRIETARY WALL ELEVATIONS		
						ROAD NO.	COUNTY	PROJECT NO.	PROJECT NAME		
									SHEET NO.		



**END BENT NO. 1**



**END BENT NO. 7**

**EXHIBIT CP-5**  
Date: 1/1/03

REVISIONS						DRAWN BY		ENGINEER OF RECORD	FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET TITLE	
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	CHECKED BY	DESIGNED BY		ROAD NO.	COUNTY	PROJECT NO.	MISCELLANEOUS DETAILS	
												PROJECT NAME	
												PROJECT NO.	
												SHEET NO.	

**GENERAL NOTES**

**1. CONSTRUCTION SPECIFICATIONS:**

Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", (2004) and supplements thereto.

**2. DESIGN SPECIFICATIONS:** Design shall be in accordance with the following specifications:

AASHTO "Standard Specifications for Highway Bridges", 16th Edition, and applicable Interim specifications.

Florida Department of Transportation "Structures Design Guidelines".

"In situ Soil Improvement Techniques" AASHTO-AGC-ARTBA Task Force 27 Ground Modification Techniques, January 1990.

**3. MATERIAL STRESSES:** All allowable stresses shall be in accordance with the current AASHTO Specifications for all the materials shown on the plans.

**4. DESIGN METHOD:** Load Factor, except that internal and external stability shall be designed for service loads.

The following minimum factors of safety shall be utilized in the design of the walls:

Overturning	F.S. = 2.0
Sliding	F.S. = 1.5
Bearing Capacity	F.S. = 2.5
Internal Pullout	F.S. = 1.5 (Allowable Deflection = 3/4")
Overall Stability	F.S. = 1.5
Steel	0.55 Fy (Straps) 0.47 Fy (Wire Mat or Grid)
Plastics	0.19 Fu (HDPE) (Permanent Walls) 0.29 Fu (Polyester and HDPE) (Temporary Walls)
Steel Connections	See AASHTO Specifications

**5. DESIGN LOADS:**

Live Loading: HS20-44

**6. For Typical Sections through roadway, see Roadway Plans.**

7. Longitudinal dimensions shown in the plans are measured along the exterior face of the wall. Elevations shown are to the top of coping, top of leveling pad or top of wall footing.

8. A structural extension of the connection of the wall panel to the soil reinforcement shall be used whenever necessary to avoid the cutting or excessive skewing (greater than 15 degrees) of the soil reinforcements at piles or other obstructions.

9. These walls are to be designed for the settlements noted for each wall. Long term settlement is measured from the beginning of wall construction.

**GEOTECHNICAL INFORMATION**

Walls MSE-1 & MSE-2 (South Approach Area)	Reinforced Soil & Random Backfill	Medium Dense Fine Sand	Medium Dense Silty Fine Sand	Medium Dense to Dense Fine Sand	Loose Fine Sand
Depth Below Existing Ground Line	_____	0'-9'	9'-23'	23'-37'	37'-45'
Unit Weight:	110 pcf	118 pcf	118 pcf	120 pcf	110 pcf
Cohesion:	0	0	0	0	0
Internal Friction:	30°	34°	34°	35°	30°

Walls MSE-3 & MSE-4 (North Approach Area)	Reinforced Soil & Random Backfill	Loose to Medium Dense Clayey Fine Sand	Medium Dense Clayey Fine Sand	Hard Sandy Clay	Loose to Dense Fine Sand
Depth Below Existing Ground Line	_____	0'-10'	10'-15'	15'-17'	17'-45'
Unit Weight:	110 pcf	116 pcf	118 pcf	120 pcf	116 pcf
Cohesion:	0	0	0	4177 psf	0
Internal Friction:	30°	32°	34°	0	34°

If the unit weight and/or  $\phi$  angle of the fill proposed by the Contractor differs from the above, the Project Engineer shall contact both the District Geotechnical Engineer and the Wall Designer for a possible redesign.

Design Based Internal Friction Angle = 30 degrees (Sand Backfill)  
34 degrees (Limerock) (Dade, Monroe Co.)

Refer to Plan and Elevation sheets of individual walls for minimum reinforcement strip/mesh length, allowable bearing capacities, minimum wall embedment and anticipated long term and differential settlements.

**SOIL REINFORCEMENT LENGTHS FOR EXTERNAL STABILITY (0.7h):**

Wall Height	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"
* Reinforcement Length	7'-0"	7'-0"	7'-0"	7'-0"	7'-0"	7'-0"
Bearing Pressure (psf)	1082	1241	1426	1648	1454	1623

\*The reinforcement strap lengths shown in this column are minimum lengths required for external stability. The proprietary wall companies are responsible for internal stability of the retaining walls. The reinforcement lengths used in the construction of the retaining walls shall be the longer of that required for internal or external stability.

The applicable wall systems for each wall location are listed below. Wall systems not listed have been deemed unacceptable for use at that specific site due to the environment, excessive settlement etc. and shall not be used, and will not be considered for future substitution during construction.

Wall Nos. 1 & 2 Environment: Extremely Aggressive

Long Term Settlement	1/2"
Short Term Settlement	3/8"
Differential Settlement	1/16"/1'

Wall Nos. 3 & 4 Environment: Extremely Aggressive

Long Term Settlement	1/2"
Short Term Settlement	1/4"
Differential Settlement	1/16"/1'

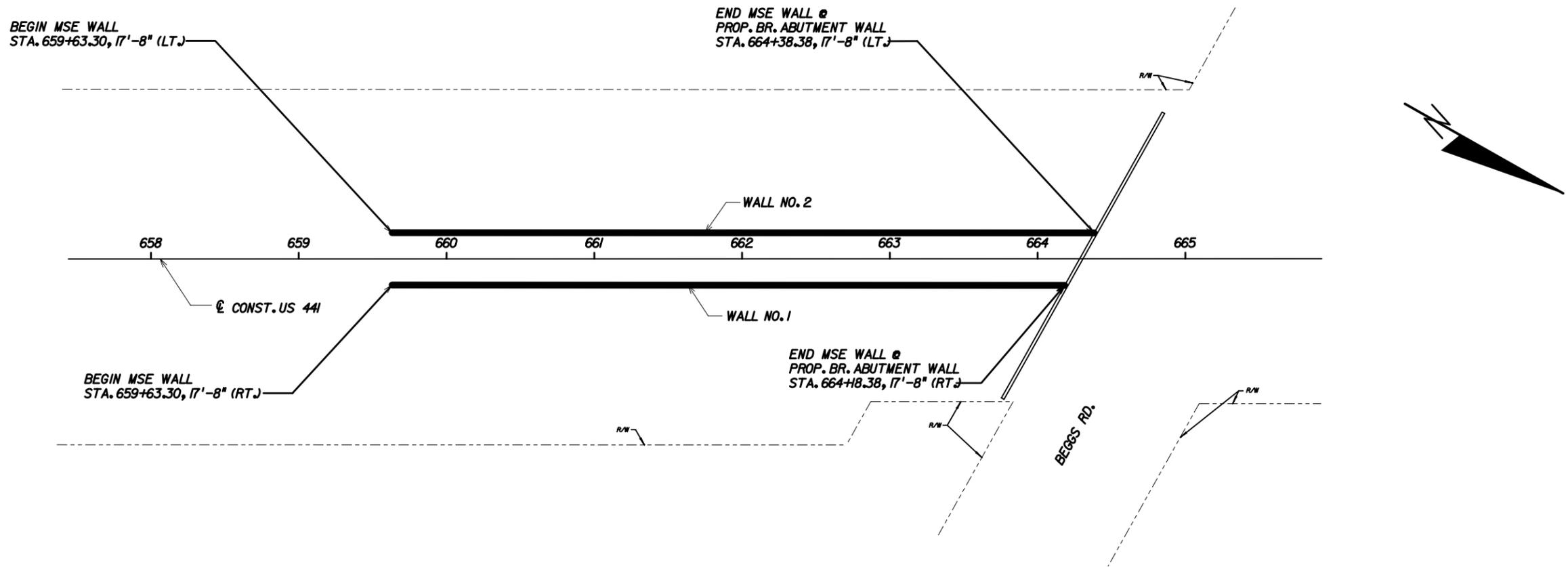
The following wall systems are acceptable for use at this location:

- Brand X
- Brand Y
- Brand Z

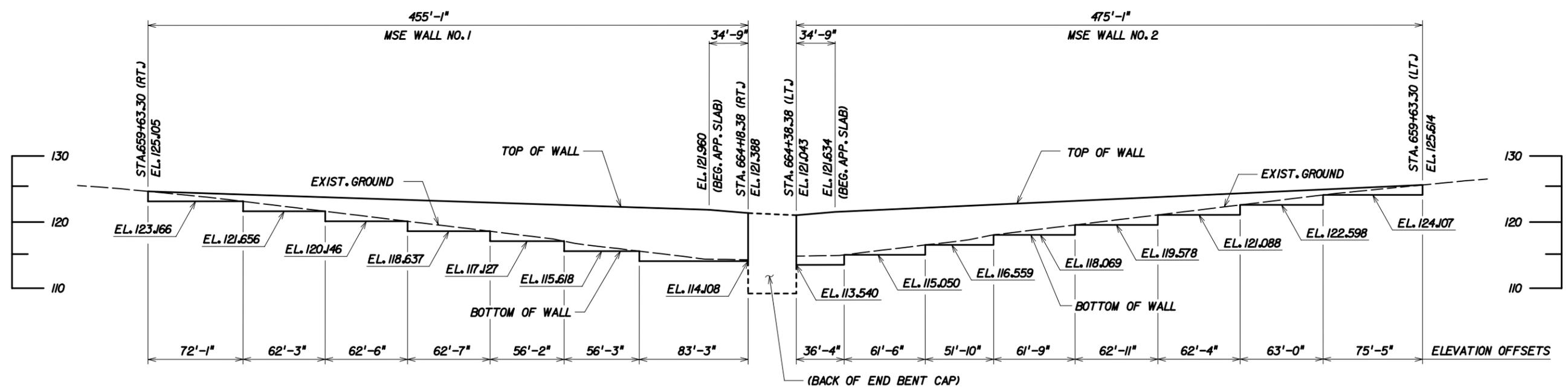
**EXHIBIT CP-6**  
Date: 1/1/05

REVISIONS						ENGINEER OF RECORD			FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET TITLE		
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DRAWN BY	CHECKED BY	DESIGNED BY	APPROVED BY	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	PROJECT NAME	SHEET NO.

**CONTROL DRAWING GENERAL NOTES**  
**INDEX NO. S-1410**



PLAN VIEW TEMP. MSE WALL NOS. 1 & 2



EXPANDED ELEVATION VIEWS (TEMP. MSE WALL NOS. 1 & 2, LOOKING AT FRONT FACE OF WALL)

EXHIBIT CP-7  
Date: 1/1/03

REVISIONS						Names		ENGINEER OF RECORD			SHEET TITLE	
Date	By	Description	Date	By	Description	Drawn by	Dates	FLORIDA DEPARTMENT OF TRANSPORTATION			TEMPORARY RETAINING WALL SYSTEM	
						Checked by		ROAD NO.	COUNTY	PROJECT NO.	PROJECT NAME	
						Designed by					SHEET NO.	
						Checked by						
						Approved by						



## Chapter 23

### Signing and Pavement Marking Plans

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## Chapter 23

### Signing and Pavement Marking Plans

#### 23.1 General

Signing and pavement marking plans are usually a component set of plans. Projects with minor signing and pavement markings may include these features on sheets in the roadway plan set or detailed on roadway sheets. When prepared as component plans they shall be assembled as a separate plans set complete with a key sheet, tabulation of quantities and all other signing and pavement marking sheets. The sheets shall be numbered consecutively with the sheet numbers prefixed by the letter "S".

A complete set of signing and pavement marking plans shall include the following sheets:

1. Key Sheet
2. Tabulation of Quantities
3. Plan Sheets
4. Guide Sign worksheet (if required)
5. Overhead Sign Cross Section Sheet (if required)
6. Overhead Sign Support Design (if required)
7. Foundation Details (if required)
8. Boring Data Sheets (if required)

Pavement marking material on projects that include new asphalt surfaces will generally be paint, rather than thermoplastic. This is based on the requirement of a 90-day curing period for new asphalt. Thermoplastic markings on these projects must be placed using a separate contract. Exceptions must be coordinated with the District Construction Office.

**Section 23.9** provides guidance for preparation of separate plans for Thermoplastic Markings.

Thermoplastic may be called for in the plans on those projects that are exclusively of concrete pavement surfaces.

## 23.2 Key Sheet

The key sheet is the first sheet in the set and shall be prepared on a standard key sheet format as described in **Chapter 3** of this volume. Contract plans set information, location map and length of project box are not required on this sheet when shown on the lead key sheet. A complete index of signing and pavement marking plans shall be shown on the left side of the sheet. The date of the governing **Standard Specifications for Road and Bridge Construction** and **Design Standards** shall be inserted in a note at the lower left corner of the key sheet.

Other data, including name, consultant contract number, vendor number, and certificate of authorization number of the firm (when plans are prepared by a consultant) shall be shown as described in **Chapter 3** of this volume.

If shop drawings are anticipated, the name(s) and address(es) of the Delegated Engineer(s) for shop drawing review(s) shall be shown on the right side of the sheet.

## 23.3 Tabulation of Quantities and Pay Item Notes

The tabulation of quantities sheet shall be prepared on the standard plan format and shall show quantities, standard sign numbers, pay item numbers (except for pavement markings pay items) and size of sign for all pay items. The sign size and standard sign number is not required if shown in the plans sheets. Pay items shall be listed in numerical order and quantities shall be tabulated per sheet or by station. Provisions shall be made to show the original and final quantities. Pay item notes shall also be shown on this sheet.

On contracts with multiple Financial Project ID's or federal aid and nonfederal aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

The Painted Pavement Markings (Final Surface) Lump Sum pay item will include the cost of two (2) applications of all painted pavement markings and one (1) application of Retro-reflective Pavement Markers. Refer to **Section 710** of the **Standard Specifications** for detailed information. For these items, the Signing and Pavement Making tabulation of quantities sheet should show the detailed description of the pay item and the quantities for each pay item EXCEPT in lieu of the pay item number substitute an "\*" in the Bid Item Number Column (see **Exhibit 23-1**).

A pay item note is included in the Roadway Plans as shown in **Exhibit 7-1** in **Chapter 7** of this Volume.

## **23.4 General Notes**

General notes pertaining to signing and pavement markings may be shown on a separate plan format sheet. This sheet shall be placed behind the tabulation of quantities in the plans assembly. On minor projects, general notes may be combined with the tabulation of quantities sheet.

## 23.5 Plan Sheets

### 23.5.1 Format and Scale

The plan sheets shall be prepared on a standard plan format. The scale shall be such that all details are clear and legible. See the requirements of **Section 10.1** as a guide. For simple projects, or sections of a project, it may be possible to "stack" two plans on one sheet, one below the other. Stationing shall progress from left to right and top to bottom. Clarity and legibility shall be preserved in all cases.

A north arrow and scale shall be shown at a point of maximum visibility on the sheet. If two plans are "stacked" on one sheet, then each plan portion shall contain a north arrow and scale.

Typical drawings may be used on rural projects with long sections of roadway that show only edge and lane delineation lines. Detail sheets should be used to depict markings at intersections along with typicals to depict the remaining areas. Signs may be tabulated to indicate location and disposition.

### 23.5.2 Required Information

The basic information pertaining to roadway geometrics and project limits required on the signing and pavement marking plan sheets is the same as that required on the plan portion of the plan-profile sheets (**Chapter 10** of this volume). Topography and construction details need not be shown. Utilities, drainage, lighting, sidewalks, driveways, landscape features, etc. shall be checked for conflicts. Those that may cause conflicts with sign placement shall be shown.

All pavement markings shall be clearly shown and labeled with their widths, color and spacing specified. Either the begin and end pavement marking stations, with offset or the begin pavement marking station with offset and the total length of roadway for pavement marking shall be shown. The location of raised pavement markers and delineators shall be indicated by specifying the type, color, spacing, and limits of application by stations.

All regulatory, warning and directional signs shall be shown at the proper locations. Each sign face shall be shown in close proximity to its respective sign with a leader line connecting the sign location and sign face. Each sign face shall be oriented on the plan sheet to be read as viewed from the direction of travel along the roadway. The location of

all signs shall be indicated by station or milepost.

The pay item number and standard sign designation, or assigned number if nonstandard, shall be shown for each sign.

Any signs to be mounted on signal span wires should be shown and listed on the signalization plan for illustration and placement purposes. Sign details should be included on the signing plans.

Begin and end stations shall be shown.

## 23.6 Guide Sign Worksheet

The sign face, with the complete message layout with legend spacing (vertical and horizontal), margins, border widths and corner radii shall be shown on the guide sign worksheet.

For multi-support roadside signs, cross sections are not required in the plans set, but the support data (size and average length) for each sign shall be tabulated on the guide sign worksheet.

This sheet should be prepared on the standard plan sheet format to any convenient scale that will preserve clarity and legibility. The number of signs that may be shown on a single sheet depends on the sign size and complexity. The format of the sheet is flexible as long as the information listed above is shown. The output from the Transoft **GuidSign** Program or a similar format may be used for the sheet.

## 23.7 Sign Supports

### 23.7.1 Multi-Post Signs

Standard foundations for multi-post signs are provided in the **Design Standards**. These foundations are based on the sign support size. However, the post size and length are not included in the **Design Standards** and must be included as a part of the design and shown in the plans.

### 23.7.2 Overhead Sign Cross Section and Support Structure

The sign cross section sheet shows the location of overhead sign(s) in cross section. A standard profile format should be utilized. The cross section of the roadway at the sign location shall be shown and fully dimensioned. The recommended scale for the cross section is 1" = 10' horizontally and vertically.

For overhead signs, the design of the support truss, columns and foundations, along with the boring data information, shall be included in the signing and marking plans. The **Structures Design Office Standard Drawings (Topic No. 625-020-300)** should be used. **S-2004**, a Semi-Standard for cantilever sign supports, is used with **2001**, **2002** and **2003**; **S-2012**, a Semi-Standard for truss sign supports, is used with **2011**. These standards include the information noted above and should be completed by the Structures Design Engineer of Record and inserted as a sheet in the plans.

A computer program for the design of overhead cantilever sign structures and a program for the design of overhead span sign structures are available. The programs were developed by the Structures Design Office and may be downloaded from the Structures Design web site.

The design of the attachment system for signs mounted on bridge structures shall be the responsibility of the Structures Design Engineer of Record. The design shall be included in the structures plans if bridge work is included in the project. If bridge work is not in the project, design details shall be included in the signing and pavement marking plans.

## **23.8 Typical Pavement Marking Sheet**

For simple projects, or sections of a project, it may be possible to show signing and pavement marking plan details schematically using straight-line format and typical markings. All signs shall be properly identified and shown at their graphic location on the straight-line diagram. Pavement markings shall be shown and labeled on a typical marking plan.

## **23.9 Plans for Thermoplastic Markings**

As discussed under **Section 23.1**, placement of thermoplastic markings on most projects will require a separate contract to be let after original construction (and striping with paint) is complete. For convenience and economy several projects may be let under one contract.

As a minimum, contract plans will consist of a Key Sheet, Summary of Pay Items, Tabulation of Quantities and details about the areas to be marked. This will include any changes in pavement markings that may have occurred since completion of the original project. The scope and final content of the plans shall be as directed by the district.

### **Exhibit 23-1 Standard Notes for Signing and Pavement Marking Plans**

Add the following note at the bottom of the Tabulation of Quantities sheet:

- \* These quantities are paid for under Painted Pavement Markings (Final Surface), Lump Sum - Item No. 710-90. The quantities shown are for one application; see **Specification 710** for the number of applications required.

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## Chapter 24

### Signalization Plans

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# Chapter 24

## Signalization Plans

### 24.1 General

Signalization Plans are usually a component set of plans. Projects with minor signalization may include these features on sheets in the roadway plans set or on the roadway sheets. When prepared as component plans they shall be assembled as a separate plans set complete with a key sheet, tabulation of quantities and all other relevant signal sheets. The sheets shall be numbered consecutively with the sheet numbers prefixed by the letter "T".

The signalization plans show the construction details, electrical circuits, signal phasing and other relevant data.

A complete set of signalization plans shall include the following sheets:

1. Key Sheet
2. Tabulation of Quantities
3. Plan Sheets
4. Mast Arm Details (if required)
5. Foundation Details - Mast Arms (if required)
6. Boring Data Sheets - Mast Arms (if required)

## 24.2 Key Sheet

The key sheet is the first sheet in the component plans set and shall be prepared as described in **Chapter 3** of this volume. The location map, length of project box and contract plans set information are not required on this sheet when shown on the lead key sheet. The index of signalization plans shall be shown on the left of the sheet. The date of the governing **Standard Specifications for Road and Bridge Construction** and **Design Standards** shall be inserted in a note below the Index of Plan Sheets. Other data, including name, consultant contract number, vendor number, and certificate of authorization number of the firm (when plans are prepared by a consultant), shall be shown as described in **Chapter 3** of this volume.

If shop drawings are anticipated, the name(s) and address(es) of the Delegated Engineer(s) for shop drawing review(s) shall be shown on the right side of the sheet.

## **24.3 Tabulation of Quantities and Standard Notes**

The tabulation of quantities sheet lists the item numbers, description and quantity of materials. This sheet shall be placed behind the key sheet in plans assembly.

Pay item numbers shall be listed in numerical order. Provisions shall be made to show the original and final quantities per sheet. Pay item notes and general notes that refer to item numbers, description of work to be performed and quantity estimates shall also be shown on this sheet. If space is limited, notes may be shown on a General Notes Sheet.

On contracts with multiple Financial Project ID's, or Federal Aid and non-Federal Aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

## **24.4 General Notes**

The general notes sheet lists special signal design information such as controller operations, loop installations, signal heads, interconnect cable, and computer interface that is generally not covered in the FDOT Standard Specifications, Supplement or Special Provisions. This sheet shall be placed behind the tabulation of quantities in the plans assembly. On minor projects, general notes may be combined with the tabulation of quantities sheet.

## 24.5 Plan Sheets

### 24.5.1 Format and Scale

Signalization Plans shall be prepared on standard plan format at a scale large enough to show all details clearly and legibly. The recommended scale is 1" = 40' or 1" = 50'. Usually, the complete intersection shall be shown on one plan sheet. However, for large intersections more sheets may be used with appropriate match lines. A north arrow and scale shall be shown at a point of maximum visibility on the sheet.

### 24.5.2 Required Information

The basic information requirements include roadway geometrics, street names, construction stationing or milepost, curb and gutter, drainage inlets, sidewalks and right of way lines as similarly required on the plan portion of the roadway plan-profile sheets. Those underground and overhead utilities, signing structures, and lighting structures that may cause construction conflicts with signal components shall be shown. All locations, including existing trees, should be checked for potential conflicts.

The plan sheet shall also show:

1. Signal head locations with directional arrows and movements (movements 2 and 6 shall be the major streets).
2. Details of signal heads in tabular form with pay item numbers.
3. Phasing diagram/signal operating plan (NOTE: If the SOP conforms to the ***Index No. 17870*** of the ***Design Standards***, then the reference to the index is all that is required. For all other operating plans, the plan shall be shown).
4. Signal controller timing chart.
5. Loop detectors.
6. Electrical service location.
7. Location of signal poles and span wires (ground elevation and elevation of roadway crown).
8. Signal wire signs.
9. Pedestrian signals.
10. Turning radii.

11. Median nose locations.
12. Location of "stop bars" and pedestrian crosswalks.
13. Coordination unit-timing chart.
14. Lane lines with directional arrows.

All equipment shown on the plan shall be clearly labeled and their respective pay item numbers and quantity indicated.

A separate signalization plan shall be prepared for each signalized intersection included in the construction project.

Any span wire or mast arm mounted signs shall be coordinated with the appropriate signing and pavement marking plans to avoid duplication.

The sign details for signs must be included on the signalization plans, if signing and pavement markings are not included in the plans package.

## **24.6 Interconnect/Communication Plan**

The interconnect/communication plan is required when signal equipment is being coordinated with other signal installations or with a computerized system. The interconnect/communication plan shows pictorially the placement of interconnect/communication cable, either underground or aerial, and tabulates all related interconnect quantities. The interconnect/communication plan sheet shall indicate all signal poles, service poles, and/or joint-use poles to which interconnect/communication cable will be attached.

The interconnect/communication plan shall be prepared on standard plan format. Unless otherwise approved, the preferred scale of the interconnect/communication plan shall be 1" = 100' for underground cable, and 1" = 200' for aerial cable. For simple projects, or sections of a project, "stacking" two plans on one sheet is generally permitted if clarity and legibility are maintained. Stationing shall progress from left to right and top to bottom.

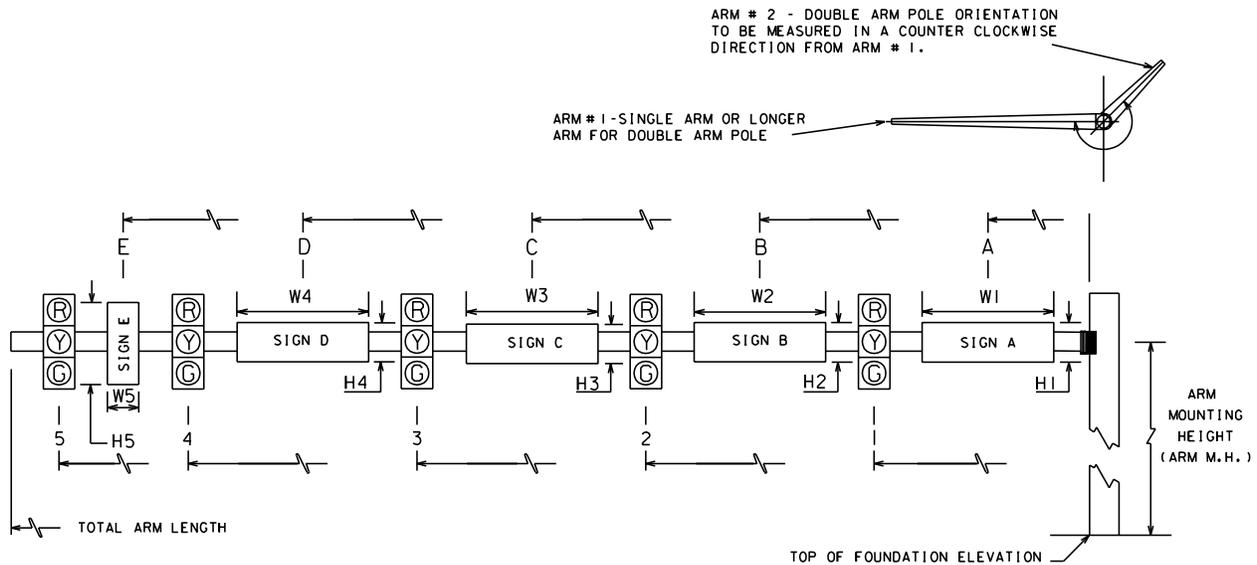
A north arrow and scale shall be shown at a point of maximum visibility on the sheet. If two plans are "stacked" on one sheet, each plan portion shall contain a north arrow and scale.

The basic plan information requirements include roadway schematic, showing cross streets and driveways, cable information, pole location, pole number, utility pole identification number, pay item number and quantity.

## 24.7 Mast Arm Sheets

The Mast Arm Tabulation Sheet, completed by the signal designer, and the Standard Mast Arm Assemblies Design Table, **Structures Standard Drawings S-1700**, completed by the structures designer, will be included in the plans. These and the applicable **Interim Standard Indexes** are the only plan sheets required for mast arm assemblies which meet the Department's Standard and are included on the Qualified Products List. The structures data table may be placed on a signal plan sheet, if space permits. Mast arm assemblies that do not meet the mast arm standard will require a special design. The completed Table of Signal Structures Variables, **Structures Standard Drawings S-1710**, will be included in the plans for special designs.

The following instructions are for use with the mast arm tabulation sheet:



1. Each mast arm assembly is identified by a unique ID number.
2. Dimensions 1-5 are for signals and dimensions A-E are for signs. Record the distance from the edge of the pole, at ground level, to the center of the signal or sign.
3. Signals may be mounted vertically or horizontally. Indicate the mounting in the appropriate column in the table.
4. The entire line for arm #2 and the space for the angle between dual arms are left blank for single arm assemblies.
5. All arms and poles will be galvanized. If a color is required, indicate the color in the table, otherwise leave blank.
6. Starting at the pole, select the signals and/or signs that match the configuration you are tabulating. The spaces representing the signs or signals not used will be blank. Example 1: If no sign is located between the pole and signal 1, the spaces for Sign A would be blank. Example 2: A configuration for three signals and one sign between signal 1 and signal 2 - Only the spaces for signals 1, 2, 3 and sign B would be completed; the others will be blank.
7. Record the number of sections in each signal head in the space following the distance to that head.
8. Record the height and width of each sign in the space following the distance to the sign.



## 24.8 Monotube Sheets

The Monotube Tabulation Sheet, completed by the signal designer, and the Standard Monotube Signal Structure Design Table, **Structures Standard Drawings S-1720**, completed by the structures designer will be included in the plans. These and the applicable **Interim Standard Indexes** are the only plan sheets required for mast arm assemblies which meet the Department's Standard and are included on the Qualified Products List. The structures data table may be placed on a signal plan sheet, if space permits. Monotube assemblies which do not meet the mast arm standard will require a special design. The Structures Design Engineer will provide all design details for a special design to be included in the plans. Shop drawings will be required for a special design.

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## **Chapter 25**

### **Lighting Plans**

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25.6	Foundations and Boring Detail Sheets .....	25-7

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# Chapter 25

## Lighting Plans

### 25.1 General

Lighting Plans are usually a component set of plans. Projects with minor lighting may include these features on sheets in the roadway plan set or detailed on the roadway plans. When prepared as component plans they shall be assembled as a separate plans set complete with a key sheet, tabulation of quantities and all other relevant lighting sheets. The sheets shall be numbered consecutively with the sheet numbers prefixed by the letter "L".

The lighting plans shall show the construction details, electrical circuits, pole data, conduits, service points, luminaires, foundations, boring details and other relevant data.

A complete set of lighting plans shall include the following sheets:

1. Key Sheet
2. Tabulation of Quantities
3. Pole Data and Legend Sheet
4. Plan Sheets or Layout Sheets
5. Foundation Details - High Mast (if required)
6. Boring Data Sheets - High Mast (if required)

## 25.2 Key Sheet

The key sheet is the first sheet in the component plans set and shall be prepared as described in **Chapter 3**. The location map, length of project box and contract plans set information are not required on this sheet when shown on the lead key sheet. Index of lighting plans shall be shown on the left of the sheet. The date of the governing **Standard Specifications for Road and Bridge Construction** and **Design Standards** shall be inserted in a note below the index of plan sheets. Other data, including name, consultant contract number, vendor number, and certificate of authorization number of the firm (when plans are prepared by a consultant), shall be shown as described in **Chapter 3**.

If shop drawings are anticipated, the name(s) and address(es) of the Delegated Engineer(s) for shop drawing review(s) shall be shown on the right side of the sheet.

## **25.3 Tabulation of Quantities and Standard Notes**

The tabulation of quantities sheet lists the item numbers, description and quantity of materials. This sheet shall be placed behind the key sheet in plans assembly.

Pay item numbers shall be listed in numerical order. Provisions shall be made to show the original and final quantities per sheet.

On contracts with multiple Financial Project ID's, or Federal Aid and non-Federal Aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

Pay item notes and standard notes that refer to item numbers shall also be shown on this sheet. General notes shall be shown on a separate plan format sheet. This sheet shall be placed behind the tabulation of quantities in the plans assembly. On minor projects, general notes may be combined with the tabulation of quantities sheet.

## **25.4 Pole Data and Legend Sheet**

The pole data sheet shall be prepared on a standard plan format and shall include details and notes pertaining to pole placement and construction.

This sheet shall provide a listing of each pole by pole number. The following information shall also be given for each pole:

1. Circuit Number
2. Roadway Station and Offset
3. Arm Length
4. Luminaire Wattage
5. Mounting Height
6. Pay Item Number

The pay item number will indicate if the pole is a standard pole or a special design. Two pay item numbers are utilized: one for standard poles and one for non-standard poles.

The design values for light intensities and uniformity ratios shall be shown together with a legend and description of the symbols used on the plan sheets.

## 25.5 Plan Sheets

### 25.5.1 Format and Scale

The plan sheets shall be prepared on a standard plan format. The scale shall be such that all details are clear and legible. However, the scale shall not be smaller than 1" = 100'. For simple projects, or for narrow sections of a project, it may be possible to "stack" two plans on one sheet, one below the other. Stationing shall progress from left to right and top to bottom. Clarity and legibility shall be preserved in all cases.

A north arrow and scale shall be shown at a point of maximum visibility on the sheet. If two plans are "stacked" on one sheet, each plan portion shall contain a north arrow and scale.

### 25.5.2 Required Information

The basic information pertaining to roadway geometrics and project limits required on the lighting plan sheets is the same as that required on the plan portion of the roadway plan-profile sheets. Topography and construction details need not be shown. Utilities, drainage, signal structures, sign structures, landscape features, sidewalks, driveways, etc. shall be checked for conflicts. Those that may cause conflicts shall be shown.

The lighting layout shall be shown on the plan format. This shall be accomplished by symbols which represent poles, conduits and service points. The symbols used shall be in accordance with the requirements of the FDOT Engineering/CADD Systems Software and shall be used throughout the plans. A flag or note shall be used to identify conduit runs with conductor size or numbers different than that shown on the pole data sheet legend.

The beginning and ending of the lighting limits shall be shown on the appropriate plan sheet(s). The symbols for poles shall be shown at the correct baseline or centerline station and the approximate offset from the roadway noted.

The poles shall be flagged and specific information for each pole shall be shown. The pole number, baseline or centerline station, circuit number and offset from baseline or centerline (for high mast) shall be shown.

The service point locations shall be shown on the plan sheets as determined through utility negotiations. **Index No. 17504** of the **Design Standards** provides details for the service

point. The service point shall be shown at the location where it is to be installed. The following information is not covered on the index and must be shown on the plan sheet:

Description--voltages, phases, etc. Ex: 240/480 Volt, 3 wire, Overhead Breaker sizes--The main breaker size and the number of branch circuits and the breaker size of each.

## 25.6 Foundations and Boring Detail Sheets

The foundation design for standard conventional poles is shown in the ***Design Standards, Index 17515*** and ***Index 17503*** for non-standard conventional poles. These foundations do not need to be shown in the plans. Foundations for high mast poles are not in the Standards and must be designed by the responsible structures design engineer of record.

Plans showing the foundation details and boring data for high mast poles shall be included in the lighting plans.

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## Chapter 26

### Landscape Plans

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## Chapter 26

### Landscape Plans

#### 26.1 General

“Landscape” or “landscaping” means any vegetation, mulches, irrigation systems, and any site amenities, such as street furniture, decorative paving, fences, and lighting (excluding public utility street and area lighting). The Legislature has requested that the Department commit program dollars to landscaping. In order for the Department to capture that information, it is critical that all landscape pay items shall be placed in TRNS\*PORT Category 0600 whether the landscape plans are a component set of plans, or prepared independently. Projects with minor landscaping may include these features on separate sheets in the roadway plans set or features may be detailed on roadway plans sheets. When prepared as component plans they shall be assembled as a separate plans set complete with a key sheet, tabulation of quantities, plant schedule, and all other relevant landscape sheets. The sheets shall be numbered consecutively with the sheet numbers prefixed by the letters “LD”.

A complete set of landscape plans shall include the following:

1. Key Sheet
2. Tabulation of Quantities
3. Planting Sheets
4. Irrigation Layout
5. Planting Schedule and Details Sheet
6. Other relevant plan sheets as outlined in this chapter

## 26.2 Key Sheet

The key sheet is the first sheet in the component plans set and shall be prepared as described in **Chapter 3**. The location map, length of project box and contract plans set information are not required if shown on the lead key sheet. The index of landscape plans shall be shown on the left of the sheet. The date of the governing **Standard Specifications for Road and Bridge Construction** and **Design Standards** shall be inserted in a note below the Index of Landscape Plans. Other data, including name, consultant contract number, vendor number, and certificate of authorization number of the firm (when plans are prepared by a consultant) shall be shown as described in **Chapter 3**.

## **26.3      Tabulation of Quantities**

The tabulation of quantities sheet or a similar sheet should be utilized to tabulate the materials required for the construction of the landscaping except for the description, size and quantity of plants which shall be shown on the plant schedule.

Notes referring to specific pay items should be shown on this sheet. Notes of a more general nature may be shown on the tabulation of quantities sheet or on the details sheet.

On contracts with multiple Financial Project ID's or Federal Aid and non-Federal Aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

## 26.4 Plant Schedule and Details Sheet

This sheet shall show a plant schedule and all details which are applicable to the project. The plant schedule shall be in tabular format and provide the information given in the example in **Table 26.1**.

**Table 26.1 Plant Schedule**

Symb.	Qty.	Botanical Nomenclature	Common Name	Installed Size	*Pay Size	Max. Maintained Size	Spacing	Remarks
SP	30	Sabal palmetto	Cabbage Palm	30' HT	Large	50' HT	As shown on plans	Hurricane cut
ZF	650	Zamia floridana	Coontie Palm	3 gal.	Small	3' HT, 3' spread full foliage	3' OC	Even mix of male and female plants

\* Pay size in accordance with the Basis of Estimates Handbook:

Small plants include:

1. All ground covers
2. Shrubs to less than 7 gallon
3. Trees to less than 7 gallon
4. Palms clustering type less than 6 foot overall height
5. Cycads to less than 7 gallon

Large plants include:

1. Shrubs 7 gallon or greater
2. Trees 7 gallon and greater
3. All palms single trunk
4. Palms clustering type 6 foot overall height and greater
5. Cycads 7 gallon or greater
6. All sabal palms (a.k.a. sabal palmetto, cabbage palm, state tree)

General notes and additional landscape and/or irrigation detail drawings may also be shown on this sheet.

## **26.5 Planting and Irrigation Plan Sheets**

### **26.5.1 Format and Scale**

Plan sheets shall be prepared on a standard plan sheet format. The scale shall be such that all details are clear and legible. However, the scale shall not be smaller than 1" = 100'. For simple projects, or narrow sections of a project, it may be possible to "stack" two plans on one sheet, one below the other. Stationing shall progress from left to right and top to bottom. Clarity and legibility shall be preserved in all cases.

A north arrow and scale shall be shown, as applicable, at a point of maximum visibility on the sheet. If two plans are "stacked" on one sheet, each plan portion shall contain a north arrow and scale.

### **26.5.2 Requirements for Planting Plan Sheets**

The base information required is as follows:

1. Project centerline
2. Edge of pavement (edge of traffic lanes)
3. Curbs or curb and gutter
4. Drainage systems
5. Guardrails
6. Right of way and/or limited access fence line
7. Sidewalks or other planned or existing structures
8. Lighting, signs and signal poles
9. Intersections and driveways which are noted in the plans
10. Overhead and underground utility locations
11. Clear Zone/Horizontal clearance (should be plotted or safety setback distances noted frequently on each plan sheet)
12. Vegetation management zones for permitted outdoor advertising signs
13. Canopy limits
14. Existing vegetation (to remain or be removed)

15. Existing off site features and conditions that affect or are affected by the project
16. Fence and gate locations
17. Setbacks from structural elements or drainage system
18. Limits of clear sight (***Index No. 546*** of the ***Design Standards***)
19. Transit Facilities

All plants shall be located on the plans, with the following information provided in the plant schedule:

1. Plant Symbol
2. Quantity
3. Botanical name, including variety or cultivar
4. Common name
5. Size when installed (height, spread, container size, clear trunk, multi-trunk, caliper, etc.)
6. Pay Size (Large or Small)
7. Spacing
8. Maximum maintained or typical mature height, spread and trunk diameter (6 inches above the ground) of normal mature specimens

### **26.5.3 Requirements for Irrigation Plan Sheets**

These sheets shall be prepared using the planting plan sheets (devoid of unnecessary text and labeling) and shall contain all details and information pertaining to the irrigation system.

## **Chapter 27**

### **Utility Joint Participation Agreement Plans**

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## Chapter 27

### Utility Joint Participation Agreement Plans

#### 27.1 General

Most utility adjustment work is performed by the utility owners or their contractor. In some cases it is advantageous to the FDOT and Utility to include the utility work as part of the roadway contract. In such cases the FDOT will enter into an agreement with a Utility for this purpose. These agreements are called Joint Participation Agreements or JPAs. The highway contractor is required to construct or relocate the specified utilities in accordance with the plans and special provisions developed by the Utility and incorporated as part of the bid package. More than one utility plans set may be included. For example, the contract plans may include separate plans for a gas utility and a water utility. It is also possible for the utilities to combine their individual facilities into one plans set and supply them to the FDOT. It is essential that the Engineer of Record (EOR) be aware which method is to be used. This is necessary because reimbursable costs and quantities must be separated and identified in each utility project.

Occasionally utility work may extend outside the normal construction limits of the project. When this is the case the limits of the utility work shall be shown or noted on the plans.

For JPAs, the utility plans shall be prepared in the same basic format as FDOT plans and as a separate plans set. The plans shall contain the following:

1. Key Sheet
2. Tabulation of Quantities
3. Plan-Profile Sheets
4. Cross Sections (as required)
5. Detail Sheets (as required)

The plans shall also reflect any special technical or relocation agreement provisions. In some cases it may not be practical or reasonable to develop separate plans sets for incidental construction under a JPA. The EOR should consult with the District Utility Engineer to determine the requirements in these cases. For further guidance, the FDOT's *Utility User's Handbook* and the *JPA Handbook* should be used.

## 27.2 Key Sheet

The key sheet, which shall be the first sheet in the set, shall be prepared on a standard key sheet format as described in **Chapter 3** of this volume. Contract plans set information, location map and length of project box are not required if shown on the lead key sheet (usually roadway). An index of plan sheets shall be shown on the left side of the utility plans key sheet. The date of the governing **Standard Specifications for Road and Bridge Construction** and the **Design Standards** shall be inserted in a note at the lower left corner of the key sheet.

In the Financial Project ID, the phase number 56 indicates reimbursable work, and 52 indicates non-reimbursable work. All other data shall be as described in **Chapter 3** of this volume.

## **27.3      Tabulation of Quantities**

The tabulation of quantities sheet shall be prepared in standard FDOT format and should show any quantities tabulated for location, size, quantity, etc. Standard notes referring to item numbers shall also be shown on this sheet or on plan sheets.

Summary of pay item sheets will be prepared as noted in **Chapter 4** of this volume.

## 27.4 Plan Sheets

Utility plans shall show full construction details for all utilities to be relocated or constructed by the contractor as covered by the JPA. A plan-profile sheet format should be utilized where appropriate. All underground utilities shall be shown in the plan portion, and those which equal or exceed 4" shall also be shown in the profile portion. All above ground Utilities shall be shown in the plan portion (inclusive of underground connections).

When the construction limits are restricted such as when a power line is above and near a sanitary or water facility, either the facility (overhead lines) must be identified and shown in profile, or the minimum available vertical clearances, along with the type facility, stated on the plans. Applicable project information shall be shown similar to that described in **Chapter 10** of this volume. Utilities to be relocated or constructed shall be shown in plan and profile and in accordance with the FDOT Engineering/CADD Systems Software. When practical, the scale used should be the same as that used for the roadway plan-profile sheets.

## Chapter 28

### Stormwater Pollution Prevention Plan

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## Chapter 28

### Stormwater Pollution Prevention Plan

#### 28.1 General

The Stormwater Pollution Prevention Plan (SWPPP) sheets document the designer's site evaluation and selection of control measures and other items to comply with the terms and conditions of the State of Florida Department of Environmental Protection Generic Permit for Stormwater Discharges from Large and Small Construction Activities (DEP Generic Permit) discussed in **Volume I, Chapter 11**. The SWPPP includes several items: a narrative description, the documents referenced in the narrative, a site map, the contractor's approved Erosion and Sediment Control Plan required by **Specification Section 104**, and reports of inspections made during construction.

For examples of SWPPP sheets, see **Exhibits SWP-1** thru **SWP-3**. Additional guidance for developing a SWPPP may be found in the DEP SWPPP template, found on the DEP web page at:

<http://www.dep.state.fl.us/water/stormwater/npdes/swppp.htm>

## 28.2 Narrative Description

The SWPPP sheets include a narrative that refers to other documents such as the **Standard Specifications** or the **Design Standards** as necessary. Use the following outline to prepare the narrative:

1. Site Description
  - a. A Description of the Construction Activity
  - b. Sequence of Major Soil Disturbing Activities
  - c. Area Estimates (The total project area and the area expected to be disturbed.)
  - d. Runoff Data consisting of:
    - 1) Rational runoff coefficient before, during, and after construction,
    - 2) The size of the drainage area for each outfall,
    - 3) The location of each outfall, in terms of latitude and longitude (to the nearest 15 seconds),
    - 4) Existing data describing the soil or the quality of discharge from the site
  - e. Site Map (Include a narrative of the site map as described in **Section 28.3**)
  - f. Receiving Waters (The name of the receiving waters for each outfall and the wetland area on the site.)
2. Controls
  - a. Erosion and Sediment Controls
    - 1) Stabilization Practices
    - 2) Structural Practices
  - b. Stormwater Management
  - c. Other Controls
    - 1) Waste Disposal
    - 2) Off-Site Vehicle Tracking & Generation of Dust
    - 3) State or Local Regulations
    - 4) Application of Fertilizers and Pesticides
    - 5) Toxic Substances
  - d. State and Local Plans

3. Maintenance
4. Inspection
5. Non-Stormwater Discharges

The sheets may also include supplemental design details and plan views of the location of the controls. Additional information for preparing the SWPPP sheets can be found in the ***FDOT Erosion and Sediment Control Handbook***.

## 28.3 Site Map

The following information shall be shown on a site map:

1. Drainage patterns
2. Approximate slopes
3. Areas of soil disturbance
4. Areas that are not to be disturbed
5. Locations of controls identified in the plan
6. Areas that are to be stabilized against erosion
7. Surface waters (including wetlands)
8. Locations where stormwater is discharged to a surface water

The above information is shown in a typical set of construction plans. A narrative description of the site map shall be prepared which identifies the construction plan sheets where the site map information required by the DEP Generic Permit can be found.

The locations of the temporary controls may be shown on SWPPP sheets, Erosion Control sheets, Plan-Profile sheets, or Traffic Control Plan (TCP) sheets. For projects where plan view sheets are not available, the locations of the controls shall be summarized in a tabular format.

If an optional Drainage Map is included in the construction plans, then the drainage patterns will be shown on it. If the Drainage Map is not included, a topographic map (for example, a USGS quadrangle map) showing contour lines shall be prepared. This map will supplement the construction plan sheets that show the other site map requirements. If this supplemental site map is not in aerial format, include it in the SWPPP sheets. If this supplemental site map is in aerial format, it cannot be placed in the contract plans set and must be delivered to the resident engineer to have available on site.

## 28.4 Controls

The SWPPP shall include a description of the controls that will be implemented at the construction site. For each of the major activities identified in **Part 1.b** of the **Narrative**, describe the timing of the implementation of control measures during the construction process. Also describe the stormwater management measures that will be installed during construction to control pollutants in the stormwater discharges that will occur after construction.

Details should be prepared for all controls that are not detailed in the **Design Standards**. The details should show the work intended, where and how the control is to be placed, and any other special design details. Any Technical Special Provisions required by the erosion control items of work should be prepared for the specification package.

The narrative for some of the other controls will be supplied by the contractor at the preconstruction conference. A plan for off-site vehicle tracking is an exception and must be included in the SWPPP prepared during design.

Any Water Management District or Local Water Management District permits obtained in connection with the project should be noted.

## 28.5 Maintenance, Inspection and Non-Stormwater Discharges

Include a description of any maintenance requirements that are not stated in the standard specifications. Include the inspection requirements, which will be either requirements of the DEP or the applicable requirements of another regulatory agency, whichever is more stringent. If special procedures have been developed to minimize turbidity associated with normal construction dewatering, include a description of those procedures.

Special monitoring requirements described in the DEP Generic Permit may apply where the project discharges to waters listed in **Section 303(d)** of the **Clean Water Act**. Consult with the district environmental permitting staff to determine if the monitoring requirements apply. If applicable, describe the special monitoring requirements in the inspection section of the narrative.







## Chapter 29

### Intelligent Transportation Systems Plans

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## Chapter 29

# Intelligent Transportation Systems Plans

### 29.1 General

The incorporation of Intelligent Transportation Systems (ITS) Plans is a relatively new development, yet it is becoming more widespread. This chapter was developed to introduce some standardization for ITS Plans. Since the use of these plans is so new, CADD standards may not be developed until July 2005 (at the earliest). This also means that for electronic deliveries, the files for ITS Plans will need to be placed in another component's directory (Signalization or Roadway), until the software recognizes ITS Plans.

ITS Plans are usually a component set of plans. Projects with minor ITS involvement may include these features on sheets in the roadway plans set or on the roadway sheets (or on sheets in the signalization plans set or on the signalization sheets if applicable). When prepared as component plans they shall be assembled as a separate plans set complete with a key sheet, tabulation of quantities and all other relevant ITS sheets. The sheets shall be numbered consecutively with the sheet numbers prefixed by the letters "IT".

A complete set of ITS Plans shall include the following sheets:

1. Key Sheet
2. Tabulation of Quantities
3. Plan Sheets
4. Detail Sheets (as required)

The ITS Plans show the construction details, electrical circuits, and other data relevant to an ITS project. Some of the different systems that may be produced under the ITS Component set of plans include, but are not limited to the following:

- |                                 |   |
|---------------------------------|---|
| 1. Freeway Management System    | 6. Electronic Toll Collection                                 |
| 2. Incident Management System   | 7. Electronic Fare Payment                                    |
| 3. Arterial Management System   | 8. Highway Rail Intersections (under electronic surveillance) |
| 4. Emergency Management Systems | 9. Regional Multimodal Traveler Information                   |
| 5. Transit Management Systems   |   |

## 29.2 Key Sheet

The key sheet is the first sheet in the component plans set and shall be prepared as described in **Chapter 3** of this volume. The location map, length of project box and contract plans set information are not required on this sheet when shown on the lead key sheet. The index of ITS plans shall be shown on the left of the sheet. The date of the governing **Standard Specifications for Road and Bridge Construction** and **Design Standards** shall be inserted in a note below the Index of Plan Sheets.

Other data, including name, consultant contract number, vendor number, and certificate of authorization number of the firm (when plans are prepared by a consultant), shall be shown as described in **Chapter 3** of this volume.

If shop drawings are anticipated, the name(s) and address(es) of the Delegated Engineer(s) for shop drawing review(s) shall be shown on the right side of the sheet.

## **29.3 Tabulation of Quantities and Standard Notes**

The tabulation of quantities sheet lists the item numbers, description and quantity of materials. This sheet shall be placed behind the key sheet in plans assembly.

Pay item numbers shall be listed in numerical order. Provisions shall be made to show the original and final quantities per sheet. Pay item notes and general notes that refer to item numbers, description of work to be performed and quantity estimates shall also be shown on this sheet. If space is limited, notes may be shown on a General Notes Sheet.

On contracts with multiple Financial Project ID's, or Federal Aid and non-Federal Aid quantities, provisions shall be made to tabulate and summarize their respective quantities.

## **29.4 General Notes**

General notes pertaining to ITS may be shown on a separate plan format sheet. The general notes sheet lists special ITS design information that is generally not covered in the FDOT Standard Specifications, Supplement or Special Provisions. This sheet shall be placed behind the tabulation of quantities in the plans assembly. On minor projects, general notes may be combined with the tabulation of quantities sheet.

## **29.5 Plan Sheets**

### **29.5.1 Format and Scale**

ITS Plans shall be prepared on standard plan format. The scale shall be such that all details are clear and legible. See the requirements of **Section 10.1** of this volume as a guide. A north arrow and scale shall be shown at a point of maximum visibility on the sheet.

### **29.5.2 Required Information**

The basic information requirements include roadway geometrics, project limits, street names, construction stationing or milepost, curb and gutter, drainage inlets, sidewalks and right of way lines as similarly required on the plan portion of the roadway plan-profile sheets. Those underground and overhead utilities, signing structures, and lighting structures that may cause construction conflicts with ITS components shall be shown. All locations, including existing trees, should be checked for potential conflicts.

All equipment shown on the plan shall be clearly labeled and their respective pay item numbers and quantity indicated.

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# **APPENDIX A**

## **Metric Practice**

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## METRIC PRACTICE

### GENERAL

This Appendix was originally included in the Metric PPM and was used as guidelines for the development of Metric plans. This was a useful tool especially for the English to Metric conversion of design information. This Appendix has now been included in the English PPM as a tool for use in cases where the designer may need to obtain information from Metric plans. This may provide the designer some insight as to how those Metric plans were developed.

### SUMMARY OF RULES

1. Convert values related to surveys, right of way and other geometric alignment using the U. S. Survey Foot taken to a minimum of 8 decimal places:

$$1 \text{ foot} = \frac{12 \text{ inches/foot}}{39.37 \text{ inches/meter}} = 0.304 \ 800 \ 61 \text{ meters}$$

For other direct mathematical conversions use the SI definition:

$$1 \text{ foot} = 0.3048 \text{ meters}$$

2. Display direct mathematical (soft) converted values to the nearest 0.001 m or 1 mm.
3. Do not use commas to separate digits if a number has more than 4 digits. For numbers with more than 4 digits either right or left of the decimal, leave a space when practical. (Where the displayed number must be used in a mathematical operation on a computer the space may not be recognized properly and should not be used).

Example: 10 000 or 0.609 35 or 13 471.359

4. To the extent practical, use the following rules for dimensioning roadway plans:
  - a. For dimensions in meters, display values to at least one decimal place.

- b. For dimensions in millimeters, display values as whole numbers with no decimal place.
  - c. Do not use the centimeter.
  - d. Using the above rules, do not show the unit symbols "m" and "mm" unless needed for clarification. Show even dimensions in meters with a decimal and following zero digit, e.g. 300.0 to avoid confusion with 300 mm.
5. If a dimensioned item has a numerical quantity that is part of a group of numbers in a different range, select the unit that most adequately covers the range without unduly large or small numbers. For example, if 300 mm is part of a group of numbers shown in meters, show it as 0.3 m.
6. Show long dimensions, including all horizontal and vertical geometry, wall lengths, bridge span lengths and box culvert lengths, spans and heights in meters.
7. In general, show cross section dimensions of structural members in millimeters. This will normally include most drainage structures (except box culverts), drainage pipe, and special drainage structure details. (Note: The actual size of drainage pipe and standard drainage structure boxes will remain the same. However, label these items in nominal size based on 1" = 25 mm. Example: Label 24" pipe as 600 mm pipe; Label a 4' diameter structure as a 1200 mm structure.)
8. Show pavement thickness descriptions in millimeters.
9. Use 0.1 m for both base extension on rural sections (formerly 3") and for stabilization extension on curbed sections (formerly 6").
10. On typical sections, show type of curb, "E" or "F", not the dimension.
11. As a general rule, display metric dimensions to one more decimal place than the corresponding dimension in English units:
  - a. Typical Section Elements, including lane widths and shoulder widths - in meters, generally to 1 decimal place.
  - b. Horizontal control points on plans, including survey centerline, baseline, intersections and alignment - in meters to 3 decimal places. The normal station interval for centerlines and baselines is 100 meters. (1 + 00.000 = 100 m)

- c. Vertical alignment control points, (PVC, PVI, PVT) and profile grade elevations - in meters to 3 decimal places.
  - d. Profile Grade - in percent to 4 decimal places.
  - e. Proposed flow lines - in meters to 2 decimal places.
  - f. Manhole tops and grate elevations - in meters to 2 decimal places.
  - g. Ditch elevations - in meters to 2 decimal places.
  - h. Box Culvert Spans and Heights - in meters to 1 decimal for new construction; in meters to 2 decimal places for extensions of existing box culverts originally constructed to English dimensions.
12. Where practical, round short radius curves (<150.0 m), including curb returns and control radii, to the nearest meter. Round longer radius curves to the nearest 5 meters. (See attached tables.)
13. Display alignment bearings and delta angles in curve data in degrees, minutes and seconds, rounded to the nearest second.
14. Omit "degree of curvature" from curve data. It has no definition in the metric system. Instead, use the radius definition. Equations:

$$\text{Tangent } T = R \tan\left(\frac{\Delta}{2}\right)$$

$$\text{Length } T = R (\Delta \text{ in Radians})$$

$$\text{Long Chord } LC = 2 R \sin\left(\frac{\Delta}{2}\right)$$

15. On resurfacing projects, hard convert typical section dimensions (lane widths, shoulder widths, etc.) where existing conditions permit. Exception: Use direct mathematical (soft) conversion (Rule Number 2) for existing pavement widths in curbed sections, existing right of way widths, and existing median widths.

16. Continue to post sign messages for speed limits and distances in English units. Note: The posted speed for curb and gutter sections with design speed of 80 km/h (corresponds to 50 mph), should not exceed 45 mph.
17. A "hard" metric project is defined as one where metric standard index drawings and metric specifications are used, and the design complies with adopted metric criteria.
18. Beginning with metric projects express slope ratios in vertical to horizontal (V:H) format. For example, show roadside slopes as 1:6, 1:4, rather than past convention as 6:1 or 4:1.
19. As a general guideline for new construction and reconstruction, show cross sections in 20 meter intervals for urban projects and 50 meter intervals for rural projects. Project specific factors may dictate greater or lesser intervals.
20. When project limits are identified by kilometer point location on the Key Sheet, show the equivalent milepost using direct mathematical conversion.  
  
(example: kp 1.609 = MP 1.000)
21. Label existing and proposed utilities in metric. Use the FDOT Basis of Estimates Handbook utility pay item list of metric sizes as a guide.

### PLAN SCALES

ENGLISH SCALE	METRIC SCALE
1" = 2'	1: 25
1" = 5'	1: 50
1" = 10'	1: 100
1" = 20'	1: 200
1" = 40'	1: 400 or 1: 500
1" = 50'	1: 500
1" = 100'	1: 1000
1" = 200'	1: 2000
1" = 400'	1: 5000

Plan sheet size will remain the same. The viewing area of a plan sheet will be 800 mm long on "D" size sheets and 400 mm on "B" size sheets. Allowing for open space at each side, this provides a coverage of 140 m at 1:400 scale, 350 m at 1:1000 and 700 m at 1:2000 on "B" size sheets.

**Plan/ Profiles:**

	Sheet Size	Horizontal	Vertical
Rural -	D	1:1000	1:50 or 1:100
	B	1:2000	1:100 or 1:200
Urban -	D	1:200	1:50
	B	1:400 or 1:500	1:50 or 1:100

Show centerline major tick marks at each station. Show centerline minor tick marks at 20 meter intervals when using 1:200 and 1:400 scale, and at 25 meter intervals when using 1:500 scale.

**Cross Sections:**

	Sheet Size	Horizontal	Vertical
Normal	D	1:50	1:25
	B	1:100	1:50
Wide Sections	D	1:100	1:25 or 1:50
	B	1:200	1:50 or 1:100
Narrow Sections	D	1:25	1:25
	B	1:50	1:50

As a guideline, the normal interval for cross sections is 20 meters for urban projects and 50 meters for rural projects.

## COMPARISON OF ENGLISH AND METRIC VALUES

### LANE WIDTHS

CURRENT	SOFT	HARD
8 ft	2.438 m	2.4 m
9 ft	2.743 m	2.7 m
10 ft	3.048 m	3.0 m
11 ft	3.353 m	3.3 m
12 ft	3.658 m	3.6 m
14 ft	4.267 m	4.2 m
15 ft	4.572 m	4.5 m

### BIKE LANE WIDTHS

4 ft	1.219 m	1.2 m
5 ft	1.524 m	1.5 m

### SIDEWALK AND UTILITY STRIP WIDTHS

CURRENT	SOFT	HARD
2 ft	0.610 m	0.6 m
3 ft	0.914 m	0.9 m
4 ft	1.219 m	1.2 m
5 ft	1.524 m	1.5 m
6 ft	1.829 m	1.8 m
7 ft	2.134 m	2.1 m
8 ft	2.438 m	2.4 m
9 ft	2.743 m	2.7 m
10 ft	3.048 m	3.0 m

### CURB AND GUTTER WIDTHS

TYPE	CURRENT	SOFT	HARD
E	2.25 ft	686 mm	675 mm
F	2.00 ft	610 mm	600 mm
Shoulder			
Gutter	3.50	1067 mm	1050 mm

### SHOULDER WIDTHS

CURRENT	SOFT	HARD
2 ft	0.610 m	0.6 m
4 ft	1.219 m	1.2 m
5 ft	1.524 m	1.5 m
6 ft	1.829 m	1.8 m
8 ft	2.438 m	2.4 m
10 ft	3.048 m	3.0 m
12 ft	3.658 m	3.6 m

## COMPARISON OF ENGLISH AND METRIC VALUES

### TRAFFIC SEPARATOR WIDTHS

CURRENT	SOFT	HARD
4 ft	1.219 m	1.2 m
6 ft	1.829 m	1.8 m
8.5 ft	2.591 m	2.6 m

### MEDIAN WIDTHS

CURRENT	SOFT	HARD
15.5 ft	4.724 m	5.0 m
17.5 ft	5.334 m	N/A
19.5 ft	5.944 m	6.0 m
22 ft	6.706 m	6.6 m
26 ft	7.925 m	7.8 m
30 ft	9.144 m	9.0 m
40 ft	12.192 m	12.0 m
50 ft	15.240 m	15.0 m
60 ft	18.288 m	18.0 m
64 ft	19.507 m	19.2 m
88 ft	26.822 m	26.4 m

### DITCH WIDTHS

CURRENT	SOFT	HARD
3 ft	0.914 m	0.9 m
3.5 ft	1.067 m	1.0 m
4 ft	1.219 m	1.2 m
5 ft	1.524 m	1.5 m

### DESIGN SPEED

CURRENT	METRIC
20	30
25	40
30	50
35	60
40	60
45	70
50	80
55	90
60	100
65	110
70	110

low speed

↑

↓

high speed

## METRIC CONVERSIONS

### RETURN RADII CONTROL RADII SHORT RADIUS CURVE RADII

TURNING SPEED mph	RADIUS (feet)	SOFT (meters)	HARD (meters)	TURNING SPEED km/h	RADIUS (meters)
10	15	4.572	5.0	15	7.0
	20	6.096	6.0		
	25	7.620	8.0		
	30	9.144	9.0		
	35	10.668	11.0		
15	40	12.192	12.0	20	10.0
	45	13.716	14.0		
	50	15.240	15.0		
	60	18.288	18.0		
20	75	22.860	23.0	30	25.0
	90	27.432	27.0		
	100	30.480	30.0		
25	150	45.720	46.0	40	50.0
30	230	70.104	70.0	50	80.0
35	310	94.488	94.0	60	115.0
40	430	131.064	131.0	60	115.0
					Small Radii ↑
	550	167.640	170.0		Large Radii ↓
	690	210.312	210.0		
	840	256.032	255.0		
	1040	316.992	315.0		

Note: Selection of appropriate radii should also consider design vehicle.

Conversions on this sheet and the next are accomplished as follows:

1. Radius in feet x (12 ÷ 39.37) = radius in meters (soft)
2. Values for metric turning speeds based on proposed AASHTO metric criteria.

## COMPARISON OF ENGLISH AND METRIC VALUES

<b>DEGREE OF CURVE TO RADIUS VALUES</b>			
<b>DEGREE</b>	<b>RADIUS</b>	<b>RADIUS-Soft (meters)</b>	<b>RADIUS-Hard (meters)</b>
0°-15'	22918.31	6985.515	6985.0
0°-30'	11459.16	3492.758	3495.0
0°-45'	7639.44	2328.505	2330.0
1°-00'	5729.58	1746.379	1745.0
1°-15'	4583.66	1397.103	1395.0
1°-30'	3819.72	1164.253	1165.0
1°-45'	3274.04	997.931	1000.0
2°-00'	2864.79	873.189	875.0
2°-15'	2546.48	776.168	775.0
2°-30'	2291.83	698.552	700.0
2°-45'	2083.48	635.047	635.0
3°-00'	1909.86	582.126	580.0
3°-15'	1762.95	537.347	535.0
3°-30'	1637.02	498.965	500.0
3°-45'	1527.89	465.701	465.0
4°-00'	1432.39	436.595	435.0
4°-15'	1348.14	410.913	410.0
4°-30'	1273.24	388.084	390.0
4°-45'	1206.23	367.659	370.0
5°-00'	1145.92	349.276	350.0
5°-30'	1041.74	317.523	320.0
6°-00'	954.93	291.063	290.0
7°-00'	818.51	249.483	250.0
8°-00'	716.20	218.297	220.0
9°-00'	636.62	194.042	195.0
10°-00'	572.96	174.638	175.0

**Note:** Degree of Curvature is not used in the Metric System.

## GENERAL METRIC INFORMATION

### SI PREFIXES

M      mega     $10^6 = 1\,000\,000$   
 k kilo     $10^3 = 1\,000$   
 m      milli     $10^{-3} = 0.001$

Base SI Units			Related Units		
Quantity	Unit	Symbol	Unit	Symbol	Relation
length	meter	m	millimeter	mm	=0.001 m ( $10^{-3}$ m)
			kilometer	km	=1000 m ( $10^3$ m)
mass	kilogram	kg	gram	g	=0.001kg ( $10^{-3}$ kg)
			megagram	Mg	=1000 kg ( $10^3$ kg)
			metric ton	t	=1000 kg ( $10^3$ kg)
time	second	s	hour	h	=3600 s

### DERIVED SI UNITS WITH SPECIAL NAMES

Quantity	Unit	Symbol	Formula
force	newton	N	$\text{kg}\cdot\text{m}/\text{s}^2$
pressure	pascal	Pa	$\text{N}/\text{m}^2$
moment	newton meter	N·m	N·m
Temperature	degree Celsius	°C	---

## GENERAL METRIC INFORMATION

Common Derived Units of SI			Related Units			
Quantity	Unit	Symbol	Unit	Symbol	Relation	
acceleration	meter/second <sup>2</sup>	m/s <sup>2</sup>				
area	square meter	m <sup>2</sup>	sq. millimeter	m m <sup>2</sup>	=0.000 001 m <sup>2</sup>	(10 <sup>-6</sup> m <sup>2</sup> )
			hectare	ha	=10 000 m <sup>2</sup>	(10 <sup>4</sup> m <sup>2</sup> )
			sq. Kilometer	k m <sup>2</sup>	=1 000 000 m <sup>2</sup>	(10 <sup>6</sup> m <sup>2</sup> )
density, mass	kilogram/cubic	kg/m <sup>3</sup>				
velocity	meter/second	m/s	kilometer/hour	km/h	=0.2778 m/s	
volume	cubic meter	m <sup>3</sup>	liter	L	=0.001 m <sup>3</sup>	(10 <sup>-3</sup> m <sup>3</sup> )
			milliliter	mL	=0.000 001 m <sup>3</sup>	(10 <sup>-6</sup> m <sup>3</sup> )

## GENERAL METRIC INFORMATION

### SOFT CONVERSION FACTORS

CLASS	MULTIPLY	BY	TO GET
LENGTH	inches	25.400 000	mm
	inches	0.025 400	m
	feet	0.304 800 **	m
	yards	0.914 400	m
	miles	1609.344 000	m
	miles	1.609 344	km
AREA	sq inches	645.160 000	mm <sup>2</sup>
	sq feet	0.092 903	m <sup>2</sup>
	sq yard	0.836 127	m <sup>2</sup>
	acres	4046.873 000	m <sup>2</sup>
	sq miles	2.589 988	km <sup>2</sup>
VOLUME	board feet	0.002 360	m <sup>3</sup>
	cubic feet	0.028 317	m <sup>3</sup>
	cubic yard	0.764 555	m <sup>3</sup>
	gallon (fluid)	3.785 412	L
	ounce (fluid)	29.573 530	ML
	bushels	0.035 239	m <sup>3</sup>
MASS	ounce	0.028 350	kg
	pound	0.453 592	kg
	ton	907.184 700	kg
	lb/ft	1.488 164	kg/m
	lb/ft <sup>2</sup>	4.882 425	kg/m <sup>2</sup>
	lb/ft <sup>3</sup>	16.018 460	kg/m <sup>3</sup>
	ounces/ft <sup>2</sup>	0.305 152	kg/m <sup>2</sup>
FORCE	pound (force)	4.448 222	N
	lb/ft	14.593 900	N/m
	lb/ft <sup>2</sup>	47.880 260	N/m <sup>2</sup>
	lb/ft <sup>3</sup>	157.087 5	n/m <sup>3</sup>
STRESS	psi	6894.757 000	Pa
	kips/in <sup>2</sup>	6.894 757	N/mm <sup>2</sup>
VELOCITY	fps	0.304 800	m/s
	mph	0.447 040	m/s
	mph	1.609 344	km/h
TEMPERATURE	(°F-32) / 1.8 = °C		
ANGLES	(no change)	deg, min, sec	

\*\* For conversion from U.S. Geodetic Survey, the U.S. survey foot equals 0.304 800 610 m