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Module 3 – Minor Design

January 2022

FDOT

Agenda

- Minor Design Process Overview
- Safety Needs
- *Q&A session*
- 3R Reports
- Pavement Design
- Guardrail
- *Break*
- Cross Slope
- ADA Considerations
- Level I Maintenance of Traffic
- *Q&A session*
- Quantities
- Electronic Review Comments (ERC)
- Certifications
- *Open Discussion*

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Minor Design Process Overview

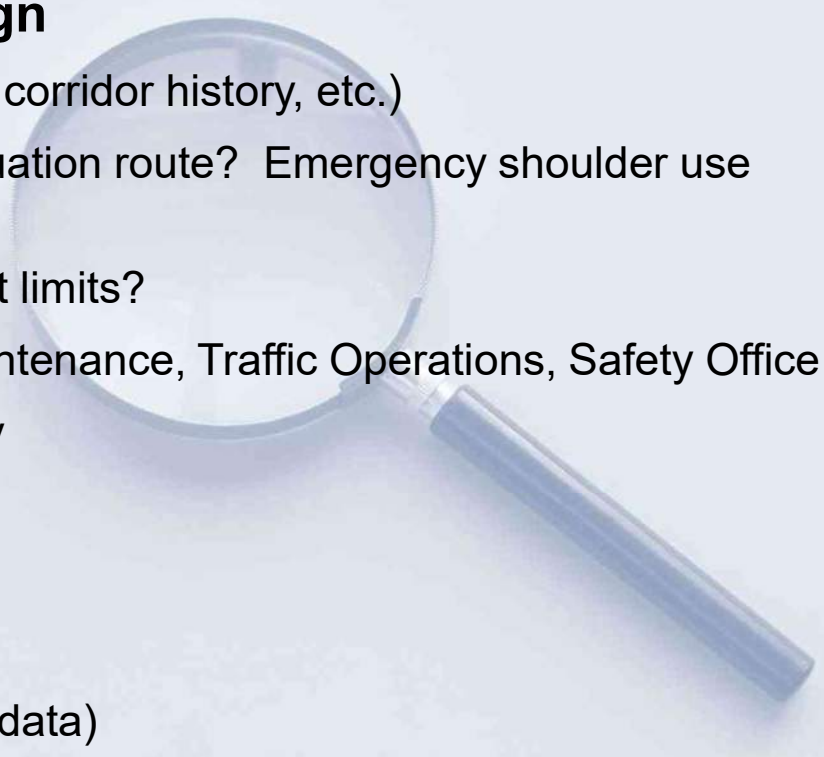
Brandi Vittur, P.E.
Florida Department of Transportation
District 2 Consultant Project Management Engineer

What is Minor Design?

- **Work Types established in Florida Administrative Code 14-75**
- **3.1, Minor Highway Design**
  - Resurfacing projects (including interstate)
  - Minor widening without major reconstruction, new curb and gutter, or substantial capacity improvements
  - Qualifications: At least one professional engineers and at least one year of post-registration experience
- **3.2, Major Highway Design**
  - Urban projects with new curb and gutter
  - New or major reconstruction rural projects
  - Rural projects with substantial capacity improvements
  - Qualifications: At least two professional engineers and at least two years of post-registration experience (with one year being in Major Highway Design)

Minor Design Process Overview

- **Information Needed to Start Design**
  - Prior project information (surveys, plans, corridor history, etc.)
  - Corridor information: SIS facility?, Evacuation route? Emergency shoulder use considerations?
  - Any Traffic Monitoring Sites within project limits?
  - Concerns from Maintenance, Bridge Maintenance, Traffic Operations, Safety Office
  - Railroad, transit, aviation facilities nearby
  - Resurfacing projects
    - Scoping Report
    - Safety Assessment Reports
    - Pavement data (crack, ride, rut; coring data)
  - Design Control Information: design speed, target speed, design vehicle, traffic data, crash data, functional classification, context classification



See FDM 301 & 901

Minor Design Process Overview

- **Information Needed to Start Design**
  - Survey Needs

DESIGN SURVEY CHECKLIST

Task No.	Task		Description of Task	Options
27.1	Horizontal Project Control (HPC)		This will be the same for every project.	N/A
27.2	Vertical PC / Bench Line		This will be the same for every project.	N/A
27.3	Alignment and Existing R/W Lines		This will be the same for every project.	N/A
27.5	Reference Points		This will be the same for every project.	N/A
27.6	Topography/DTM (3D)		This type of Survey data is needed to provide a DTM surface. Provide detailed limits of 3d topography. Provide limits along the project and limits from centerline pavement out to Right-of-Way (ex. - 20' from centerline pavement; from centerline to back of ditch; from centerline to woods line)	From Centerline of Pavement: ___ to edge of paved shoulder ___ to face of curb ___ to back of curb ___ to face of walk ___ to back of walk ___ to bottom of ditch ___ to top of slope at back of ditch ___ to woods line ___ to right-of-way line ___ ____' beyond right-of-way line
27.7	Planimetric (2D)		This Survey data does not have elevation associated with it. DTM surfaces cannot be produced from this data. Provide detailed limits of 2d topography (same as 3d examples).	From Centerline of Pavement: ___ to edge of paved shoulder ___ to face of curb ___ to back of curb ___ to face of walk ___ to back of walk ___ to bottom of ditch ___ to top of slope at back of ditch ___ to woods line ___ to right-of-way line ___ ____' beyond right-of-way line

Minor Design Process Overview

- **Phase I Plans Submittal**
  - For resurfacing projects, this submittal is the 3R Report
  - For other minor design projects, a Phase I submittal is typically skipped
  - Identify any needed Modified Special Provisions, Technical Special Provisions, Developmental Specifications
  - Identify any sole-source approvals
  - Identify the need for Design Variations and Exceptions
  - Typical Section Package is submitted
  - Pavement Design Report is submitted
  - Potential right-of-way concerns are identified and discussed with Design, Right-of-Way, and Survey & Mapping

See FDM 301 & 901

Minor Design Process Overview

- **Phase II Plans submittal**
  - Constrained schedule date
  - If a resurfacing project, the 3R Report and LRE has been completed
  - Submit drafts any needed Modified Special Provisions, Technical Special Provisions, Developmental Specifications
  - Any related sole-source approvals need to be submitted
  - Reflects approved Typical Section Package and Pavement Design Report
  - Final confirmation of right-of-way impacts and needs
  - Need for a Construction and Maintenance Agreement is confirmed
  - Permitting needs are also identified
  - Update LRE construction cost estimate and load pay items into AASHTOWare (no quantities)
  - Submit the Proposal Summary of Pay Items Report
  - Maintenance of Traffic Plans are included and coordinated with Design, Planning, Traffic Operations, and Construction.
  - 60% Field Review with ERC reviewers

See FDM 301 & 901

Minor Design Process Overview

- **Phase III Plans submittal**
  - At this point, design is complete except for addressing any comments
    - Typical Section Package and Pavement Design Report approved by District
    - Design Variations and/or Exceptions, if needed, approved by District
    - Maintenance Agreement, if needed, in process with locals
    - Permits, if needed, have been submitted and are under review
    - Finalized Modified Special Provisions, Technical Special Provisions, and Developmental Specifications should be included with any related sole-sourced items approved by the District
  - Very important submittal for Utilities and Construction
    - Utility conflicts, matrix, and needed Utility Work Schedules
    - Contract Time Memo – need this information to set MOT quantities in the Phase IV Plans
  - Load cost estimate in AASHTOWare (pay items and quantities)
  - Submit the Estimated Quantities Report

See FDM 301 & 901

Minor Design Process Overview

- **Phase IV Plans submittal**
  - Finalized design to address Phase III comments, which should be minor
  - If not, alert Construction and Utilities
  - Update cost estimate in AASHTOWare
  - Submit the Estimated Quantities Report
  - Document pay item and quantities changes in the Pay Item Change Memo

See FDM 301 & 901

Minor Design Process Overview

- **Plans, Specifications, and Estimates (PS&E) Submittal**
  - Certifications must be in place
  - Maintenance Agreement needs to be executed

See FDM 301 & 901

Minor Design Process Overview

- **Items to keep in mind throughout Design**
  - Constant check of the Begin Mile Post, End Mile Post, and Project Length against the PSEE “Work Length”
    - Project Length = End Mile Post – Begin Mile Post – Any Exceptions
  - Update the Construction Cost Estimate with any changes
  - Governing order of contract documents

5-2 Coordination of Contract Documents.

These Specifications, the Plans, Special Provisions, and all supplementary documents are integral parts of the Contract; a requirement occurring in one is as binding as though occurring in all. All parts of the Contract are complementary and describe and provide for a complete work. In addition to the work and materials specified in the Specifications as being included in any specific pay item, include in such pay items additional, incidental work, not specifically mentioned, when so shown in the Plans, or if indicated, or obvious and apparent, as being necessary for the proper completion of the work under such pay item and not stipulated as being covered under other pay items.

In cases of discrepancy, the governing order of the documents is as follows:

1. Special Provisions.
2. Technical Special Provisions.
3. Plans.
4. Standard Plans.
5. Developmental Specifications.
6. Supplemental Specifications.
7. Standard Specifications.

Computed dimensions govern over scaled dimensions.

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Safety Needs

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District 2 Consultant Project Management Engineer

Vital Few

- **Improve Safety**
  - Forefront of the design
  - Any enhancements?
- **Enhance Mobility**
  - Careful consideration of the MOT plan
  - Consideration of all modes and users
- **Inspire Innovation**
  - Think outside the box for project issues
- **Foster Talent**
  - Coaching and development opportunities

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Q&A Session

J.W. Hunter, P.E.
ACEC District 2 Liaison

Q&A Session

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3R Reports

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Transportation Engineer

RRR Reports in District 2

Resurfacing, Restoration & Rehabilitation Report

Financial Project ID 445545-1-52-01

SR 93 (I-75)
from Columbia County Line to Hamilton County Line
Suwannee County (37130)

Prepared for:

FDOT District Two

Prepared by:

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February 2021
(Revised May 2021)

SR 93 (I-75) RRR Report
FPID 445545-1-52-01

What is a RRR Report?

- **The RRR (3R) Report is a report submitted by the Design Team that presents their findings and recommendations on a RRR project**
- **The RRR Report serves as the Phase I Submittal for RRR projects**
- **The RRR Report is used by the Department to:**
  - Set the direction of the project's design
  - Provide them an opportunity to review and comment on aspects of the design prior to the Phase II Submittal
  - Review any proposed scope modifications the Design Team has found during design for potential inclusion within the project
- **The RRR Report will be uploaded to ERC for the typical four week review period**

RRR Report – Scope and Negotiations

- It is recommended that the Scope of Services includes the submittal of a RRR Report as the Phase I Submittal.
- Example

2 PROJECT DESCRIPTION

The CONSULTANT shall investigate the status of the project and become familiar with concepts and commitments (typical sections, alignments, etc.) developed from prior studies and/or activities. If a Preliminary Engineering Report is available from a prior or current Project Development and Environmental (PD&E) study, the CONSULTANT shall use the approved concepts as a basis for the design unless otherwise directed by the DEPARTMENT.

Milling and resurfacing of SR93 (I-75) from Columbia County Line to the Hamilton County Line. Evaluate the features included in a resurfacing and milling project outlined in the FDM. Develop a complete Resurfacing, Restoration & Rehabilitation (RRR) Report to serve as the Phase I Submittal.

- During Negotiations, hours should be included within Section 4.15 Design Report for the Design Team to create and submit the RRR Report

4. Roadway Analysis				
Task No.	Task	Units	Staff Hour Range	Basis for Staff Hour Range
4.15	Design Report	LS	See Basis for Staff Hour Range	Includes all work necessary to assemble design documentation for the project. (LS - based on 24 to 80 per report.)

RRR Report – Contents

- **Below is an example template for the contents of a RRR Report**

- **Cover Sheet**
- **Table of Contents**
- **Executive Summary**
- **Body of Report**
  - Project Introduction
    - Description
    - Project Location
    - LRE Project Cost
  - Findings and Recommendations
  - Design Criteria
- **Appendices**

RRR Report – Executive Summary

- **An Executive Summary section within the RRR Report includes specific topics that the Design Team wants a response from the Department**
- **These topics help the Department and Design Team to determine the work that will be performed within the project**
- **Some examples of items that may be included in the Executive Summary**
  - Proposed modification to project limits or limits of milling and resurfacing
  - Turn lane widening extension based on field review and analysis
  - Results/recommendations of a pier protection analysis
  - Removed flared driveways in urban sections
  - Replacement of existing multi-post signs after they have been reviewed
  - Items that Maintenance may need to address sooner then the Let of the project

RRR Report – Executive Summary

- The Department reviews and provides concurrence with recommendations for each topic
- The Design Team will then update the concurrence and comments section of each topic and resubmit the final RRR Report
- The Executive Summary section should be at or near the beginning of the report

RRR Report – Executive Summary

- Example

SR 93 (I-75) RRR Report
FPID 445545-1-52-01

EXECUTIVE SUMMARY FOR DEPARTMENT CONCURRENCE

The primary purpose of this project (FPID 445545-1) is to Resurface, Restore and Rehabilitate (RRR) SR 93 (I-75), in Suwannee County, in order to preserve the roadway integrity and ultimately extend the service life of the pavement. The project length is 3.656 miles on SR 93 from the Columbia County Line, MP 0.000, to the Hamilton County Line, MP 3.656. The project also includes 0.407 miles on SR 136 and the SR 136 interchange on/off ramps. This report proposes recommendations for potential improvements and documents areas where modifications are not recommended based on reviews of the field conditions and design.

The following is a summary of items for the Florida Department of Transportation (FDOT) to review and provide feedback:

Pier Protection on SR 93 (I-75) at the SR 136 Bridge Overpass – Upon review of the existing pier protection and existing bridge piers, it is recommended to replace the existing pier protection for both the northbound and southbound outside piers to meet the requirements of the latest Standard Plans Index 521-002, Pier Protection Barrier. See Section 2.6.2. Pier Protection at SR 136 Bridge for further information. Replacement of these pier protections will require a Supplement Agreement for the additional Design Services.

Concurrence: Y / N
Comments:

Replacement of Existing Multi-Post Signs – We have identified four existing multi-post signs that are in poor condition or do not meet FDOT/MUTCD standards. We are recommending to replace these signs. See Section 3.4. Signing and Pavement Marking for each of these signs. Replacement of these signs will require a Supplemental Agreement for the additional Design Services.

Concurrence: Y / N
Comments:

RRR Report – Executive Summary

- Example

SUMMARY OF ITEMS FOR DEPARTMENT CONCURRENCE

The following is a summary of items for the Department's review and concurrence:

Project Limits – The scope document for the project identifies the project limits to begin at MP 20.400 and end at MP 25.462 (Nassau County Line per the Straight Line Diagram). However, a review of the project survey, the old plans within the same project limits and the Straight Line Diagram, indicates that the true project limits should begin at MP 20.398 (STA. 1123+00). Per the Straight Line Diagram, at the end of the project, the bridges over the CSX Railroad (Removed) (Bridges: 270048 (WB), 270058 (EB)) are entirely located within Baker County. Comparing the locations between the project survey and the old plans, a more logical end of the project should be at MP 25.473 (Eastern end of Bridge 270048). We recommend modifying the work program to identify the new limits (MP 20.398 to MP 25.473).

FDOT Concurrence: [ ]
Comments:

Inclusion of SR 121 and SR 228 Exit and Entrance Ramps Resurfacing – The exit and entrance ramps at SR 121 and SR 228 are currently excluded from the current project scope. The interchange at SR 121 is a partial clover leaf with EB and WB loop exit ramps. SR 228 meets I-10 at a diamond interchange. The ramps at SR 121 and SR 228 were last resurfaced in 2008 when I-10 was last resurfaced (FPID# 213003-4). SR 228 (including the section within the Limited Access Right of Way) was milled and resurfaced in 2019 (FPID# 437613-1). The entrance and exit ramps of the interchange were not part of that project. We recommend to include the milling and resurfacing of the ramps at the 2 interchanges into the current RRR project. If these ramps are

RRR Report – LRE (Long Range Estimate)

- **An initial LRE is submitted with the RRR Report**
  - This estimates the cost of the project based on the Design Teams' field reviews, survey data, project scope, etc…
  - It additionally provides the Department with possible costs associated with any recommendations listed in the RRR Report
- **An updated LRE with the approved recommendations needs to be submitted with the final RRR Report that includes the Department's concurrence and comments in the Executive Summary**

RRR Report – Finding and Recommendations

- The body of the RRR Report should summarize the Design Team's findings and recommendations
- Existing conditions should be included and tailored to the project's scope and needs
- Photos can be beneficial for the Department to better understand the condition that the Design Team is describing

RRR Report – Finding and Recommendations

- Example

Photo 11
Sta. 1810+10 LT (℄ Survey SR 93)

From the west side of SR 93 looking west, damaged fence at right of way due to a fallen tree. The red line in the photo represents the top of the fence and the blue line represents the bottom of the fence.

RRR Report – Finding and Recommendations

- Example

Photo 18
Sta. 1817+00 LT (℄ Survey SR 93)

From the west side of SR 93 looking east, U-type concrete endwall is eroded at the bottom. The area at the bottom of drainage structure will be regraded and resodded or rip rap will be added due to existing erosion issue. We will coordinate with Maintenance for their recommendation.

RRR Report – Finding and Recommendations

- Example

Photo 36
Sta. 566+80 LT (℄ Survey SR 136)

From the north side of SR 136 looking south, this area will be widened due to an existing off-tracking issue.

RRR Report – Design Criteria

- The Design Criteria should be included in the RRR Report
- It is recommended to provide this information within a table
- Examples

A summary of the Design Criteria and the project compliance to the required criteria is presented in the table below:

FDM Section/ FDM Table	Design Element	Meets FDM Criteria			Remarks*/ Recommendation
		Yes	No	N/A	
201.5	Design Speed	X			
201.5.2	Ramp Design Speed			X	
211.2	Travel Lanes and Auxiliary Lanes	X			
Table 211.2.1	Minimum Ramp Widths - Turning Roadways			X	
211.2.2/ Table 211.2.3	Pavement Cross Slopes	X*			1. Average meets Criteria. 2. Cross Slope correction

SR 93 (I-75) RRR Report
FPID 445545-1-52-01

4. DESIGN CRITERIA

SR 93 (I-75)
The project will be designed and constructed in compliance with the criteria established in the following chapters of the 2021 FDOT Design Manual, Part 2:

- Chapter 201 Design Controls
- Chapter 211 Limited Access Facilities
- Chapter 215 Roadside safety

DESIGN ELEMENT	EXISTING	REQUIRED	PROPOSED	REFERENCE
Functional Classification	Rural Principal Arterial Interstate		Rural Principal Arterial Interstate	2021 FDM Part 2 Table 200.2.1
Context Classification	LA		LA	2021 FDM Part 2 Table 200.4.1
SIS Corridor	Yes		Yes	Straight Line Diagram
Traffic Volume Design Year K D T	40,500 9.5% 54% 28%		68,700 2043 9.5% 54% 28%	
Design Speed [mph]	70	70	70	2021 FDM Part 2 Table 201.5.1
Posted Speed [mph]	70		70	
Travel Lane Width	12'	12'	12'	2021 FDM Part 2 Section 211.2
Auxiliary Lane Width	12'	12'	12'	2021 FDM Part 2 Section 211.2
Shoulder Width (Paved Width)	12' (10')	12' (10')	12' (10')	2021 FDM Part 2 Table 211.4.1
Clear Zone Travel Lane		36' (DS ≥60 mph)		2021 FDM Part 2 Table 215.2.1
Clear Zone Auxiliary Lane		24' (DS ≥60 mph)		2021 FDM Part 2 Table 215.2.1
Audible and Vibratory Treatment	Yes	Ground-in Rumble Strips	Yes	2021 FDM Part 2 Section 211.4.4

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Pavement Design

Stephen Park, P.E.
RS&H, Inc.
Transportation Engineer

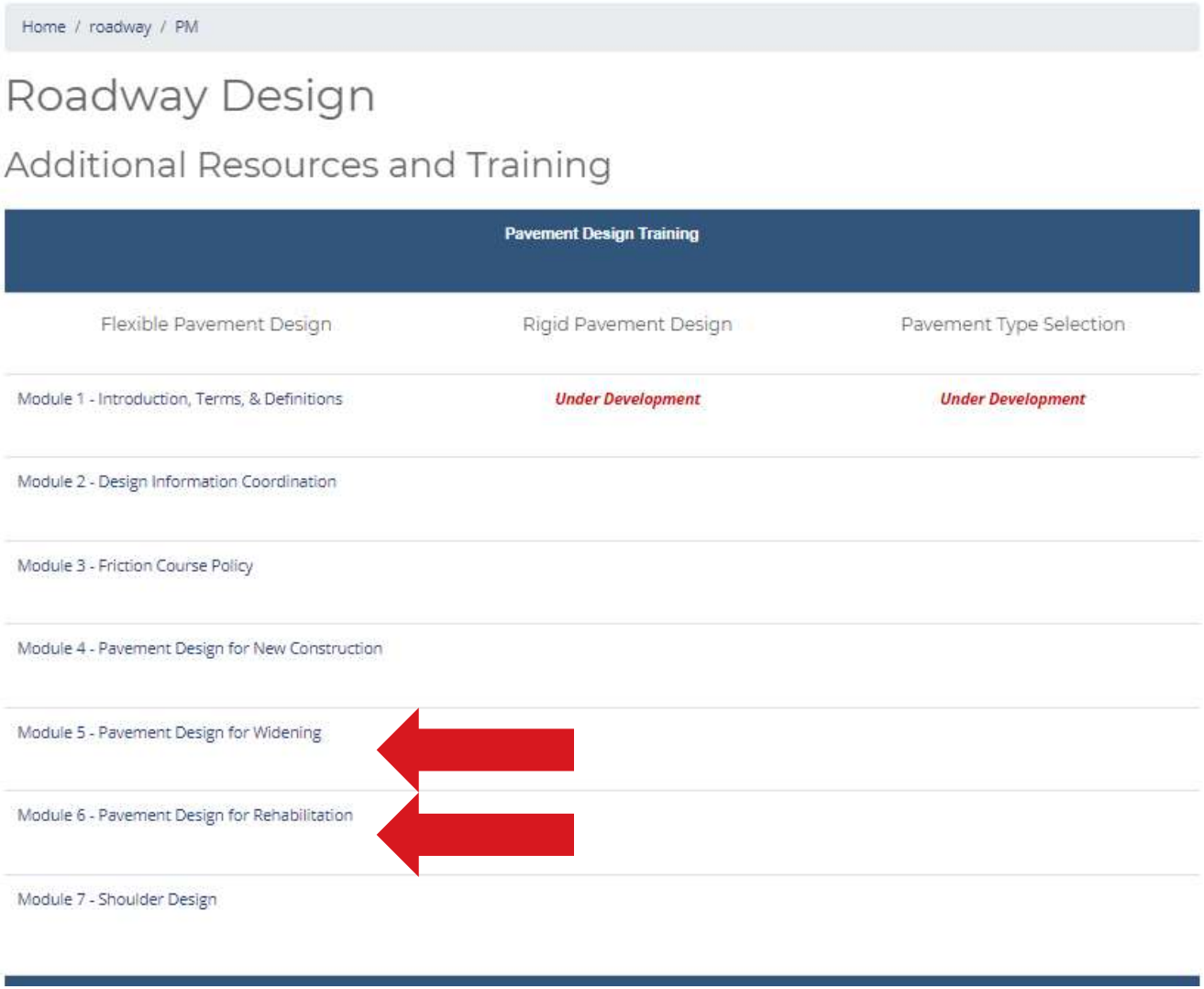
Minor Project Pavement Design

- **Minor Project Pavement Designs**
  - Rehabilitation Projects
  - Minor Widening
- **Helpful Resources**
  - Flexible Pavement Design Manual (FPDM) - Asphalt
  - Rigid Pavement Design Manual (RPDM) - Concrete

FDOT

Minor Project Pavement Design

- **Additional Trainings - https://www.fdot.gov/roadway/PM/Projects.shtm**



Home / roadway / PM

Roadway Design

Additional Resources and Training

Pavement Design Training		
Flexible Pavement Design	Rigid Pavement Design	Pavement Type Selection
Module 1 - Introduction, Terms, & Definitions	*Under Development*	*Under Development*
Module 2 - Design Information Coordination		
Module 3 - Friction Course Policy		
Module 4 - Pavement Design for New Construction		
Module 5 - Pavement Design for Widening		
Module 6 - Pavement Design for Rehabilitation		
Module 7 - Shoulder Design		

Minor Project Pavement Design

- **Project Scope – Roadway Analysis**

> **4.3 Pavement Design Package**
>
> The CONSULTANT shall provide an approved Pavement Design Package prior to the Phase II plans submittal date.

- **Negotiations Fee estimate – Roadway Analysis**
  - Task No. 4.3 within the Roadway Analysis tab – Pavement Design Package

4.3	Pavement Design Package	LS	See Basis for Staff Hour Range

Includes pavement type selection and all necessary coordination to resolve issues related to pavement design when provided by the Department. Initial set-up includes collecting all data necessary for entire project limits. (LS based 12 to 60 hours for initial set up and developing one pavement design, and 4 to 16 hours for each additional pavement design required for the project.)

4.22	Technical Meetings	LS	See Basis for Staff Hour Range

Meetings with departmental and/or Agency staff such as meetings with Access Management meetings, pavement design meetings, local governments, etc. Excludes Project Manager hours.

Minor Project Pavement Design

- **Rehabilitation Project**
  - QC Checklist – Appendix B of FPDM

Rehabilitation

Field Evaluation of Project..... _____

Pavement Coring and Evaluation Complete..... _____

Distress Evaluation..... _____

Existing Cross Slope and Correction Method..... _____

Milling Depth and Purpose..... _____

Overlay Structural Number (SNO) Calculations..... _____

Overbuild Recommendation..... _____

Pavement Evaluation Coring and Condition Data Report..... _____

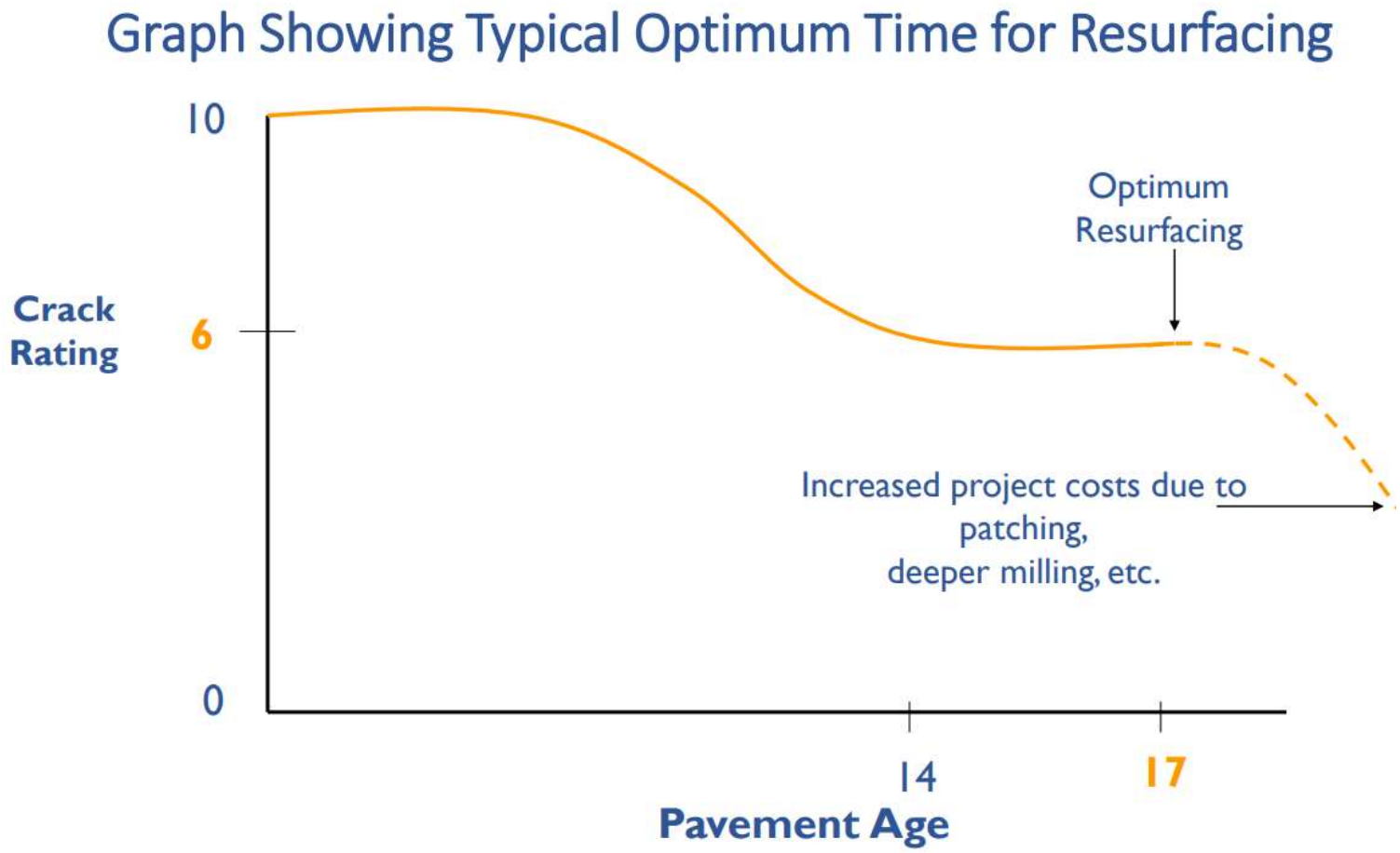
Minor Project Pavement Design

- Rutting

Minor Project Pavement Design

- Cracking

Minor Project Pavement Design



Minor Project Pavement Design

- **Rehabilitation Project**
  - **Step 1 - Determine Strength of Existing Pavement**
    - Existing structural number (SN_E)

$$SN_E = (a_1 \times D_1) + (a_2 \times D_2) + (a_3 \times D_3) + \ldots + (a_N \times D_N)$$

  - **Step 2 - Determined your Strength of Required Pavement**
    - Structural Number (SN_R)
    - Determined from ESALD and MR
  - **Step 3 - Difference of these is your Overlay Strength (or Proposed)**
    - Needed to bring the pavement up to the needed design requirements.
    - Overlay Structural Number (SN_O)

$$SN_O = SN_R - SN_E$$

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Minor Project Pavement Design

- **Determine SN_E**
  - Layer Coefficients and Layer Thickness

$$SN_E = (a_1 \times D_1) + (a_2 \times D_2) + (a_3 \times D_3) + \ldots + (a_N \times D_N)$$

Core Number	Mile Post	Lane	Wheel Path	Pavement Layer (top ←) FC12	FC3	SP125	S1	T1	BIND	Core Length	Base Type	Crack Depth	Crack Type	Crack Class	Crack Extent	Pavement Condition	Rut Depth (inches)	Cross Slope (%)	Slope Direction (in / out)	Comments:
21	5.100	L1	N		1.2		1.7	1.1		4.0	LR					P	0.49	2.1	O	light raveling
22	3.300	L3	N		1.1		4.0			5.1	ABC=9.9					P	0.59	3.6	O	light raveling
23	3.600	L3	O		1.1		3.0			4.1	ABC=9.5					P	0.43	2.8	O	light raveling
24	3.900	L3	N		1.0		3.2			4.2	ABC=8.4					P	0.48	1.7	I	light raveling, curve
25	4.300	L3	N		1.0		4.0			5.0	ABC=9.0					P	0.41	3.0	O	light raveling
26	4.600	L3	N		1.1		3.5			4.6	ABC=9.0					F	0.52	2.9	O	light raveling

Pavement Conditions Survey

Layer	Original Design	Pavement Condition: Good	Fair	Poor
FC-2 or FC-5	0			
FC-1 or FC-4	0.20	0.17	0.15	0.12
FC-3	0.22	0.20	0.17	0.15
FC-6	0.44	0.34	0.25	0.15
FC-12.5 or FC-9.5	0.44	0.34	0.25	0.15
Type S or SP	0.44	0.34	0.25	0.15

Layer Coefficients (Table 7.1 of FPDM)

Table 7.1 of FPDM

Minor Project Pavement Design

- Determine SNE - layer thickness
  - Pavement Cores

CORE NO., APPROXIMATE STATION & OFFSET, DATE DRILLED	DEPTH RANGE (INCH)	DESCRIPTION
C-5 SR 16 1112+10 440' RT 10/20/2016	0.0 – 4.4 4.4 – 4.9 4.9 – 7.0 7.0 – 12.0 CBT[1]	TYPE S or SP ARMI Layer TYPE 2 Limerock Base Course GWL[2]: Not Encountered at TOC[3]

Minor Project Pavement Design

- Existing Structural Number (SNE)

EXISTING 2-LANE / 2-WAY PAVEMENT DESIGN TABLE

LAYER TYPE	THICKNESS	COEFFICIENT	STRUCTURAL NUMBER
TYPE S or SP**	2.50	0.25	0.63
T-II**	2.50	0.15	0.38
OBG 5***	7.00	0.18	1.26
STABILIZATION**	12.00	0.08	0.96
TOTAL STRUCTURAL NUMBER			3.22

Minor Project Pavement Design

- **Calculate the Required Structural Number (SNR)**
  - Determined MR

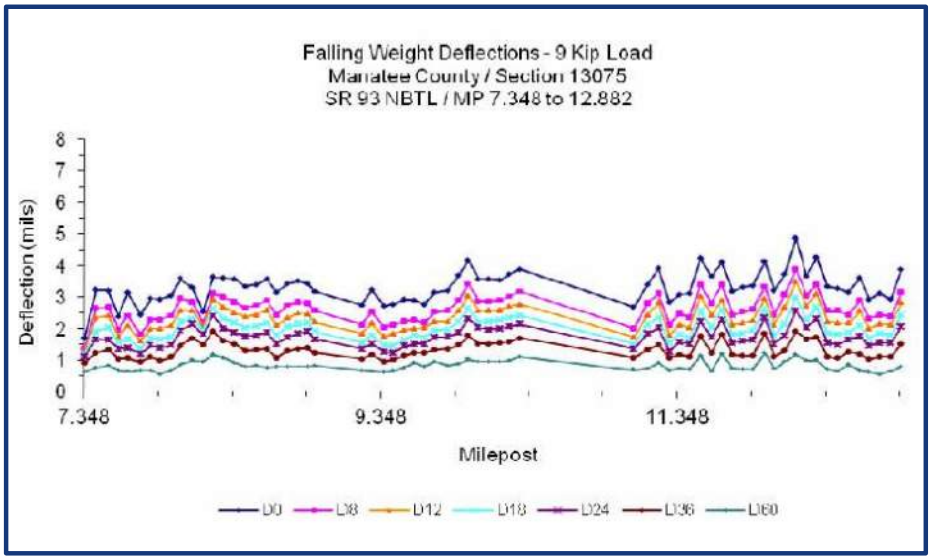
SUBJECT: Resilient Modulus Recommendation

Project Description: SR 93 / I-75
MP 7.348 to 12.882
Project Number: 13075
FIN No.: 201032-5
County: Manatee

On September 19, 2012 deflection tests were conducted in the northbound and southbound traffic lanes of SR 93. Evaluation of the data and resulting deflection plots indicate the following Resilient Modulus values are representative of the existing pavement system and are hereby recommended for this project.

Travel Direction	Beginning Milepost	Ending Milepost	Modulus (psi)	Modulus (MPa)
Northbound	7.348	12.882	32,000	221
Southbound	7.348	12.882	27,000	186

Please let me know if you need further assistance.



Minor Project Pavement Design

- **Required Structural Number (SNR)**
  - Determined ESALS

18 kip EQUIVALENT SINGLE AXLE LOAD ANALYSIS (FLEXIBLE)

SR 93 (I-75)

PROJECT TRAFFIC FOR DESIGN ANALYSIS INFO / FACTORS

YEARS: 2022 TO 2042

SECTION #: 13075 ITEM # 201032-5-52-01

LOCATION # SR 93 (I-75)

YEAR	AADT	ESAL (1000S)	ACCUM (1000S)	D	T	LF	EF
2022	104300	1254		0.5	13.40%	0.546	0.90
2023	106780	1279	1279	0.5	13.40%	0.544	0.90
2024	109260	1304	2583	0.5	13.40%	0.542	0.90
2025	111740	1329	3912	0.5	13.40%	0.540	0.90
2026	114220	1354	5266	0.5	13.40%	0.539	0.90
2027	116700	1379	6645	0.5	13.40%	0.537	0.90
2028	119180	1404	8049	0.5	13.40%	0.535	0.90
2029	121660	1428	9477	0.5	13.40%	0.533	0.90
2030	124140	1453	10930	0.5	13.40%	0.532	0.90
2031	126620	1477	12407	0.5	13.40%	0.530	0.90
2032	129100	1502	13909	0.5	13.40%	0.529	0.90
2033	131580	1526	15435	0.5	13.40%	0.527	0.90
2034	134060	1550	16985	0.5	13.40%	0.525	0.90
2035	136540	1574	18560	0.5	13.40%	0.524	0.90
2036	139020	1598	20158	0.5	13.40%	0.522	0.90
2037	141500	1622	21780	0.5	13.40%	0.521	0.90
2038	143980	1646	23427	0.5	13.40%	0.519	0.90
2039	146460	1670	25097	0.5	13.40%	0.518	0.90
2040	148940	1694	26790	0.5	13.40%	0.517	0.90
2041	151420	1717	28508	0.5	13.40%	0.515	0.90
2042	153900	1741	30249	0.5	13.40%	0.514	0.90

Opening to Mid-Design Year ESAL Accumulation (1000S): 13909

Opening to Design Year ESAL Accumulation (1000S): 30249

30,249

Minor Project Pavement Design

- Required Structural Number (SNR)

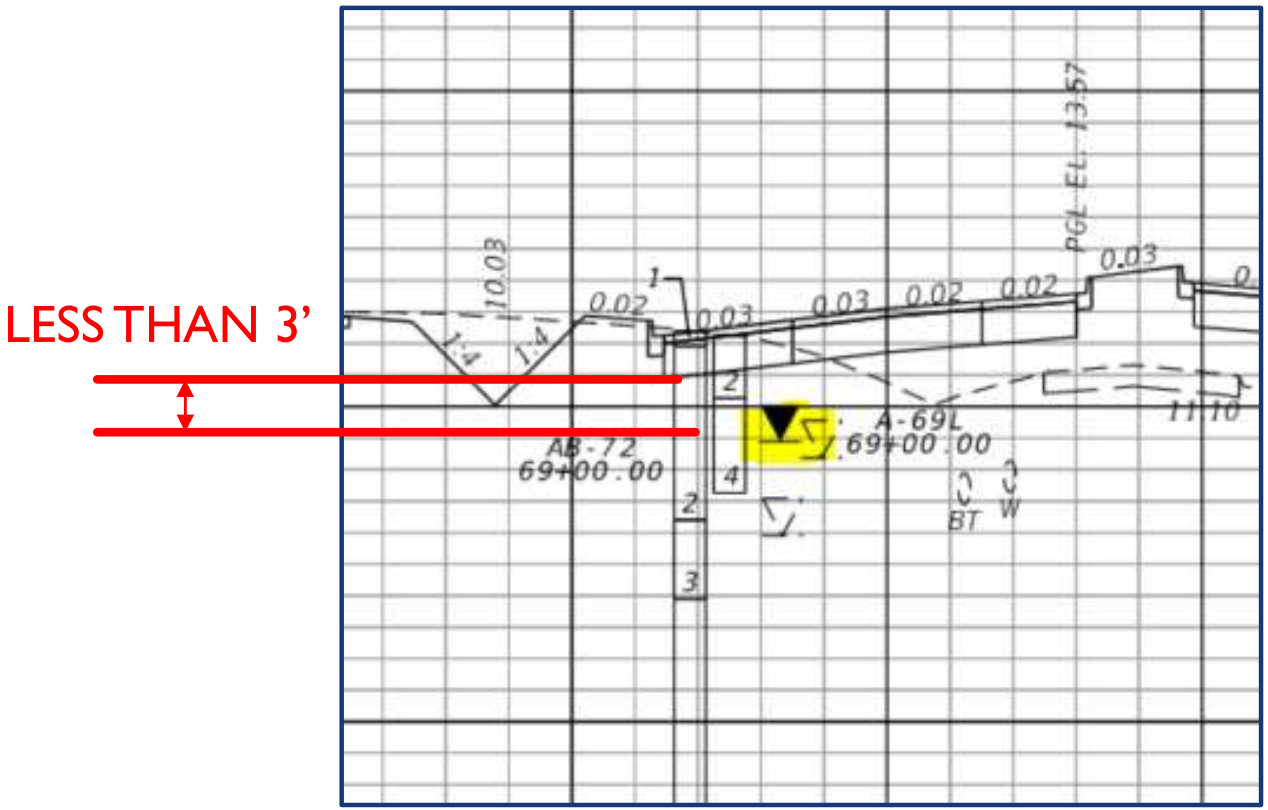
	RESILIENT MODULUS (M_R), (PSI x 1000)											
$ESAL_D$	18	19	20	21	22	23	24	25	26	27	28	29
100,000	1.79	1.75	1.72	1.68	1.65	1.62	1.59	1.57	1.54	1.52	1.49	1.47
150,000	1.92	1.88	1.84	1.81	1.77	1.74	1.71	1.68	1.66	1.63	1.61	1.58
200,000	2.02	1.98	1.94	1.90	1.86	1.83	1.80	1.77	1.74	1.72	1.69	1.67
250,000	2.10	2.05	2.01	1.97	1.94	1.90	1.87	1.84	1.81	1.78	1.76	1.73
300,000	2.16	2.12	2.07	2.03	2.00	1.96	1.93	1.90	1.87	1.84	1.81	1.79
350,000	2.22	2.17	2.13	2.09	2.05	2.01	1.98	1.95	1.92	1.89	1.86	1.84
400,000	2.27	2.22	2.18	2.14	2.10	2.06	2.03	1.99	1.96	1.93	1.91	1.88
450,000	2.31	2.26	2.22	2.18	2.14	2.10	2.07	2.03	2.00	1.97	1.95	1.92
500,000	2.35	2.30	2.26	2.22	2.18	2.14	2.10	2.07	2.04	2.01	1.98	1.95
600,000	2.43	2.38	2.33	2.29	2.24	2.21	2.17	2.14	2.10	2.07	2.04	2.02
700,000	2.49	2.44	2.39	2.35	2.30	2.26	2.23	2.19	2.16	2.13	2.10	2.07
800,000	2.55	2.49	2.44	2.40	2.36	2.32	2.28	2.24	2.21	2.18	2.14	2.12
900,000	2.60	2.54	2.49	2.45	2.40	2.36	2.32	2.29	2.25	2.22	2.19	2.16
1,000,000	2.64	2.59	2.54	2.49	2.44	2.40	2.36	2.33	2.29	2.26	2.23	2.20
1,500,000	2.83	2.77	2.71	2.66	2.62	2.57	2.53	2.49	2.45	2.42	2.38	2.35
2,000,000	2.96	2.90	2.85	2.79	2.74	2.70	2.65	2.61	2.57	2.54	2.50	2.47
2,500,000	3.08	3.01	2.95	2.90	2.85	2.80	2.75	2.71	2.67	2.63	2.59	2.56
3,000,000	3.17	3.10	3.04	2.99	2.93	2.88	2.84	2.79	2.75	2.71	2.67	2.64
3,500,000	3.25	3.19	3.12	3.06	3.01	2.96	2.91	2.87	2.82	2.78	2.74	2.71
4,000,000	3.32	3.26	3.19	3.13	3.08	3.03	2.98	2.93	2.89	2.84	2.80	2.77
4,500,000	3.39	3.32	3.26	3.20	3.14	3.09	3.04	2.99	2.94	2.90	2.86	2.82
5,000,000	3.45	3.38	3.31	3.25	3.19	3.14	3.09	3.04	3.00	2.95	2.91	2.87
6,000,000	3.55	3.48	3.41	3.35	3.29	3.24	3.18	3.13	3.09	3.04	3.00	2.96
7,000,000	3.64	3.57	3.50	3.44	3.38	3.32	3.27	3.21	3.17	3.12	3.08	3.04
8,000,000	3.72	3.65	3.58	3.51	3.45	3.39	3.34	3.29	3.24	3.19	3.15	3.10
9,000,000	3.79	3.72	3.65	3.58	3.52	3.46	3.40	3.35	3.30	3.25	3.21	3.17
10,000,000	3.86	3.78	3.71	3.64	3.58	3.52	3.46	3.41	3.36	3.31	3.27	3.22
15,000,000	4.11	4.03	3.96	3.89	3.82	3.76	3.70	3.64	3.59	3.54	3.49	3.44
20,000,000	4.30	4.22	4.14	4.07	4.00	3.94	3.87	3.82	3.76	3.71	3.66	3.61
[illegible]	4.45	4.36	4.29	4.21	4.14	4.08	4.01	3.95	3.90	[illegible]	3.79	3.74
30,000,000	4.57	4.49	4.41	4.33	4.26	4.19	4.13	4.07	4.0	3.96	3.90	3.85
35,000,000	4.68	4.59	4.51	4.43	4.36	4.29	4.23	4.17	4.1	4.05	4.00	3.95
40,000,000	4.77	4.68	4.60	4.52	4.45	4.38	4.32	4.25	4.20	4.14	4.08	4.03

FPDM Appendix A

Interpolated Required SN(R) = 3.97

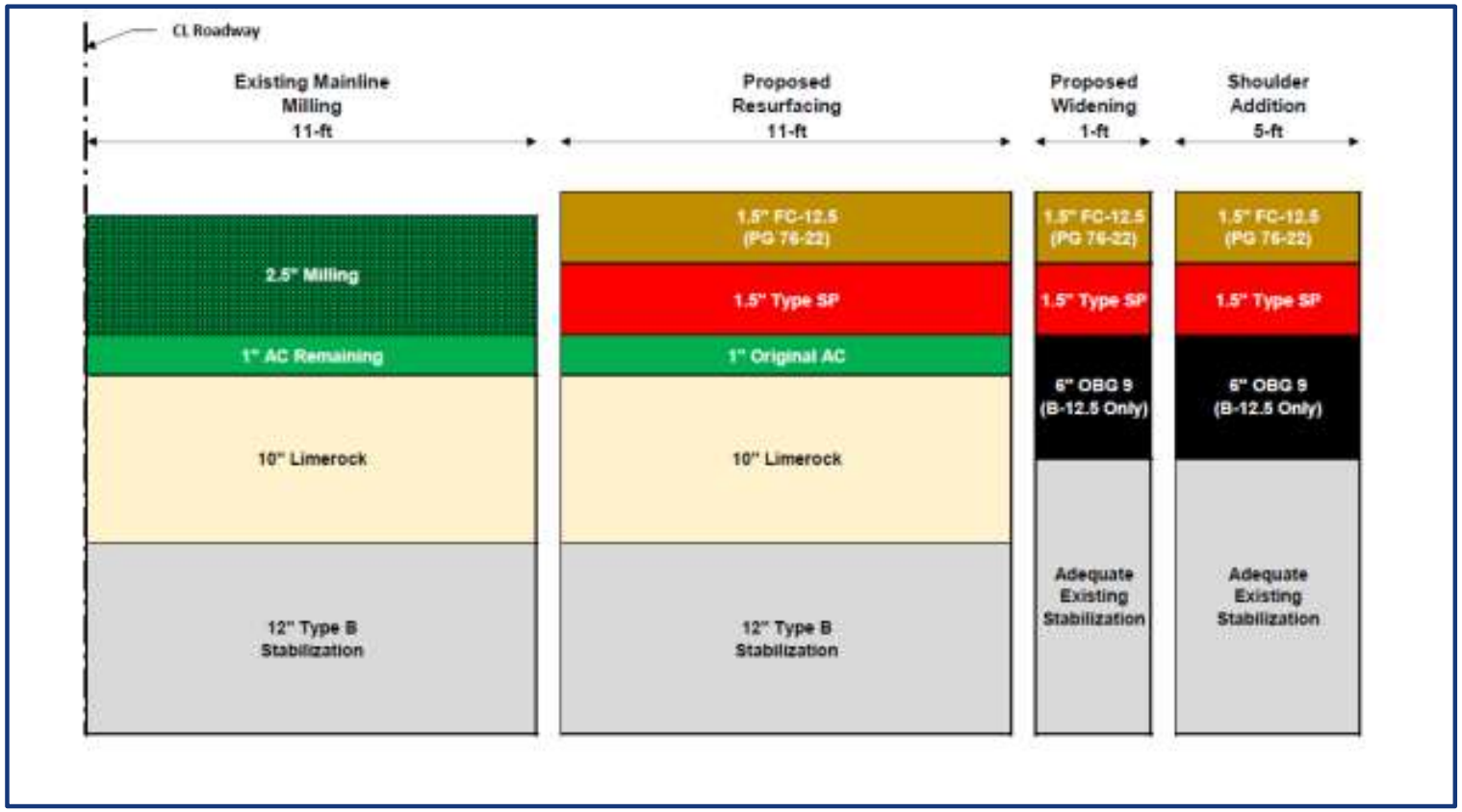
Minor Project Pavement Design

- **Helpful Recommendations**
  - Water table issues – Reduce Resilient Modulus



Minor Project Pavement Design

- **Helpful Recommendations**
  - Think about constructability
  - Always Draw out a detail sketch of your design (especially structural course)



FDOT ACEC

PM ACADEMY

Guardrail

Stephen Park, P.E.
RS&H, Inc.
Transportation Engineer

Guardrail

- **Helpful Resources**
  - Index 536-001

		Guardrail			
536-001		Guardrail	400	SPI	XLS
536-002	Errata	Guardrail Transitions and Connections for Existing Bridges	402	SPI	

  - FDOT Design Manual (FDM) 215 – Roadside Safety
  - AASHTO – Chapter 4 – Roadside Design

- **Additional Trainings**
  - MASH Roadside Barriers - Design Lessons Learned- Richard Stepp
    https://www.fdot.gov/roadway/training/pres19
  - Guardrail: How It Works! – Derwood Sheppard

    https://www.fdot.gov/roadway/training/pres20

Guardrail

- When to use guardrail?
  - Shielding Hazards
  - Roadside slopes higher than 20 feet for flush shoulder roadways

Table 215.2.3 Roadside Slope Criteria

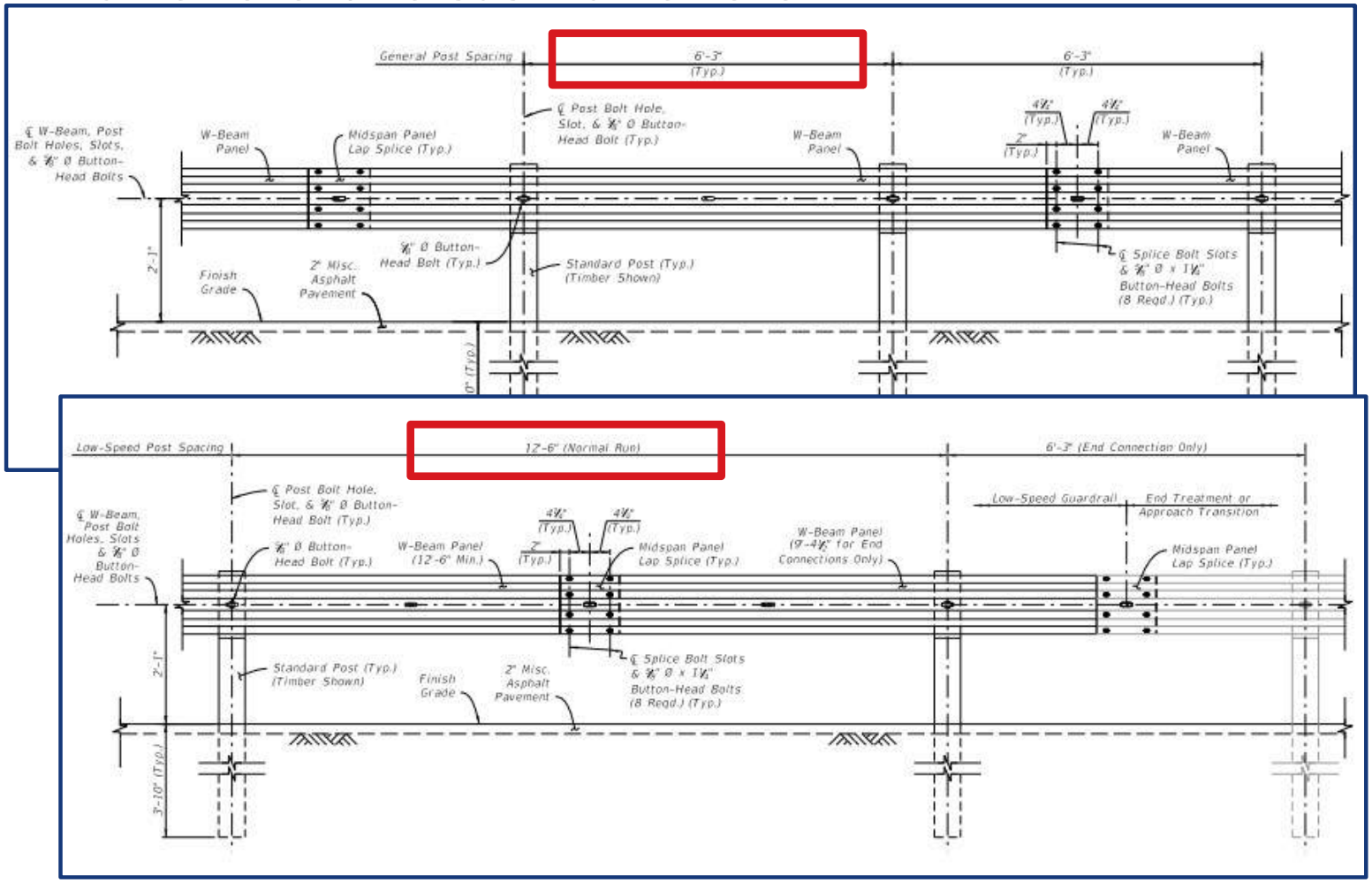
Type of Slope	Flush Shoulder and High Speed Curbed		Curbed	
	Height of Fill (feet)	Rate	Height of Fill (feet)	Rate
Front Slope	0 – 5	1:6	0-6	1:2 or to suit property owner, not flatter than 1:6.
	5 – 10	1:6 to edge of Clear Zone, then 1:4	> 6	1:3 or to suit property owner, not flatter than 1:6.
	10 – 20	1:6 to edge of Clear Zone, then 1:3		
	> 20	1:2 with guardrail		

FDM Table 215.2.3

  - Costs when compared to Barrier wall (LF)
    - 38” Shoulder Concrete barrier - $279.42
    - Guardrail - $17.96

Guardrail

- Traffic Level 3 versus Traffic Level 2



TL-3

TL-2

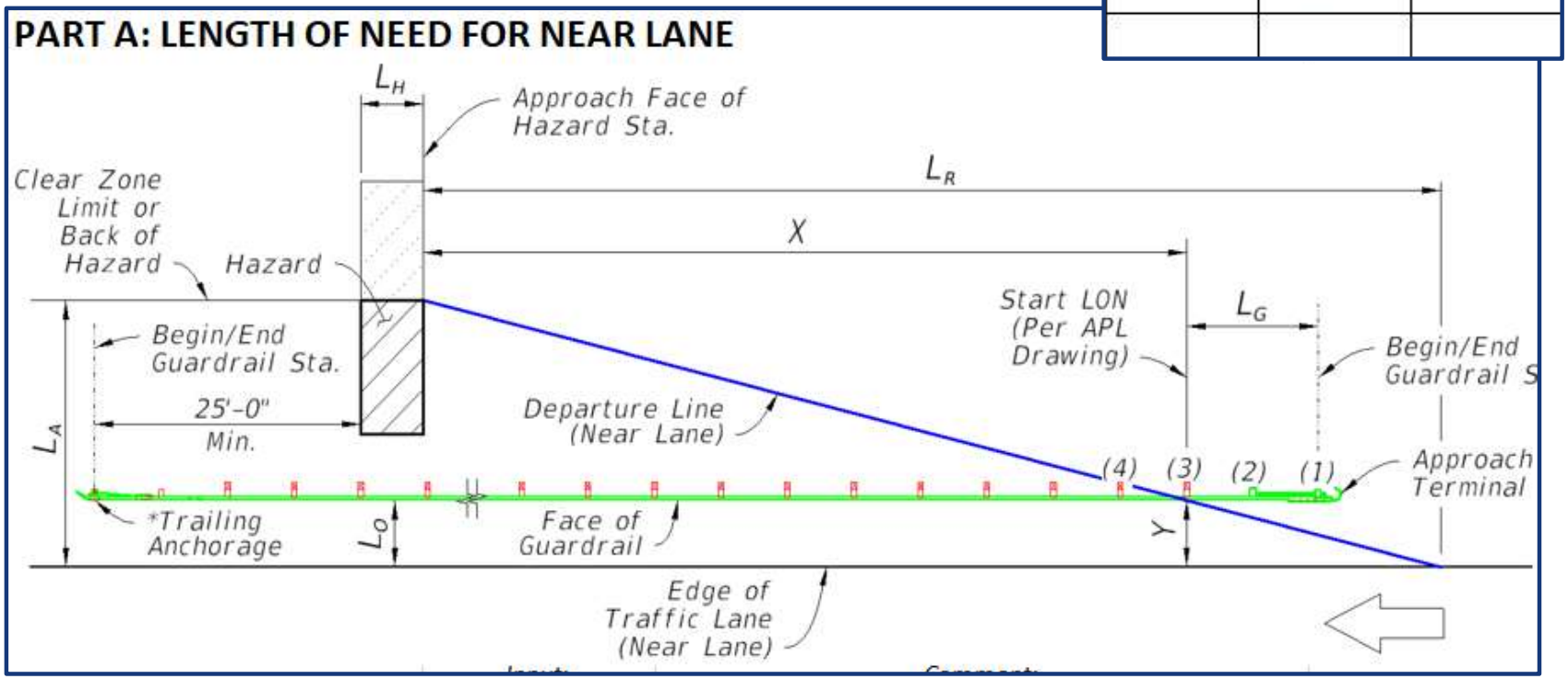
Standard Plans Index 536-001

Guardrail

Standard Plans Index
536-001 Design Tool

400	SPI	XLS
402	SPI	

- Length of Need



- Roadside Hazard- Include Part B for 2-Lane, 2-Way
- Bridge Approach with C.C.
- Bridge Approach with Terminal
- Rigid Barrier Approach

Guardrail

- **Length of Need Calculation Tool – Index 536-001**

	Input:	Comment:
Direction of Near Lane Traffic	Westbound	for relative stationing calculations
AADT (Vehicles Per Day)	10000	
Design Speed (MPH)	50	
Approach Face of Hazard Station	10+00.	enter as total feet (do not input a plus sign)
Length of Hazard, L_H (Ft.)	10	
Lateral Area Concern, L_A (Ft.)	35	the lesser distance from the 'Edge of Traffic Lane' to the 'Clear Zone Limit' or 'Back of Hazard'
Lateral Offset of Guardrail, L_O (Ft.)	10	the typical guardrail offset from the 'Edge of Traffic Lane,' near the 'Hazard' location (outside of flare)
Length of Gating, L_G (Ft.)	12.5	"Gating" Terminals typically have a 'Start LON' at Post 3 or Post 4 per the APL Drawings. For "Non-Gating" Terminals, the 'Start LON' is at 'Post 1' (L_G =0). NOTE: Prior to use of "Non-Gating" terminals, verify availability of applicable options on the APL (MASH required for new projects)
Terminal Flare @ Post(1) (Ft.)	0	This input equals 0 Ft. where RDB18-02 applies for new projects with MASH terminals; flared terminals are not available. Otherwise, this input has a 4 Ft. max. for old NCHRP350 designs.
Flare's Taper Length (Ft.)	35	default value is acceptable at 35'-0", but this may be refined per specific APL drawing (Input used to calculate 'Y')
	Output:	
End Treatment Offset, Y (Ft.)	10.0	
Runout Length, L_R (Ft.)	230	
Length of Need, X (Ft.)	164.3	$X = \frac{L_A - Y}{L_A / L_R}$ AASHTO RDG (5-3)
Unadjusted Begin/End Guardrail Sta. @ Primary Approach Terminal	11+76.8	
Unadjusted Begin/End Guardrail Sta. @ Trailing Anchorage (If Applicable)	9+65.	

Standard Plans Index 536-001 Design Tool

Guardrail

- **Guardrail Deflection / Setback and post spacing**
  - Verify with all disciplines (lighting, utilities, signals, etc.)

Table 215.4.2 Minimum Barrier Setback
(Measured from the face of the barrier, as shown in *Figure 215.4.7*)

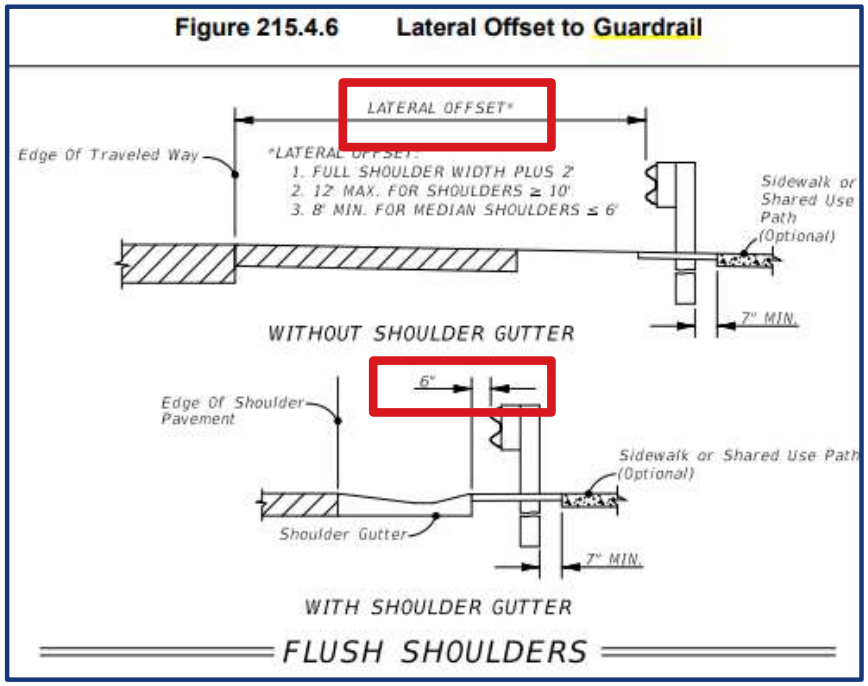
Barrier Type	Setback Distance
Flexible Barrier	
High Tension Cable Barrier (HTCB)	12 feet, 0 inches
Semi-Rigid Barrier	
W-Beam with Post Spacing @ 6 feet, 3 inches (TL-3)	5 feet, 0 inches
W-Beam with Post Spacing @ 12 feet, 6 inches (TL-2)	5 feet, 0 inches
W-Beam with Post Spacing @ 3 feet, 1.5 inches (½ Spacing)	3 feet, 10 inches
W-Beam with Post Spacing @ 1 foot, 6.75 inches (¼ Spacing)	3 feet, 2 inches
Nested W-Beams with Post Spacing @ 3 feet, 1.5 inches (½ Spacing)	3 feet, 0 inches
Nested W-Beams with Post Spacing @ 1 foot, 6.75 inches (¼ Spacing)	2 feet, 8 inches
Deep Post W-Beam installed on 1:2 Slope Break with Post Spacing @ 6 feet, 3 inches (TL-3)	5 feet, 6 inches

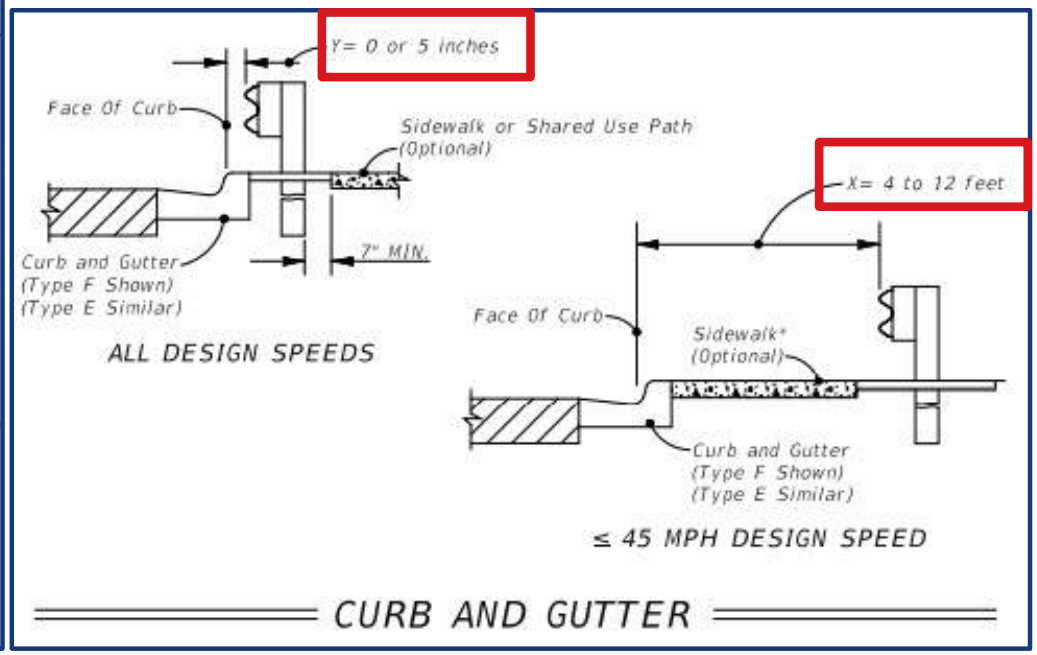
FDM Table 215.4.7

Guardrail

- Guardrail Offset

FDM Figure 215.4.6





Guardrail

- Flared End Anchorages

Guardrail

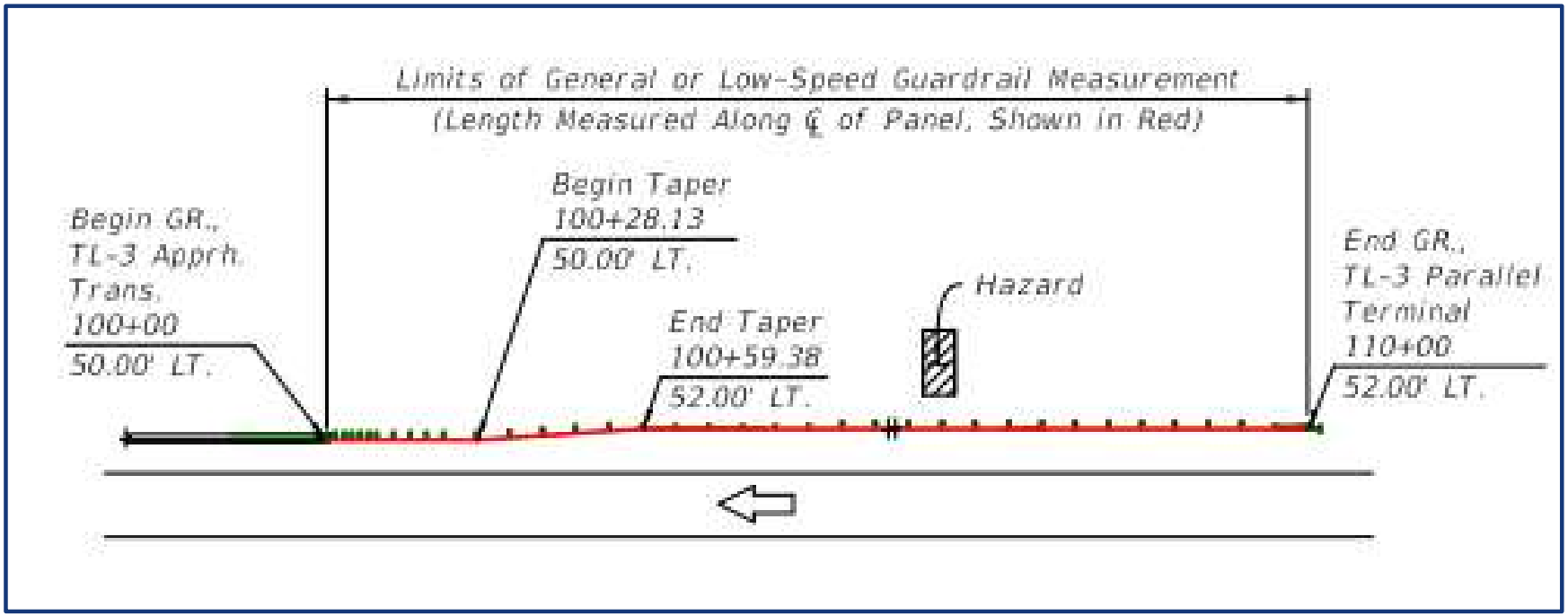
- APL Parallel End Anchorages

Guardrail

- Quantities

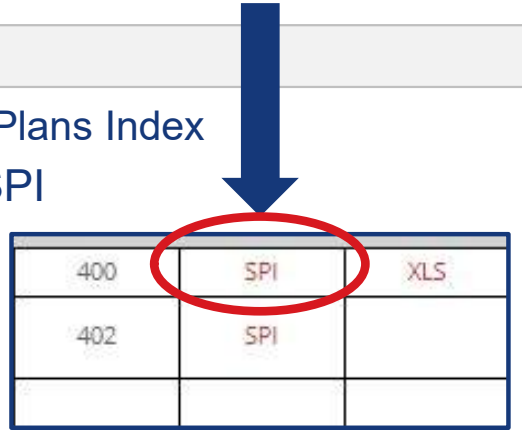
Standard Plans Index
536-001 - SPI

400	SPI	XLS
402	SPI	



Guardrail

Standard Plans Index
536-001 SPI



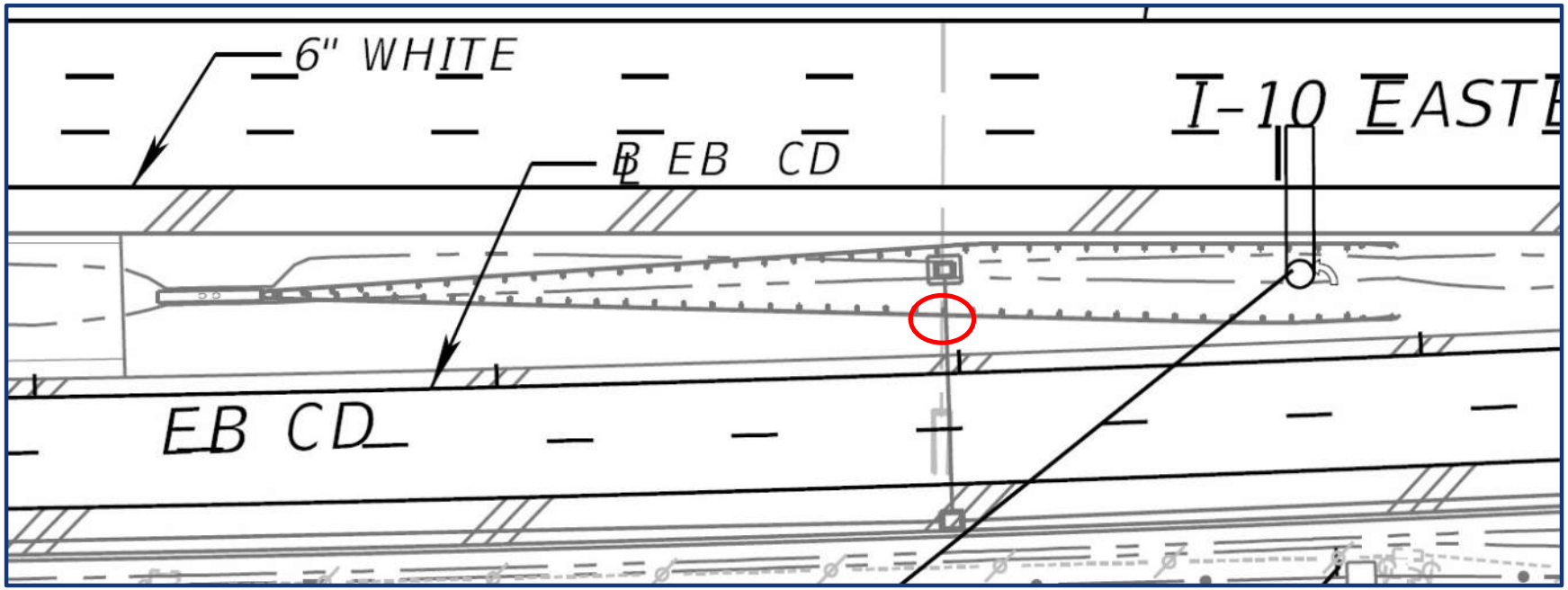
- **Standard Plans Instructions (SPI)**
  - Common Design Features – Checklist

Common Design Features – Checklist (NOTE: Not All-inclusive)

Check Item:	Description:	Key Reference(s)
Shielding Hazards	Meet shielding requirements for hazard types, depending on offsets and project type	FDM 215, Clear Zone, Minimum Lateral Offsets, Aboveground Hazards, Drop-off Hazards, Canal Hazards, Rigid Barrier Ends
Length of Need	Extend Guardrail upstream of hazards per 'Length of Need' ('LON') requirements	Part B; FDOT 'LON' Design Tool (Excel Spreadsheet), AASHTO RDG Equation 5-3
Trailing Extension	Extend Guardrail 25'-0" downstream of hazards or overlapping barrier run	Part C (Trailing Anchorage) Index 536-001, Sheet 9
Guardrail Lateral Offset	Meet Guardrail lateral offset placement requirements	FDM 215.4.6.1; FDM Figure 215.4.6
Hazard Setback	Meet barrier setback requirements; Include reduced post spacing if needed	Part K; FDM 215.4.6.1; FDM Table 215.4.2
Taper Rates	Keep Guardrail Parallel to the roadway, or meet the maximum taper rate requirements	Part I

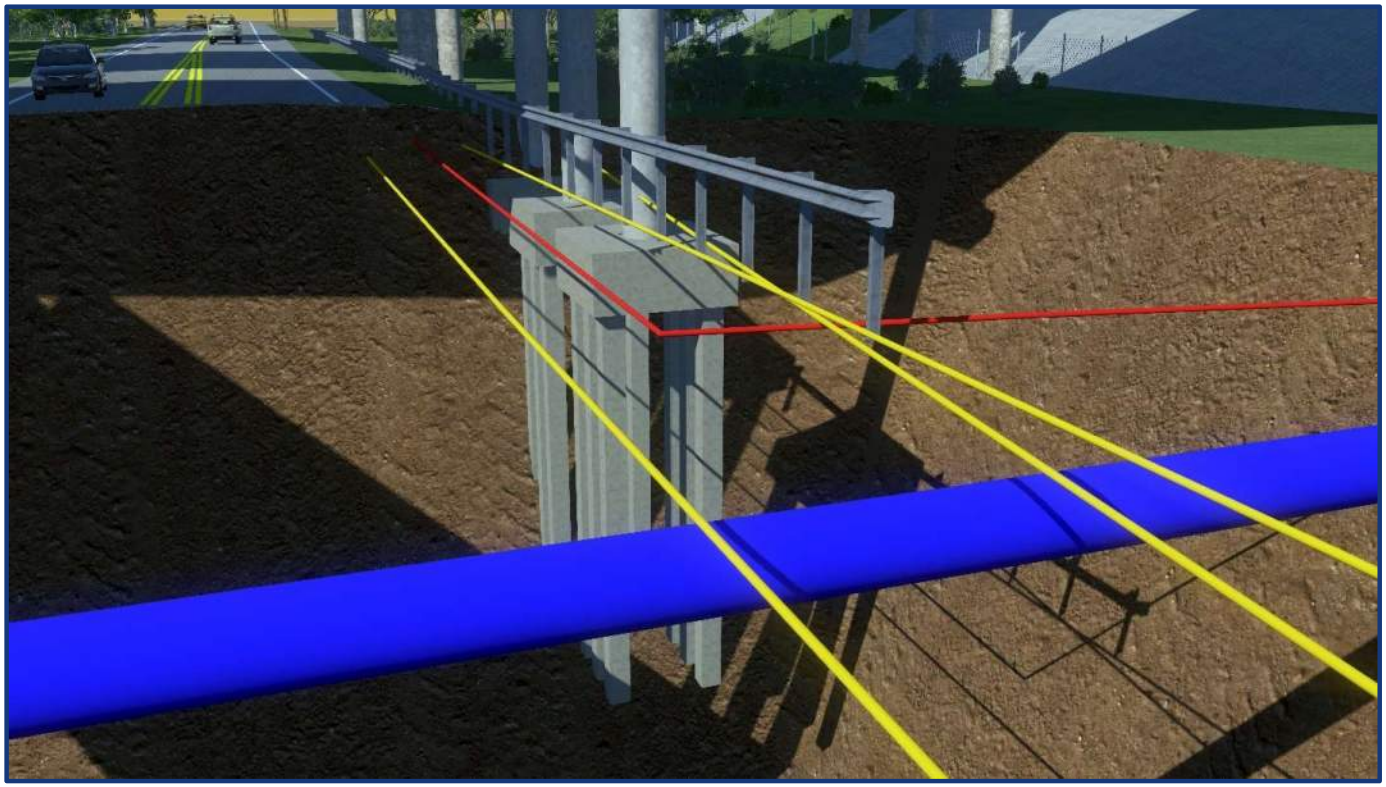
Guardrail

- **Helpful Recommendations**
  - Guardrail post in conflict with drainage pipe



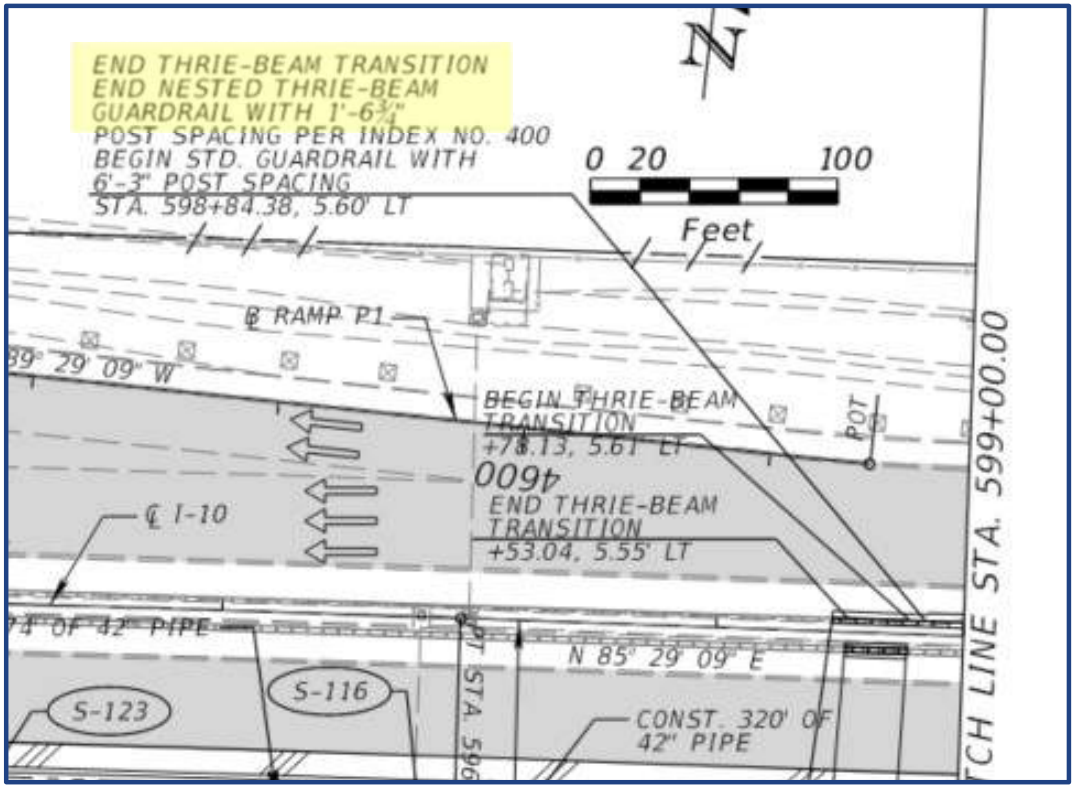
Guardrail

- **Helpful Recommendations**
  - Clash Detection tool – Microstation OpenRoads
    - Shows design conflicts with Guardrail posts



Guardrail

- **Helpful Recommendations**
  - Guardrail Deflection / Setback and post spacing
    - Verify with all disciplines (lighting, utilities, signals, etc.)



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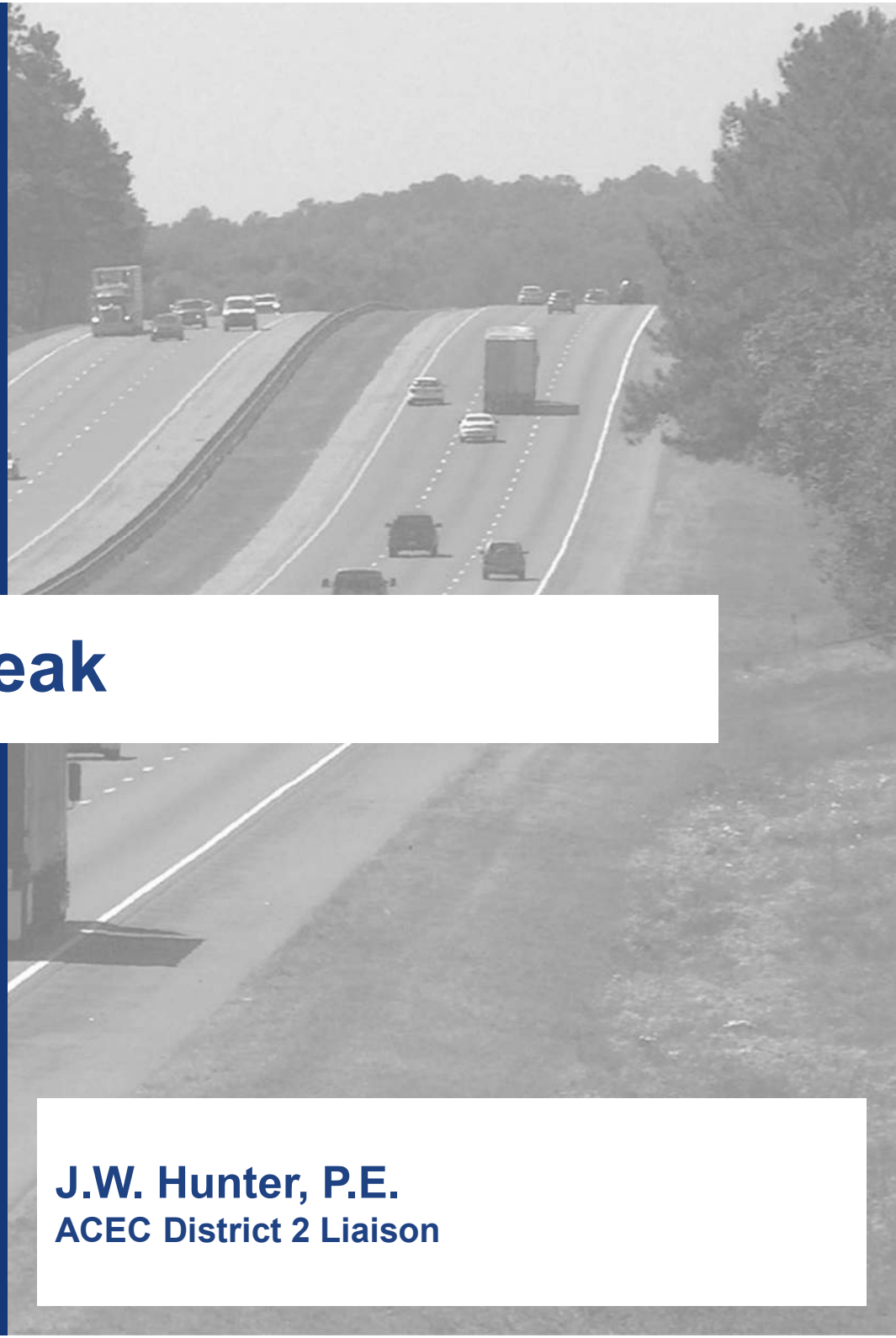
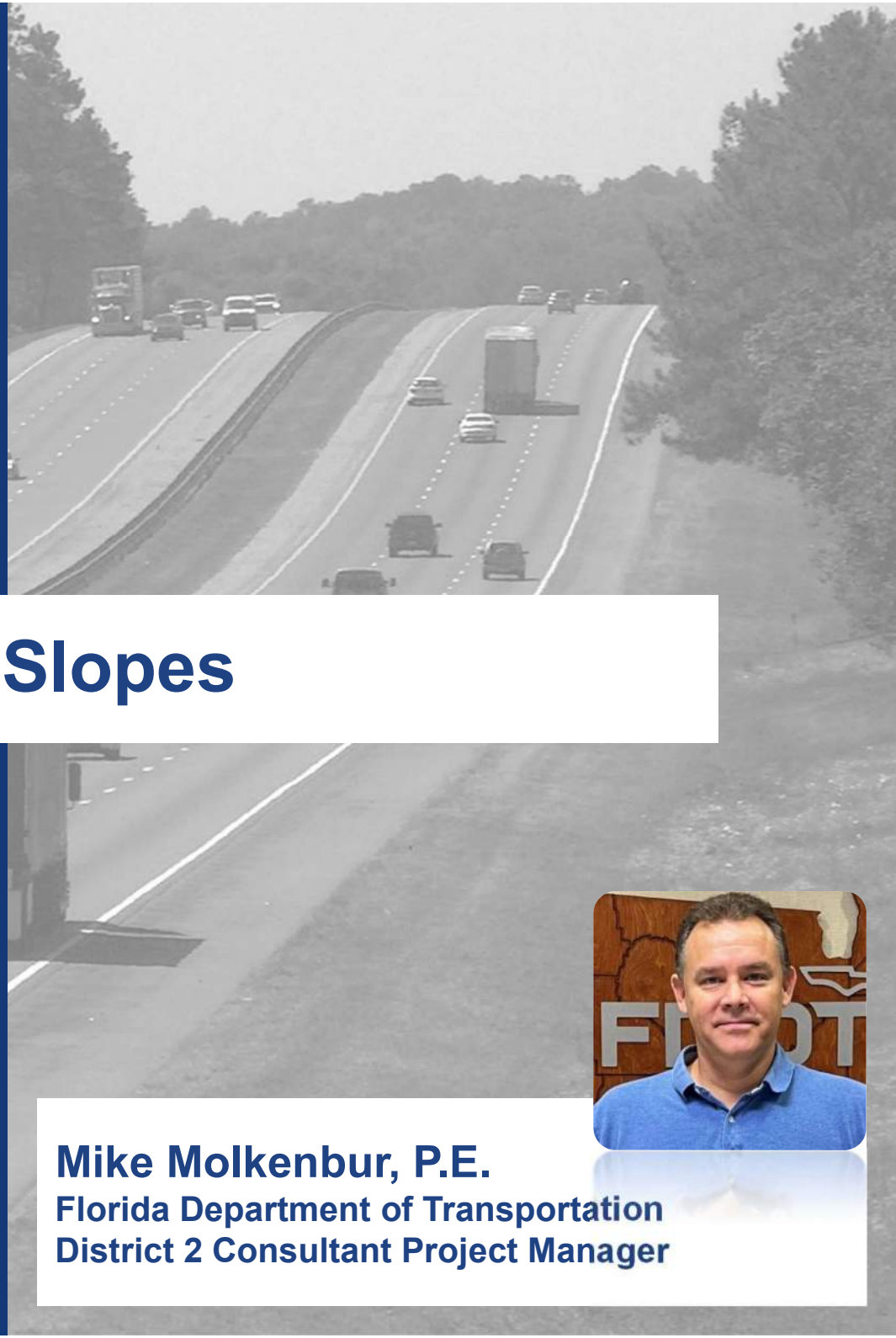


Break

J.W. Hunter, P.E.
ACEC District 2 Liaison

FDOT ACEC

PM ACADEMY



Cross Slopes

Mike Molkenbur, P.E.
Florida Department of Transportation
District 2 Consultant Project Manager

Cross Slopes – References

- **FDM Chapter 210.2.4 for Arterials and Collectors**
- **FDM Chapter 211.2.2 for Limited Access Facilities**
  - Number of travel lanes with cross slope in one direction
  - Maximum algebraic difference in cross slope between adjacent through lanes
  - Bridge cross slopes
  - RRR Criteria for Cross Slopes
  - RRR Criteria for Superelevation in Horizontal Curves

Cross Slopes – Scope/Negotiations

- **Scope provides detail in Section 4.4**
- **Negotiations**
  - Design Staff Hour Estimation Forms
    - Tabs 4 & 5 – Tasks 4.4 & 5.2.2

4.4 Cross-Slope Correction

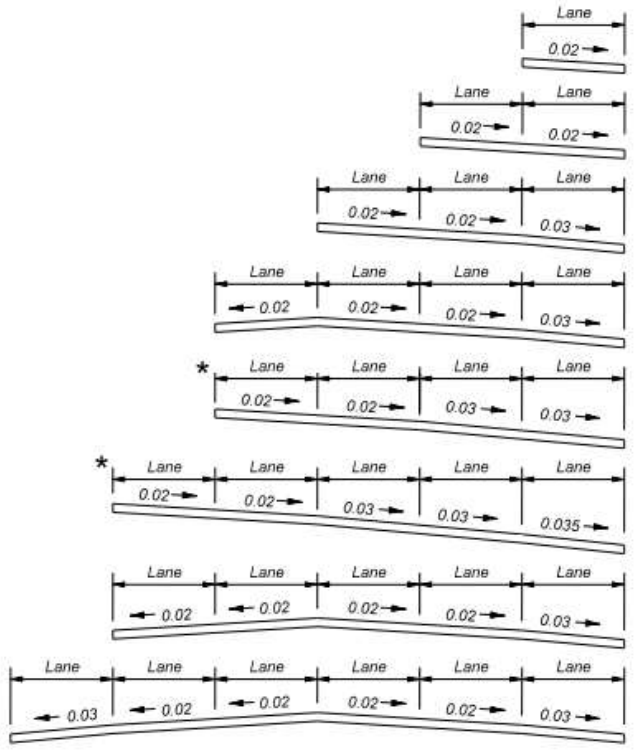
The CONSULTANT shall coordinate with the DEPARTMENT to obtain existing cross slope data, determine roadway limits where cross slope is potentially out of tolerance and determine a resolution.

Task No.	Task	Units	Staff Hour Range	Basis for Staff Hour Range
4.4	Cross-Slope Correction	LS	See Basis for Staff Hour Range	Includes all work necessary to analyze existing cross-slopes and crash data, and develop cross-slope correction concepts. Analysis of exisiting cross-slopes: LS based on 1 to 4 hours per lane-mile. Development of cross-slope correction concepts: LS based on 8 to 60 (based on length of correction, number of correction areas, number of lanes, etc.)
5.2.2	Typical Section Details	EA	4 to 16	Cross slope correction, superelevation correction, minor widening etc.

Cross Slopes – Design Requirements

- **FDM 210.2.4 Pavement Cross Slopes**
  - Max number of lanes with cross slope in same direction
    - Figure shows travel lanes in one direction
    - General Rule – Maximum number of lanes with cross slope in on direction is three.
    - Cross slopes increase from center of roadway to outside of roadway
    - **Notes at bottom of Figure 210.2.1 provide flexibility**

Figure 210.2.1 Standard Pavement Cross Slopes



All Travel Lanes One Direction

(1) These sections show only the standard slopes for adjoining travel lanes; they do not prescribe needed lanes, lane usage or typical section requirements other than lane slope. These slopes are not applicable to parabolic crowns.

(2) Maximum pavement cross slopes for tangent sections are:
- (a) 0.04 for design speeds of 45 mph or less
- (b) 0.03 for design speeds greater than 45 mph
- (c) 0.035 may only be used for 5-lanes sloped in one direction as shown above.

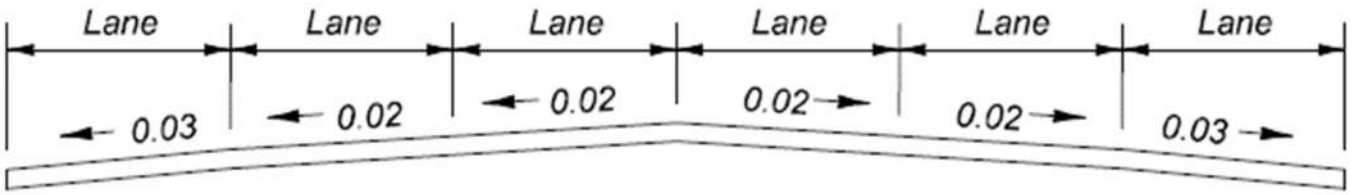
(3) The maximum change in cross slope between adjacent through lanes is 0.04.

(4) Slopes on multi-purpose lanes may be 0.03 to 0.05. Portions of multi-purpose lanes that are reserved for parking and access isles for the physically disabled are to have cross slopes not exceeding 1:50 (0.02) in all directions.

(5) 4 or 5 lanes sloped in one direction (*) may be used with design speed 65 mph or less and longitudinal grades not exceeding 5%.

Cross Slopes – Design Requirements

- **FDM 210.2.4 Pavement Cross Slopes**
  - Max algebraic difference between adjacent through lanes is 0.04 ft/ft.



All Travel Lanes One Direction

(1) These sections show only the standard slopes for adjoining travel lanes; they do not prescribe needed lanes, lane usage or typical section requirements other than lane slope. These slopes are not applicable to parabolic crowns.

(2) Maximum pavement cross slopes for tangent sections are:
   (a) 0.04 for design speeds of 45 mph or less
   (b) 0.03 for design speeds greater than 45 mph
   (c) 0.035 may only be used for 5-lanes sloped in one direction as shown above.

(3) The maximum change in cross slope between adjacent through lanes is 0.04.

(4) Slopes on multi-purpose lanes may be 0.03 to 0.05. Portions of multi-purpose lanes that are reserved for parking and access isles for the physically disabled are to have cross slopes not exceeding 1:50 (0.02) in all directions.

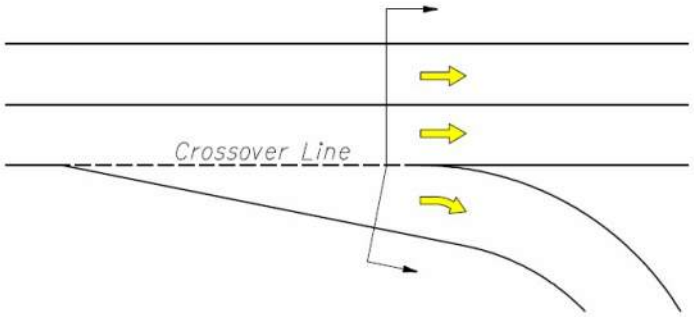
(5) 4 or 5 lanes sloped in one direction (*) may be used with design speed 65 mph or less and longitudinal grades not exceeding 5%.

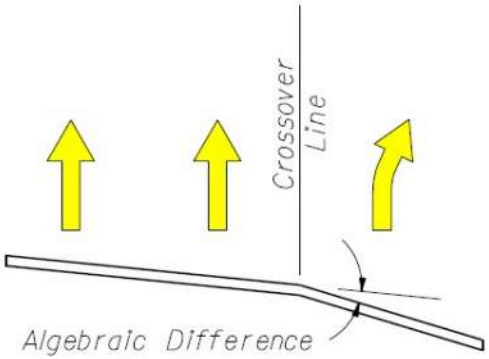
Cross Slopes – Design Requirements

- **FDM 210.2.4 Pavement Cross Slopes**
  - Max algebraic difference between a through lane and an auxiliary lane at a turning roadway terminal is 0.06 ft/ft for design speed less than 35 mph and 0.05 ft/ft for design speed 35 mph and over.

Table 210.2.2 Maximum Algebraic Difference in Cross Slope at Turning Roadway Terminals

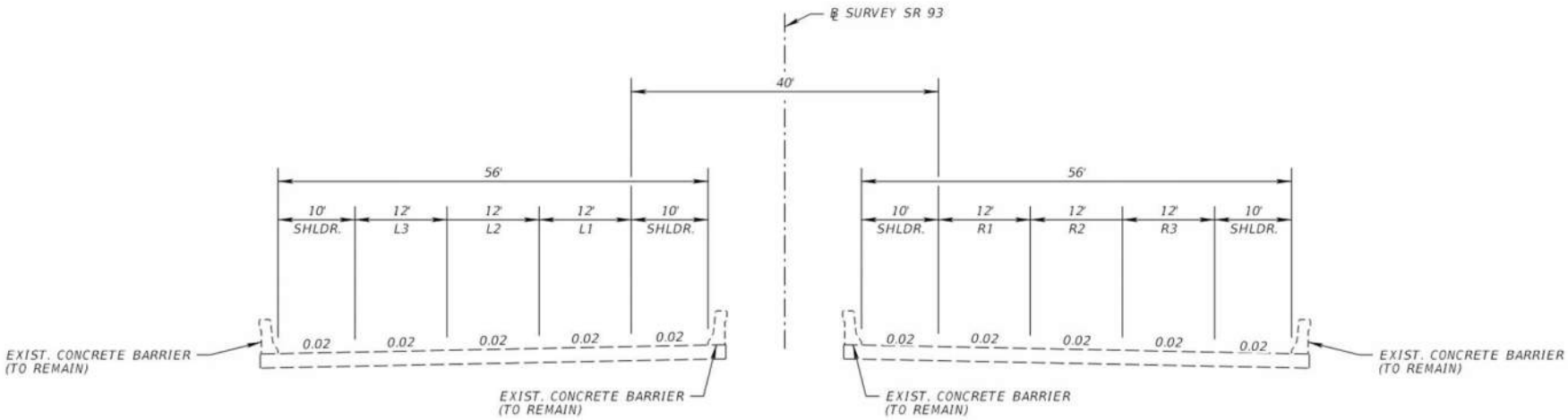
Design Speed of Exit or Entrance Curve (mph)	Maximum Algebraic Difference in Cross Slope at Crossover Line (%)
Less than 35	6.0
35 and over	5.0





Cross Slopes – Design Requirements

- **FDM 210.2.4 Pavement Cross Slopes**
  - Bridge slopes
    - Uniform cross slopes, typically 0.02 ft/ft
    - Cross slope transitions on roadway section



TYPICAL SECTION 2

Cross Slopes – Design Requirements

- FDM 210.2.4 Pavement Cross Slopes
  - Section 210.2.4.1 RRR Criteria for Cross Slopes
    - Step 1 – Review existing pavement and shoulder cross slopes on 100' intervals by:
      - (1) Full Digital Terrain Model (DTM)
      - (2) Vehicle Mounted Scanner (VAN data)

SR 426 Orange | 445211-1 | MPSV Analysis | 75006-001

Milepost	L1	L2	L Minimum	L Maximum	Alignment Data	Correction Notes
0.049	3.09	4.42	1.500	4.000		
0.051	3.30	4.42	1.500	4.000	Begin Project MP 0.050	*FDM Table 210.2.3 allows existing multi-
0.053	3.30	4.58	1.500	4.000		lane curbed roadways with outside lanes
0.055	3.18	4.77	1.500	4.000		up to 5.0% to remain.
0.057	3.14	4.79	1.500	4.000		
0.059	3.21	4.77	1.500	4.000	Fairview Ave = MP 0.059	
0.061	3.28	4.66	1.500	4.000		

Cross Slopes – Design Requirements

- FDM 210.2.4 Pavement Cross Slopes
  - Section 210.2.4.1 RRR Criteria for Cross Slopes
    - Step 2 – Determine if cross slope correction is necessary
      - Table 210.2.3

Table 210.2.3 RRR Criteria for Existing Roadway Cross Slopes

Facility or Feature	Standard (ft/ft)	Allowable Range (ft/ft)
Two-Lane Roads	0.02	0.015 - 0.030
Multilane Roads	0.02	0.015 - 0.040
	0.03	0.025 - 0.040
	0.035	0.030 - 0.040
Outside Shoulders	0.06	Adjacent Lane Cross Slope - 0.080
Inside Shoulders	0.05	0.020 - 0.080
Parking Lanes	0.05	0.015 - 0.050

Notes:

(1) Existing multilane curbed roadways may have outside travel or auxiliary lanes with a maximum cross slope of 0.05.

(2) Outside auxiliary lanes on flush shoulder roadways must match or exceed adjacent travel lane cross slopes with a maximum cross slope of 0.04.

(3) The maximum algebraic difference between adjacent through lanes must not exceed 0.06.

(4) When existing shoulders are to remain, the algebraic difference between the shoulder slope and adjoining roadway pavement slope must be ≤ 0.07.

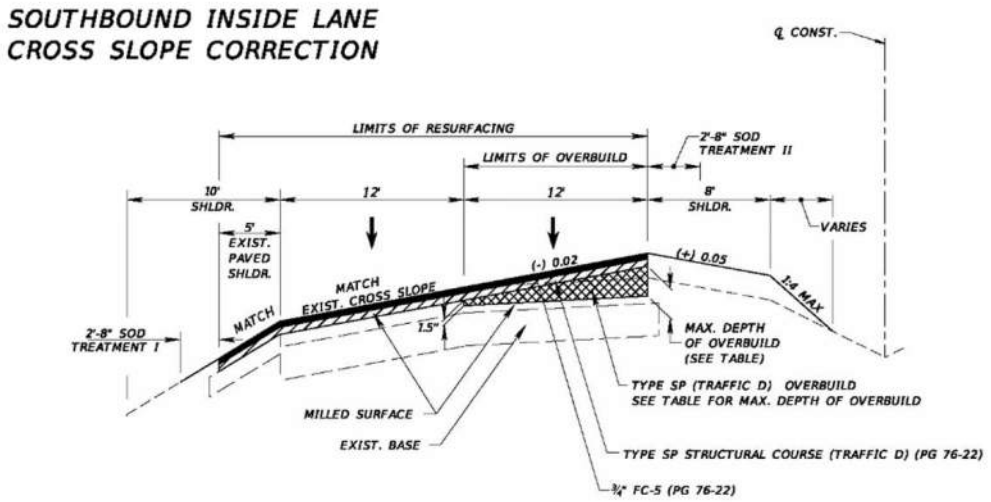
(5) Parking spaces and access aisles dedicated to serving persons with disabilities must have cross slopes no steeper than 0.02 (1:50) in any direction.

Cross Slopes – Design Requirements

- FDM 210.2.4 Pavement Cross Slopes
  - Section 210.2.4.1 RRR Criteria for Cross Slopes
    - Step 3 – Determine if cross slope correction is practical
      - FDM 210.2.4.2 Hydroplaning Risk Analysis
        - https://www.fdot.gov/roadway/Drainage/ManualsandHandbooks.shtm

Cross Slopes – Design Requirements

- **FDM 210.2.4 Pavement Cross Slopes**
  - **Section 210.2.4.1 RRR Criteria for Cross Slopes**
    - Step 4 – Provide cross slope correction details and tables
      - Work with District Pavement Design Engineer and District Pavement Materials Engineer
      - Cross slope correction details and tables
      - Calculate material quantities based on cross slope correction details. Do not show cross slope correction details on roadway cross sections.



OVERBUILD DETAILS

LOCATION		EXIST. SLOPE (%)	PROPOSED SLOPE (%)	MAX. DEPTH OF OVERBUILD (IN.)	WIDTH OF OVERBUILD (FT.)	AREA OF OVERBUILD (SQ. FT.)
STATION	LANE					
145+00.00	SOUTHBOUND - INSIDE	(+) 1.6	EXIST.	0.0	12.0	0.0
146+00.00	SOUTHBOUND - INSIDE	(+) 1.0	(-) 2.0	5.1	12.0	2.8
147+00.00	SOUTHBOUND - INSIDE	(+) 1.6	(-) 2.0	5.8	12.0	3.1
148+00.00	SOUTHBOUND - INSIDE	(+) 0.9	(-) 2.0	4.7	12.0	2.5
149+00.00	SOUTHBOUND - INSIDE	(+) 0.4	(-) 2.0	3.9	12.0	2.2
150+00.00	SOUTHBOUND - INSIDE	(+) 0.9	(-) 2.0	4.5	12.0	2.5
151+00.00	SOUTHBOUND - INSIDE	(+) 0.4	(-) 2.0	3.5	12.0	1.9
152+00.00	SOUTHBOUND - INSIDE	(+) 0.3	(-) 2.0	3.8	12.0	2.1
153+00.00	SOUTHBOUND - INSIDE	(+) 0.0	(-) 2.0	3.4	12.0	1.9
154+00.00	SOUTHBOUND - INSIDE	(+) 0.6	(-) 2.0	4.2	12.0	2.3
155+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.2	12.0	2.8
156+00.00	SOUTHBOUND - INSIDE	(+) 1.4	(-) 2.0	5.6	12.0	3.0
157+00.00	SOUTHBOUND - INSIDE	(+) 0.8	(-) 2.0	4.7	12.0	2.9
158+00.00	SOUTHBOUND - INSIDE	(+) 1.1	(-) 2.0	5.6	12.0	3.0
159+00.00	SOUTHBOUND - INSIDE	(+) 1.0	(-) 2.0	4.9	12.0	2.6
160+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.4	12.0	2.9
161+00.00	SOUTHBOUND - INSIDE	(+) 2.2	(-) 2.0	7.5	12.0	4.1
162+00.00	SOUTHBOUND - INSIDE	(+) 2.2	(-) 2.0	7.1	12.0	3.8
163+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.4	12.0	2.9
164+00.00	SOUTHBOUND - INSIDE	(+) 0.8	(-) 2.0	4.7	12.0	2.5
165+00.00	SOUTHBOUND - INSIDE	(+) 0.6	(-) 2.0	4.6	12.0	2.4
166+00.00	SOUTHBOUND - INSIDE	(+) 1.5	EXIST.	0.0	12.0	0.0

OVERBUILD AND RESURFACING DETAIL

NTS

STA. 145+00.00 TO STA. 166+00.00

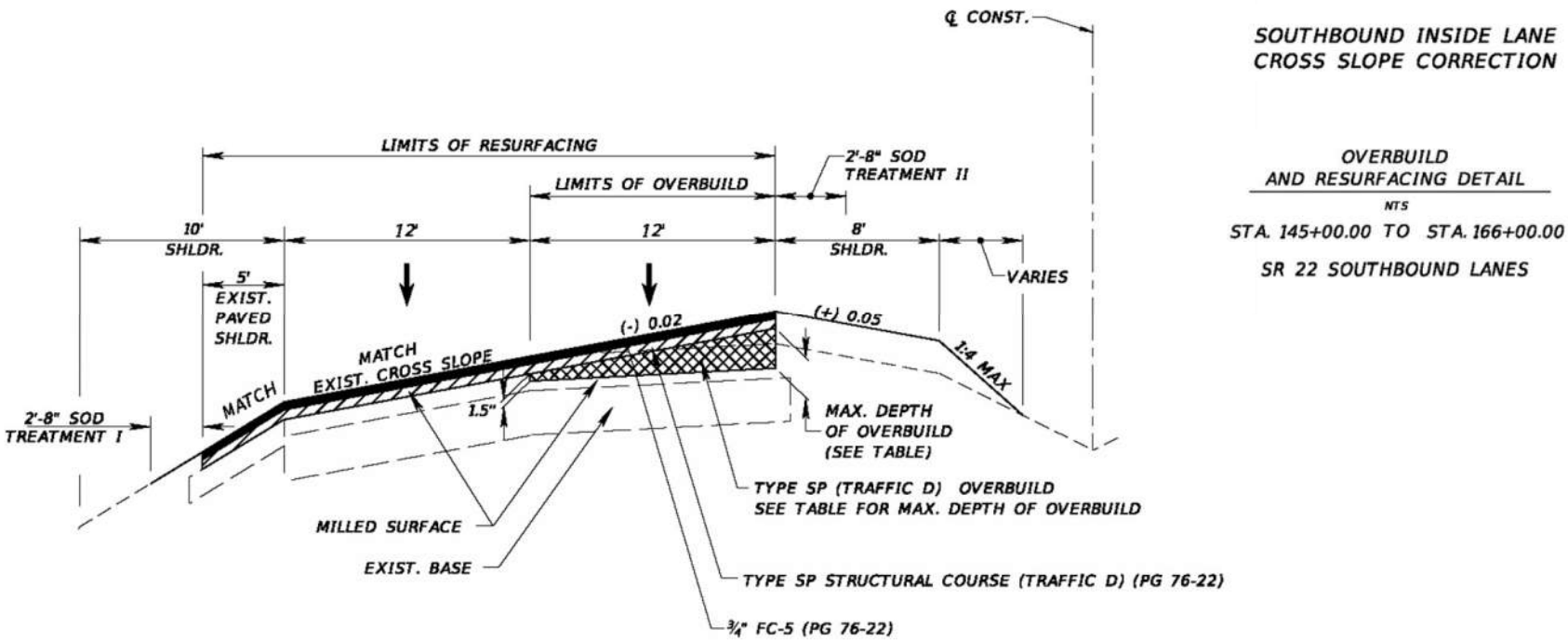
SR 22 SOUTHBOUND LANES

Include the subtotals in the Summary of Pavement sheet as a line item named "Summary of Overbuild". Do not include contingency quantities associated with overbuild.

Exhibit 306-10B
Overbuild Details
Date: 1/1/20

Cross Slopes – Design Requirements

- **Methods of Cross Slope Correction – Correction by Overbuild**
  - Milling depth is uniform
  - Overbuild “wedge”
  - Shoulder grading



SOUTHBOUND INSIDE LANE
CROSS SLOPE CORRECTION

OVERBUILD
AND RESURFACING DETAIL
NTS

STA. 145+00.00 TO STA. 166+00.00

SR 22 SOUTHBOUND LANES

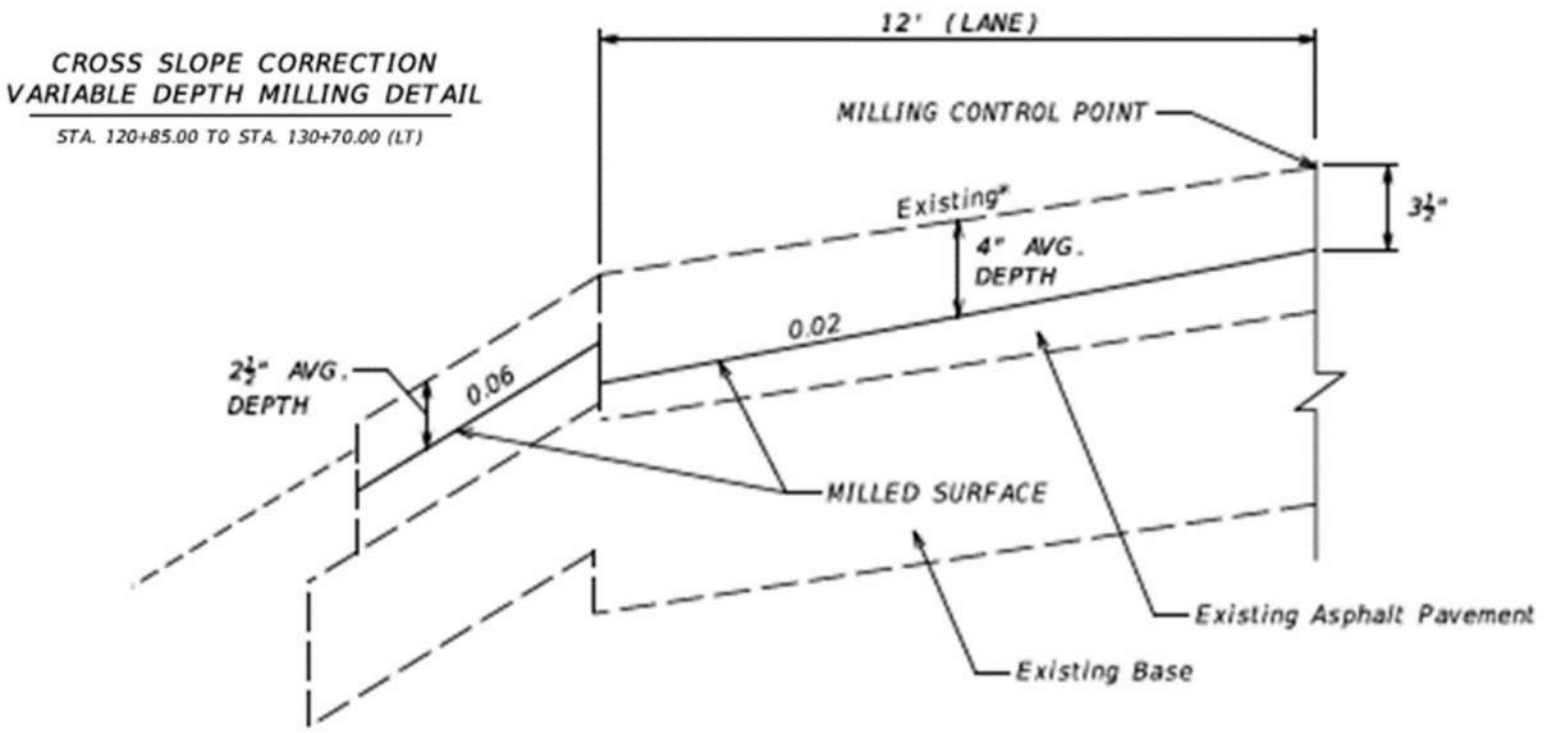
Cross Slopes – Design Requirements

- **Methods of Cross Slope Correction – Correction by Overbuild**
  - Table requirements

OVERBUILD DETAILS						
LOCATION		EXIST. SLOPE (%)	PROPOSED SLOPE (%)	MAX. DEPTH OF OVERBUILD (IN.)	WIDTH OF OVERBUILD (FT.)	AREA OF OVERBUILD (SQ. FT.)
STATION	LANE					
145+00.00	SOUTHBOUND - INSIDE	(+) 1.6	EXIST.	0.0	12.0	0.0
146+00.00	SOUTHBOUND - INSIDE	(+) 1.0	(-) 2.0	5.1	12.0	2.8
147+00.00	SOUTHBOUND - INSIDE	(+) 1.6	(-) 2.0	5.8	12.0	3.1
148+00.00	SOUTHBOUND - INSIDE	(+) 0.9	(-) 2.0	4.7	12.0	2.5
149+00.00	SOUTHBOUND - INSIDE	(+) 0.4	(-) 2.0	3.9	12.0	2.2
150+00.00	SOUTHBOUND - INSIDE	(+) 0.9	(-) 2.0	4.5	12.0	2.5
151+00.00	SOUTHBOUND - INSIDE	(+) 0.4	(-) 2.0	3.5	12.0	1.9
152+00.00	SOUTHBOUND - INSIDE	(+) 0.3	(-) 2.0	3.8	12.0	2.1
153+00.00	SOUTHBOUND - INSIDE	(+) 0.0	(-) 2.0	3.4	12.0	1.9
154+00.00	SOUTHBOUND - INSIDE	(+) 0.6	(-) 2.0	4.2	12.0	2.3
155+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.2	12.0	2.8
156+00.00	SOUTHBOUND - INSIDE	(+) 1.4	(-) 2.0	5.6	12.0	3.0
157+00.00	SOUTHBOUND - INSIDE	(+) 0.8	(-) 2.0	4.7	12.0	2.9
158+00.00	SOUTHBOUND - INSIDE	(+) 1.1	(-) 2.0	5.6	12.0	3.0
159+00.00	SOUTHBOUND - INSIDE	(+) 1.0	(-) 2.0	4.9	12.0	2.6
160+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.4	12.0	2.9
161+00.00	SOUTHBOUND - INSIDE	(+) 2.2	(-) 2.0	7.5	12.0	4.1
162+00.00	SOUTHBOUND - INSIDE	(+) 2.2	(-) 2.0	7.1	12.0	3.8
163+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.4	12.0	2.9
164+00.00	SOUTHBOUND - INSIDE	(+) 0.8	(-) 2.0	4.7	12.0	2.5
165+00.00	SOUTHBOUND - INSIDE	(+) 0.6	(-) 2.0	4.6	12.0	2.4
166+00.00	SOUTHBOUND - INSIDE	(+) 1.5	EXIST.	0.0	12.0	0.0

Cross Slopes – Design Requirements

- **Methods of Cross Slope Correction – Correction by Variable Milling**
  - Milling depth varies
  - Asphalt placed in consistent lifts
  - Shoulder “cutting”



Cross Slopes – Design Requirements

- **Methods of Cross Slope Correction – Correction by Variable Milling**
  - Table requirements
  - Quantities – for this example, PI 327-70-7 Milling Existing Asphalt Pavement, SY (4”)

SUMMARY OF CROSS SLOPES

LOCATION		EXIST. SLOPE (%)	PROPOSED SLOPE (%)	MAX. DEPTH OF OVERBUILD (IN.)	WIDTH OF OVERBUILD (FT.)	AREA OF OVERBUILD (SQ. FT.)
STATION	LANE					
145+00.00	SOUTHBOUND - INSIDE	(+) 1.6	EXIST.	0.0	12.0	0.0
146+00.00	SOUTHBOUND - INSIDE	(+) 1.0	(-) 2.0	5.1	12.0	3.8
147+00.00	SOUTHBOUND - INSIDE	(+) 1.6	(-) 2.0	5.8	12.0	3.1
148+00.00	SOUTHBOUND - INSIDE	(+) 0.9	(-) 2.0	4.7	12.0	2.5
149+00.00	SOUTHBOUND - INSIDE	(+) 0.4	(-) 2.0	3.9	12.0	2.2
150+00.00	SOUTHBOUND - INSIDE	(+) 0.9	(-) 2.0	4.5	12.0	2.5
151+00.00	SOUTHBOUND - INSIDE	(+) 0.4	(-) 2.0	3.5	12.0	1.9
152+00.00	SOUTHBOUND - INSIDE	(+) 0.3	(-) 2.0	3.8	12.0	2.1
153+00.00	SOUTHBOUND - INSIDE	(+) 0.0	(-) 2.0	3.4	12.0	1.9
154+00.00	SOUTHBOUND - INSIDE	(+) 0.6	(-) 2.0	4.2	12.0	2.3
155+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.2	12.0	2.8
156+00.00	SOUTHBOUND - INSIDE	(+) 1.4	(-) 2.0	5.6	12.0	3.0
157+00.00	SOUTHBOUND - INSIDE	(+) 0.8	(-) 2.0	4.7	12.0	2.9
158+00.00	SOUTHBOUND - INSIDE	(+) 1.1	(-) 2.0	5.6	12.0	3.0
159+00.00	SOUTHBOUND - INSIDE	(+) 1.0	(-) 2.0	4.9	12.0	2.6
160+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.4	12.0	2.9
161+00.00	SOUTHBOUND - INSIDE	(+) 2.2	(-) 2.0	7.5	12.0	4.1
162+00.00	SOUTHBOUND - INSIDE	(+) 2.2	(-) 2.0	7.1	12.0	3.8
163+00.00	SOUTHBOUND - INSIDE	(+) 1.2	(-) 2.0	5.4	12.0	2.9
164+00.00	SOUTHBOUND - INSIDE	(+) 0.8	(-) 2.0	4.7	12.0	2.5
165+00.00	SOUTHBOUND - INSIDE	(+) 0.6	(-) 2.0	4.6	12.0	2.4
166+00.00	SOUTHBOUND - INSIDE	(+) 1.5	EXIST.	0.0	12.0	0.0

Cross Slopes – Design Requirements

- **RRR Criteria for Superelevation**
  - Max Rate for high-speed roadways is 10%
  - Max Rate for low-speed roadways is 5%
  - **If any crashes within the last 5 years are attributable to superelevation, correct the superelevation rates to new construction values provided in Tables 210.9.1 & 210.9.2**

Topic #625-000-002
FDOT Design Manual
January 1, 2022

Table 210.9.1 Superelevation Rates for e_{max} = 0.10

Superelevation Rates (e_{max} =0.10) Tabulated Values										
Degree of Curve (D)	Radius R (ft.)	Design Speed (mph) 30	35	40	45	50	55	60	65	70
0° 15'	22,918	NC	NC	NC	NC	NC	NC	NC	NC	NC
0° 30'	11,459	NC	NC	NC	NC	NC	NC	RC	RC	RC
0° 45'	7,639	NC	NC	NC	NC	RC	RC	0.023	0.025	0.028
1° 00'	5,730	NC	NC	NC	RC	0.021	0.025	0.030	0.033	0.037
1° 15'	4,584	NC	NC	RC	0.022	0.026	0.031	0.036	0.041	0.046
1° 30'	3,820 *R_{NC}	NC	RC	0.021	0.026	0.031	0.037	0.043	0.048	0.054
2° 00'	2,865 *R_{RC}	RC	0.022	0.028	0.034	0.040	0.048	0.055	0.062	0.070
2° 30'	2,292	0.021	0.028	0.034	0.041	0.049	0.058	0.067	0.075	0.085
3° 00'	1,910	0.025	0.032	0.040	0.049	0.057	0.067	0.077	0.087	0.096
3° 30'	1,637	0.029	0.037	0.046	0.055	0.065	0.075	0.086	0.095	0.100
4° 00'	1,432	0.033	0.042	0.051	0.061	0.072	0.083	0.093	0.099	D_{max} = 3° 30'
5° 00'	1,146	0.040	0.050	0.061	0.072	0.083	0.094	0.098	D_{max} = 4° 15'	
6° 00'	955	0.046	0.058	0.070	0.082	0.092	0.099	D_{max} = 5° 15'		
7° 00'	819	0.053	0.065	0.078	0.089	0.098	D_{max} = 6° 30'			
8° 00'	716	0.058	0.071	0.084	0.095	0.100				
9° 00'	637	0.063	0.077	0.089	0.098	D_{max} = 8° 15'				
10° 00'	573	0.068	0.082	0.094	0.100					
11° 00'	521	0.072	0.086	0.097	D_{max} = 10° 15'					
12° 00'	477	0.076	0.090	0.099						
13° 00'	441	0.080	0.093	0.100						
14° 00'	409	0.083	0.096	D_{max} = 13° 15'						
15° 00'	382	0.086	0.098							
16° 00'	358	0.089	0.099							
18° 00'	318	0.093	D_{max} = 17° 45'							
20° 00'	286	0.097								
22° 00'	260	0.099								
24° 00'	239	0.100								
		D_{max} = 24° 45'								

Notes:
NC = Normal Crown (-0.02)
RC = Reverse Crown (+0.02)
R_{NC} = Minimum Radius for NC
R_{RC} = Minimum Radius for RC
(1) Rates for intermediate D's and R's are to be interpolated.
(2) Degree of Curvature (D) on high speed curbed roadways must not exceed: 2° 30' for 50 mph and 2° 00' for 55 mph.
(3) Degree of Curvature (D) on interstate must not exceed 3° 00' for 70 mph.

* NC/RC (▪ ▪) and RC/e (—) Break Points (Radius in feet)

Break Points	Design Speed (mph) 30	35	40	45	50	55	60	65	70
R_{NC}	3349	4384	5560	6878	8337	9949	11709	13164	14714
R_{RC}	2471	3238	4110	5087	6171	7372	8686	9783	10955

210 – Arterials and Collectors

Topic #625-000-002
FDOT Design Manual
January 1, 2022

Table 210.9.2 Superelevation Rates for e_{max} = 0.05

Superelevation Rates (e_{max} =0.05) Tabulated Values					
Degree of Curve (D)	Radius (R) (feet)	Design Speed (mph) 25-30	35	40	45
2° 00'	2,865	NC	NC	NC	NC
2° 15'	2,546				
2° 45'	2,083				NC
3° 00'	1,910				RC
3° 45'	1,528			NC	
4° 00'	1,432			RC	
4° 45'	1,206				
5° 00'	1,146		NC		
5° 15'	1,091		RC		
5° 30'	1,042				
5° 45'	996				
6° 00'	955				RC
6° 15'	917				0.022
6° 30'	881				0.024
6° 45'	849				0.027
7° 00'	819	NC			0.030
7° 15'	790	RC			0.033
7° 30'	764				0.037
7° 45'	739				0.041
8° 00'	716			RC	0.045
8° 15'	694			0.022	0.050
8° 30'	674			0.025	D_{max} = 8° 15'
8° 45'	655			0.027	
9° 00'	637			0.030	
9° 30'	603			0.034	
10° 00'	573			0.040	
10° 30'	546		RC	0.047	
11° 00'	521		0.023	D_{max} = 10° 45'	
11° 30'	498		0.026		
12° 00'	477		0.030		
13° 00'	441		0.036		
14° 00'	409	RC	0.045		
15° 00'	382	0.023	D_{max} = 14° 15'		
16° 00'	358	0.027			
17° 00'	337	0.032			
18° 00'	318	0.038			
19° 00'	302	0.043			
20° 00'	286	0.050			
		D_{max} = 20° 00'			

Notes:
(1) NC = Normal Crown (-0.02), RC = Reverse Crown (+0.02)
(2) Rates for intermediate D's and R's are to be interpolated.
(3) Design speeds of 25 mph are to be designed as 30 mph.

210 – Arterials and Collectors

Cross Slopes – Design Requirements

- **RRR Criteria for Superelevation**
  - Low Speed Curves
    - Within 0.5% (+/-) of Table 210.9.2 values

Table 210.9.2 Superelevation Rates for e_{max} = 0.05

Superelevation Rates (e_{max} =0.05) Tabulated Values					
Degree of Curve (*D*)	Radius (R) (feet)	Design Speed (mph)			
		25-30	35	40	45
2° 00'	2,865	NC	NC	NC	NC
2° 15'	2,546				
2° 45'	2,083				NC
3° 00'	1,910				RC
3° 45'	1,528			NC	
4° 00'	1,432			RC	
4° 45'	1,206				
5° 00'	1,146		NC		
5° 15'	1,091		RC		
5° 30'	1,042				
5° 45'	996				
6° 00'	955				RC
6° 15'	917				0.022
6° 30'	881				0.024
6° 45'	849				0.027
7° 00'	819	NC			0.030
7° 15'	790	RC			0.033
7° 30'	764				0.037
7° 45'	739				0.041
8° 00'	716			RC	0.045
8° 15'	694			0.022	0.050
8° 30'	674			0.025	D_{max} = 8° 15'
8° 45'	655			0.027	
9° 00'	637			0.030	
9° 30'	603			0.034	
10° 00'	573			0.040	
10° 30'	546		RC	0.047	
11° 00'	521		0.023	D_{max} = 10° 45'	
11° 30'	498		0.026		
12° 00'	477		0.030		
13° 00'	441		0.036		
14° 00'	409	RC	0.045		
15° 00'	382	0.023	D_{max} = 14° 15'		
16° 00'	358	0.027			
17° 00'	337	0.032			
18° 00'	318	0.038			
19° 00'	302	0.043			
20° 00'	286	0.050			
		D_{max} = 20° 00'			

Notes:
(1) NC = Normal Crown (-0.02), RC = Reverse Crown (+0.02)
(2) Rates for intermediate D's and R's are to be interpolated.
(3) Design speeds of 25 mph are to be designed as 30 mph.

Cross Slopes – Design Requirements

- **RRR Criteria for Superelevation**
  - High Speed Curves and all Ramps
    - AASHTO Green Book emax 6% and 12% tables

Topic #625-000-002
FDOT Design Manual
January 1, 2022

Table 210.9.1 Superelevation Rates for e_{max} = 0.10

Superelevation Rates (e_{max} =0.10) Tabulated Values										
Degree of Curve (D)	Radius R (ft.)	Design Speed (mph)								
		30	35	40	45	50	55	60	65	70
0° 15'	22,918	NC	NC	NC	NC	NC	NC	NC	NC	NC
0° 30'	11,459	NC	NC	NC	NC	NC	NC	RC	RC	RC
0° 45'	7,639	NC	NC	NC	NC	RC	RC	0.023	0.025	0.028
1° 00'	5,730	NC	NC	NC	RC	0.021	0.025	0.030	0.033	0.037
1° 15'	4,584	NC	NC	RC	0.022	0.026	0.031	0.036	0.041	0.046
1° 30'	3,820 *R_{NC}	NC	RC	0.021	0.026	0.031	0.037	0.043	0.048	0.054
2° 00'	2,865 *R_{RC}	RC	0.022	0.028	0.034	0.040	0.048	0.055	0.062	0.070
2° 30'	2,292	0.021	0.028	0.034	0.041	0.049	0.058	0.067	0.075	0.085
3° 00'	1,910	0.025	0.032	0.040	0.049	0.057	0.067	0.077	0.087	0.096
3° 30'	1,637	0.029	0.037	0.046	0.055	0.065	0.075	0.086	0.095	0.100
4° 00'	1,432	0.033	0.042	0.051	0.061	0.072	0.083	0.093	0.099	D_{max} = 3° 30'
5° 00'	1,146	0.040	0.050	0.061	0.072	0.083	0.094	0.098	D_{max} = 4° 15'	
6° 00'	955	0.046	0.058	0.070	0.082	0.092	0.099	D_{max} = 5° 15'		
7° 00'	819	0.053	0.065	0.078	0.089	0.098	D_{max} = 6° 30'			
8° 00'	716	0.058	0.071	0.084	0.095	0.100				
9° 00'	637	0.063	0.077	0.089	0.098	D_{max} = 8° 15'				
10° 00'	573	0.068	0.082	0.094	0.100					
11° 00'	521	0.072	0.086	0.097	D_{max} = 10° 15'					
12° 00'	477	0.076	0.090	0.099						
13° 00'	441	0.080	0.093	0.100						
14° 00'	409	0.083	0.096	D_{max} = 13° 15'						
15° 00'	382	0.086	0.098							
16° 00'	358	0.089	0.099							
18° 00'	318	0.093	D_{max} = 17° 45'							
20° 00'	286	0.097								
22° 00'	260	0.099								
24° 00'	239	0.100								
		D_{max} = 24° 45'								

Notes:
NC = Normal Crown (-0.02)
RC = Reverse Crown (+0.02)
R_{NC} = Minimum Radius for NC
R_{RC} = Minimum Radius for RC
(1) Rates for intermediate D's and R's are to be interpolated.
(2) Degree of Curvature (D) on high speed curbed roadways must not exceed: 2° 30' for 50 mph and 2° 00' for 55 mph.
(3) Degree of Curvature (D) on interstate must not exceed 3° 00' for 70 mph.

* NC/RC (- - -) and RC/e (—) Break Points (Radius in feet)									
Break Points	Design Speed (mph)								
	30	35	40	45	50	55	60	65	70
R_{NC}	3349	4384	5560	6878	8337	9949	11709	13164	14714
R_{RC}	2471	3238	4110	5087	6171	7372	8686	9783	10955

210 – Arterials and Collectors

Cross Slopes – Design Requirements

- **RRR Criteria for Superelevation**
  - Superelevation Correction
    - Detail transition from normal cross slope to superelevation
    - Summary table of estimated quantities for milling, overbuild and structural course
    - Cross sections depicting superelevation correction:
      - At the PC and PT of the curve
      - Fifty feet before and after the PC and PT
      - At 300 ft. intervals within the curve

Cross Slopes – Design Requirements

- **RRR Criteria for Superelevation**
  - Superelevation Transitions
    - Slope Rates determined by ratios shown below
    - Standard is 80% of transition on the tangent and 20% on the curve
      - Can be adjusted to 50% of the transition on the curve

Table 210.9.3 Superelevation Transition Slope Rates

# Lanes One Direction	Superelevation Transition Slope Rates						
	e_{max} = 0.10				e_{max} = 0.05		
	Design Speed (mph)				Design Speed (mph)		
	25-40	45-50	55-60	65-70	25-35	40	45
1-Lane & 2-Lane	1:175	1:200	1:225	1:250	1:100	1:125	1:150
3-Lane	—	1:160	1:180	1:200			
4-Lane or more	—	1:150	1:170	1:190			

Notes:

e_{max} = 0.10:

(1) The length of superelevation transition is to be determined by the relative slope rate between the travel way edge of pavement and the profile grade, except that the minimum length of transition is 100 feet.

(2) For additional information on transitions, see the ***Standard Plans*, Index 000-510.**

e_{max} = 0.05:

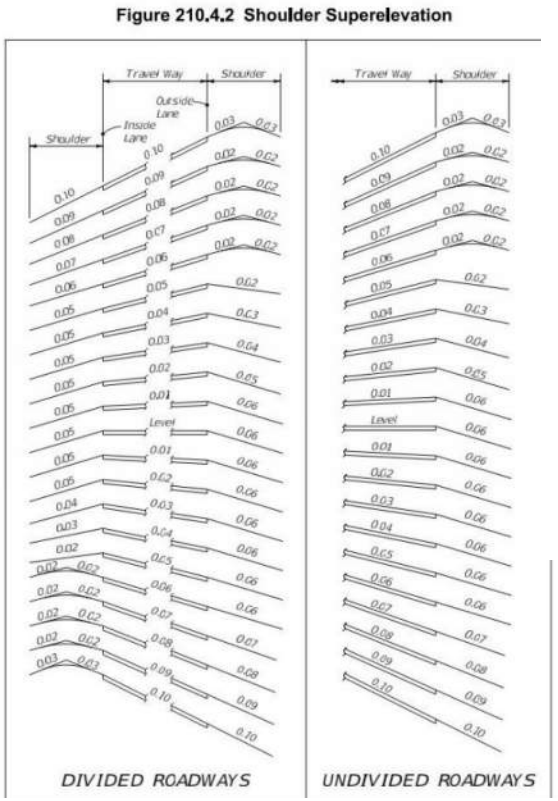
(1) The length of superelevation transition is to be determined by the relative slope rate between the travel way edge of pavement and the profile grade, except that the minimum length of transition is 50 feet for design speeds 25-35 mph and 75 feet for design speeds 40-45 mph.

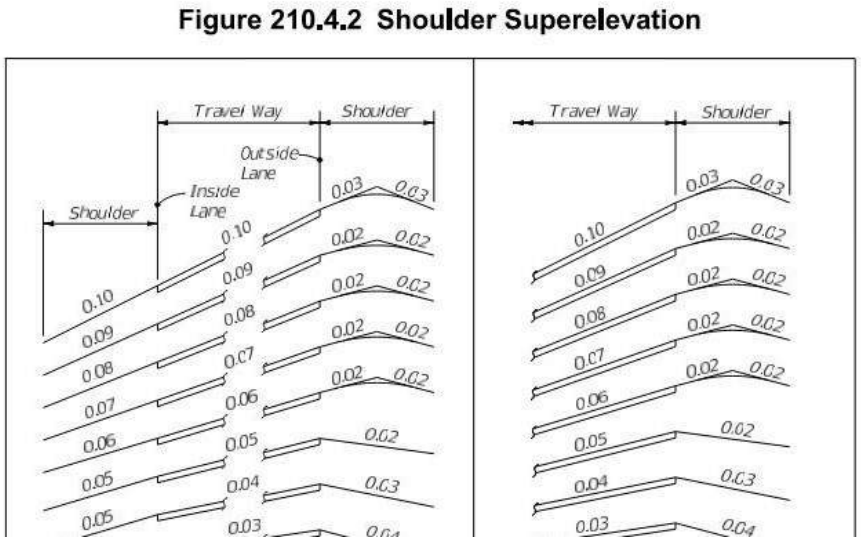
(2) A slope rate of 1:125 may be used for 45 mph under restricted conditions.

(3) For additional information on transitions, see the ***Standard Plans*, Index 000-511.**

Cross Slopes – Design Requirements

- **RRR Criteria for Superelevation**
  - Other Important Considerations
    - Minimum length of full superelevation within curves:
      - 100 feet for design speed <=45 mph
      - 200 feet for design speed >=50 mph
    - Shoulder superelevation requirements





Cross Slopes – Helpful Recommendations

- **Analyze Crash Data**
  - Make determination if correction is required or if Design Exception or Variation is appropriate
  - Include a cost analysis
- **Length of correction should be coordinated with FDOT Construction to check constructability issues**
- **Be cognizant of pavement structural number for variable milling approach**
- **Check existing features adjacent to the cross slope correction**

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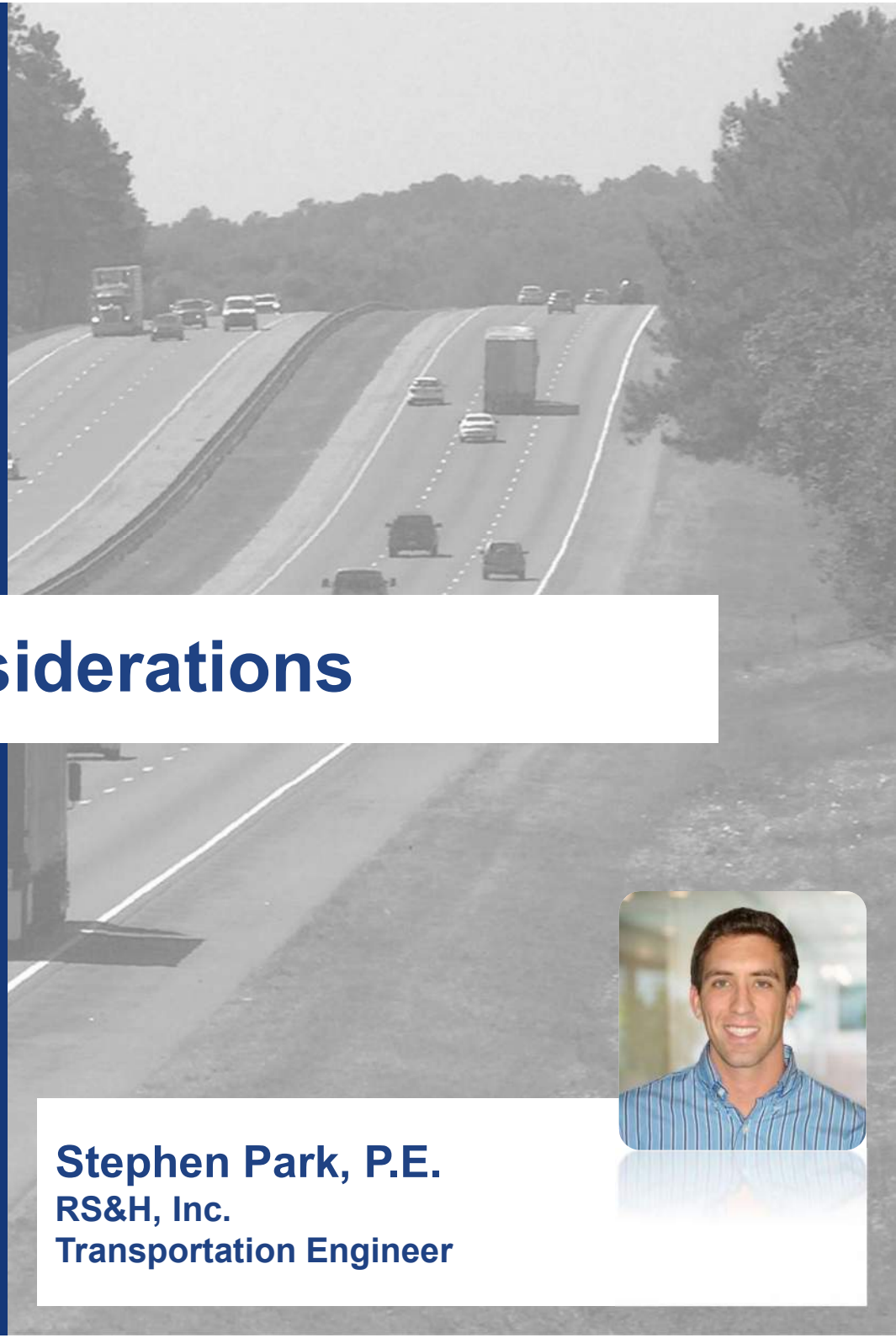


ADA Considerations

Stephen Park, P.E.
RS&H, Inc.
Transportation Engineer

ADA Considerations

- **References**
  - FDOT Design Manual
  - FDOT Standard Plans
  - Florida Greenbook
  - Department of Justice ADA Standards (2010)
  - Department of Transportation ADA Standards for Transportation Facilities (2006)
  - Public Rights of Way Accessibility Guidelines (PROWAG) 2005
  - Florida Building Code - Accessibility (Florida Administrative Code, 6th edition)
  - MUTCD
  - ADA Design Expo Presentation on 7/8/21 by Brad Bradley (SWS - ADA | GoToStage.com)
  - ADA Accessible Design Lite https://www.fdot.gov/roadway/ADA/ADATraining.shtm

ADA Considerations

- **ADA FDOT Standard Plan**

102-660	Sidewalk Closure
522-001	Concrete Sidewalk
522-002	Detectable Warnings and Sidewalk Curb Ramps
665-001	Pedestrian Detector Assembly Installation Details
700-102	Special Sign Details
711-001	Pavement Markings

- **ADA FDOT FDM**
  - 214 – Driveways
  - 222 – Pedestrian Facilities
  - 224 – Shared Use Path
  - 225 – Public Transit Facilities

- **Florida Greenbook (218)**
  - Chapter 8 – Pedestrian Facilities
  - Chapter 13 – Transit

ADA Considerations

- **Negotiations Fee estimate – Roadway Analysis**

4.15	Design Report	LS	See Basis for Staff Hour Range

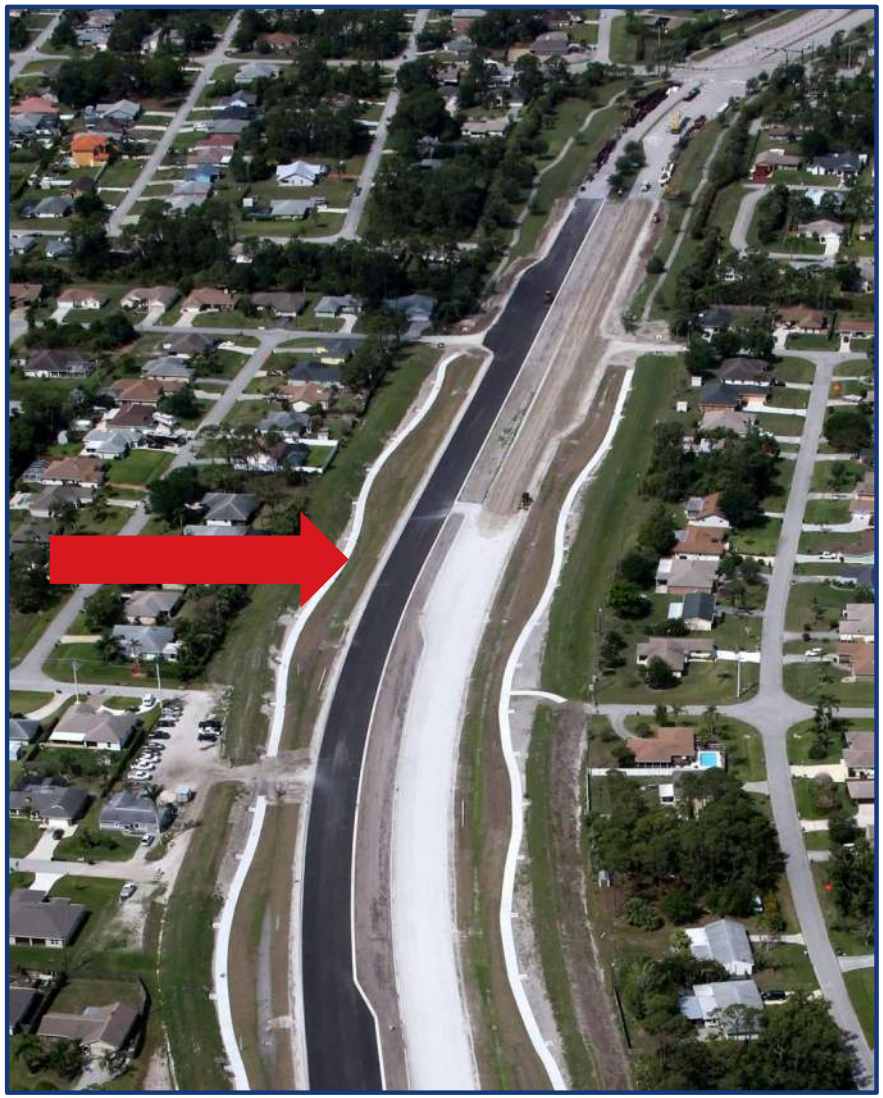
Includes required design reports, e.g., 3R, Safety Report, ADA Assessment Report. (LS - based on 24-80 per report.) Use additional 4 to 16 hours for Highway Safety Manual analysis as needed.

4.5	Horizontal /Vertical Master Design Files	LS	See Basis for Staff Hour Range

All efforts required for establishing the master design files for the horizontal and vertical geometry, drainage structure features, utilities (including conflict location identification and adjustments), etc. This includes all work to create elements showing the alignment for both horizontal and vertical geometries in plan and profile portion of plan sheets. Includes efforts required to place labels and required information in accordance with the FDOT CADD Manual and FDM in master design file. Also includes all engineering work for designing and analyzing elements required for the plan/profile geometries including horizontal/vertical alignments, back of sidewalk profiles, intersection layouts, curb return profiles, ramp profiles, utilities, etc. Includes time for EOR to develop utility conflict information (if not included in tab 7).
(LS - Based on centerline miles unless otherwise specified)

ADA Considerations

- **Pedestrian Facilities Requiring ADA**
  - Sidewalks and Shared Use Paths
  - Curb ramps
  - Crosswalks
  - Street and At-grade railroad crossings
  - Refuge islands
  - Pedestrian bridges
- **Accessible Route Requirements**
  - Clear Widths
  - Running or Longitudinal Slopes
  - Cross Slopes
  - Surfaces
    - Changes in level Gaps, and Grates
  - Protruding Objects



Pedestrian Facilities Requiring ADA

- **Clear Widths**
  - 5 feet unobstructed width required for all Context Classifications
  - 48” minimum for signal, light, sign poles
  - 36” minimum unobstructed sidewalk width for utilities or 32” not exceeding 24” in length

Pedestrian Facilities Requiring ADA

Table 222.2.1 Standard Sidewalk Widths

Context Classification		Sidewalk Width (feet)
C1	Natural	5
C2	Rural	5
C2T	Rural Town	6
C3	Suburban	6
C4	Urban General	6
C5	Urban Center	10
C6	Urban Core	12

Notes:

(1) For C2T, C3 and C4, sidewalk width may be increased up to 8 feet when the demand is demonstrated.

(2) For C5 and C6, when standard sidewalk width cannot be attained, provide the greatest attainable width possible, but not less than 6 feet.

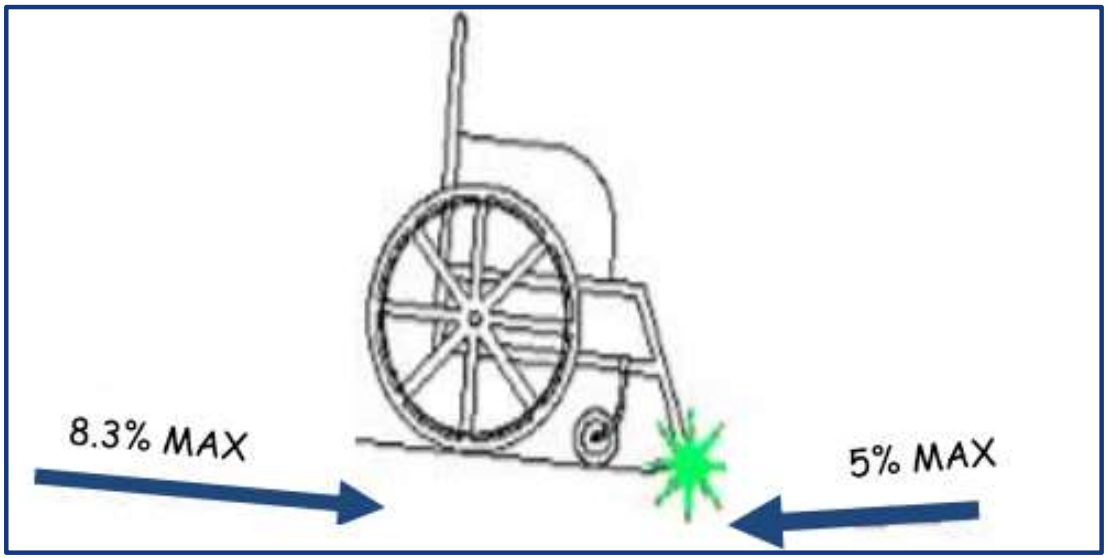
(3) For RRR projects, unaltered sidewalk with width 4 feet or greater may be retained within any context classification.

(4) See ***FDM 260.2.2*** for sidewalk width requirements on bridges.

FDM Table 222.2.1

Pedestrian Facilities Requiring ADA

- **Longitudinal (Running slope)**
  - Sidewalk Not Adjacent to travel way may not exceed 5% slope
  - Sidewalk to follow the existing grade of the roadway when consistent separation from curb
  - Max Algebraic Difference between grades is 13.3%



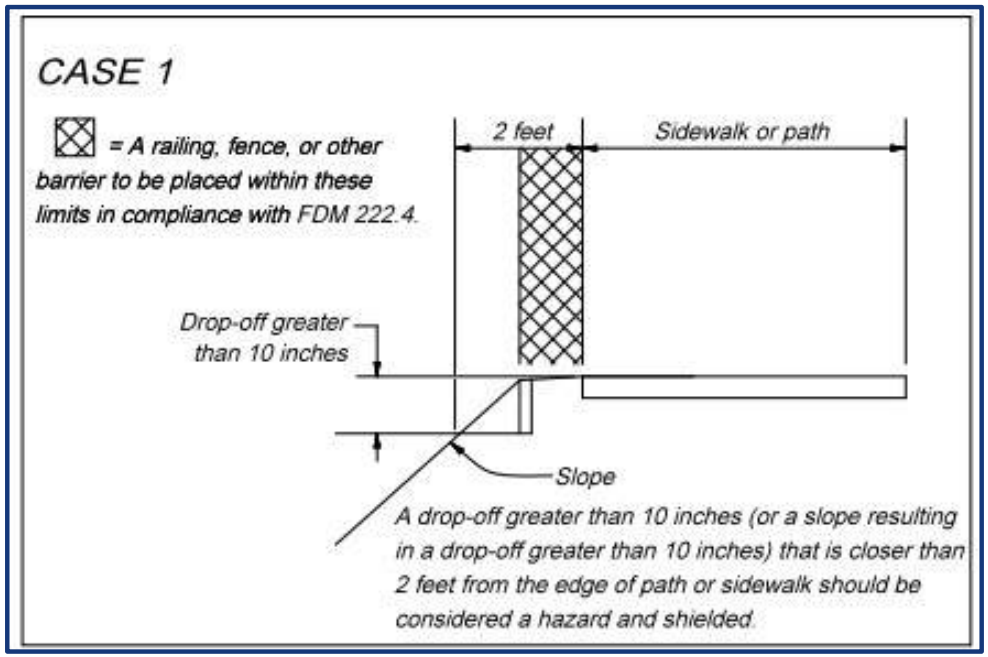
Pedestrian Facilities Requiring ADA

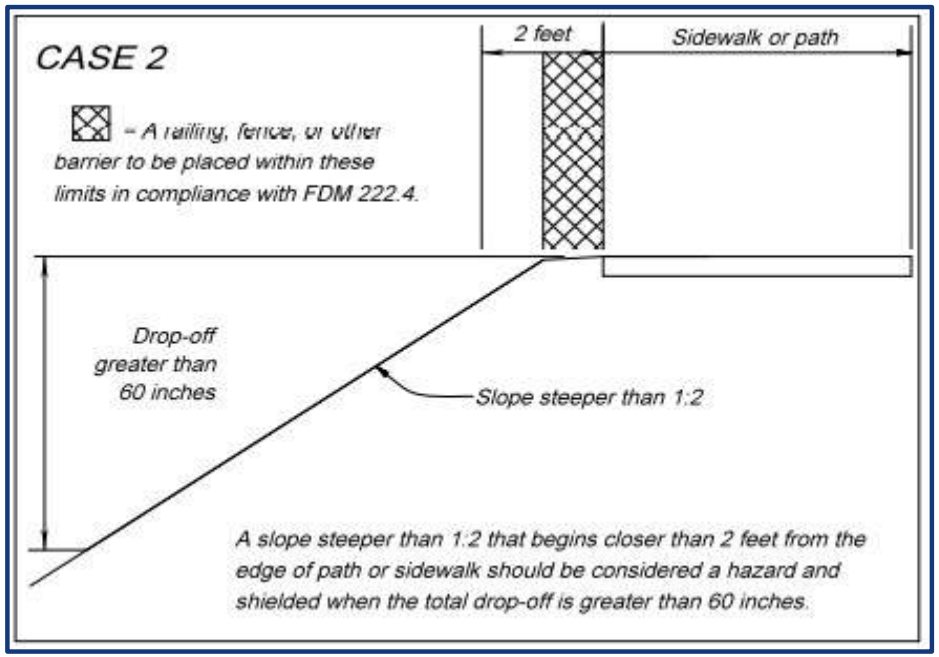
- **Cross slope**
  - Cross Slopes
  - Max cross slope 2%
    - 1.5% preferred
    - 5% cross slope is allowed for crosswalks at signalized intersections, midblock, or driveways

Pedestrian Facilities Requiring ADA

- **Drop Off Hazards for Pedestrians**

FDM Figure 222.4.1





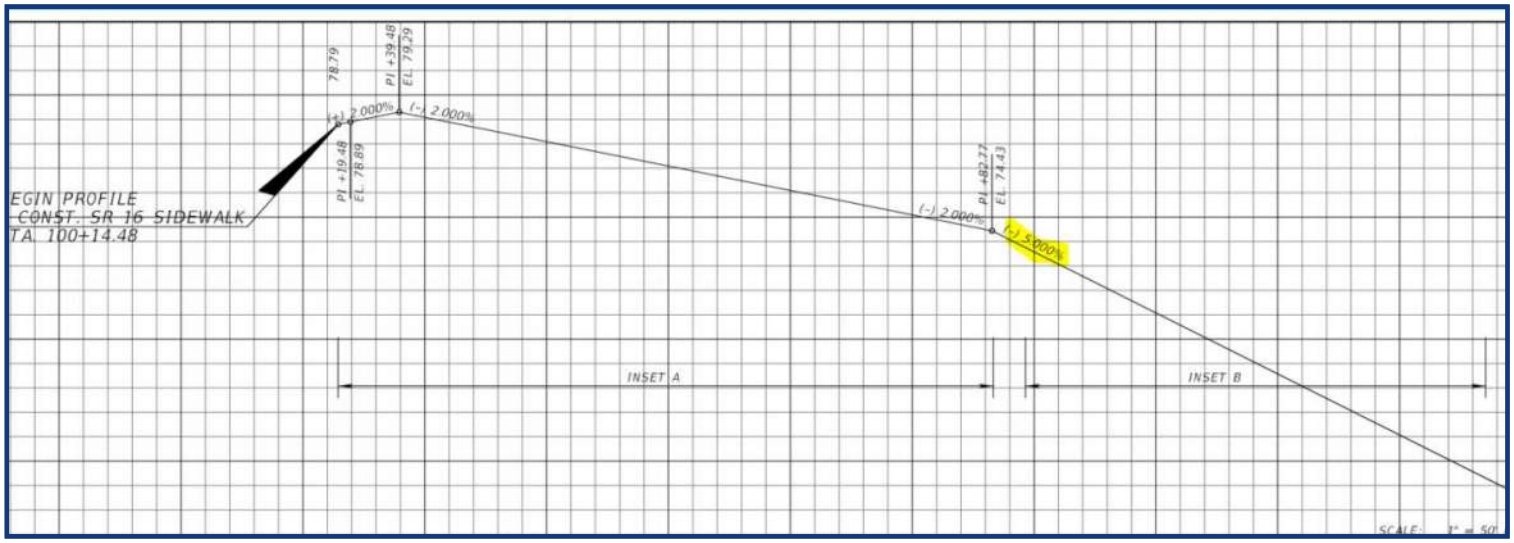
Pedestrian Facilities Requiring ADA

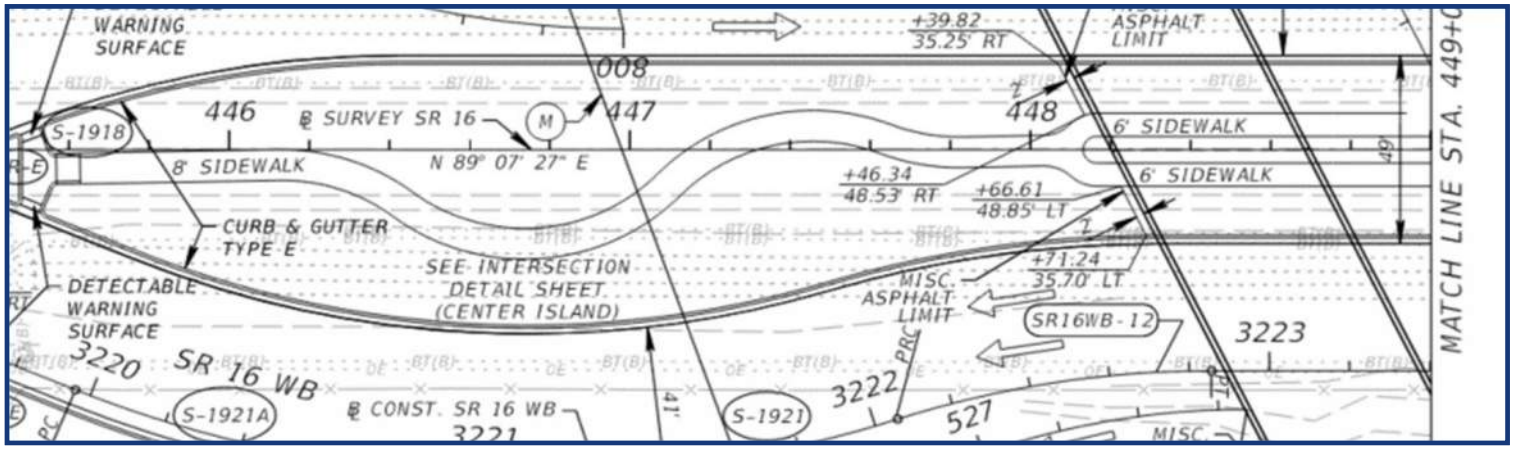
- **Sidewalk Design**
  - Sidewalk should be constructed on both sides of the roadway.
  - Provide sidewalk on all curbed roadways, except where prohibited by **Section 316.130 (18), Florida Statute (F.S)**.
  - Place sidewalk in following order of desirability:
    1. As near the R/W line as possible.
    2. Outside of the clear zone.
    3. Five feet beyond the limits of the full width shoulder.
    4. At the limits of the full width shoulder.
  - For RRR Projects, unaltered sidewalks or driveways are not required to be reconstructed.

- **Process a Design Variation when the design criteria for pedestrian facilities in FDM cannot be met.**

Pedestrian Facilities Requiring ADA

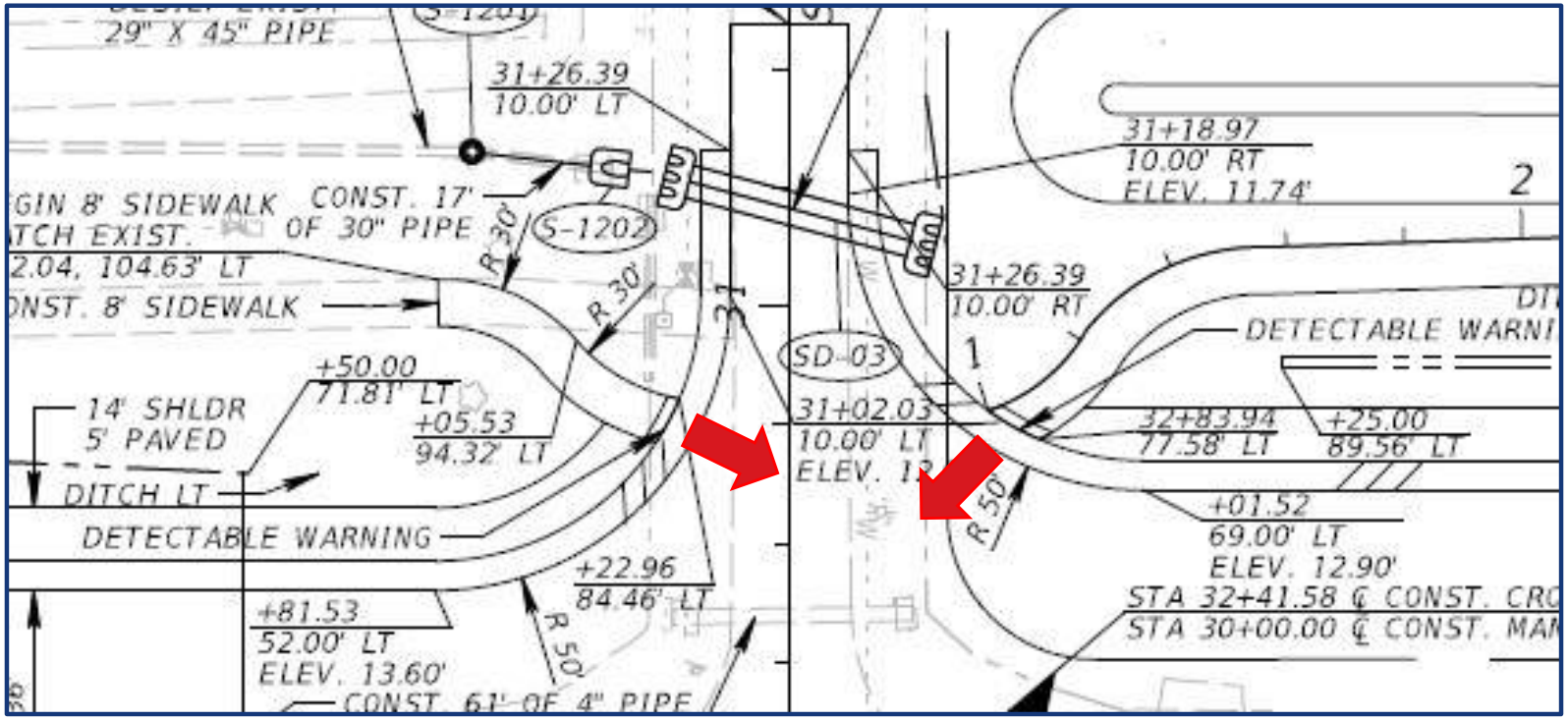
- Longitudinal Slope example





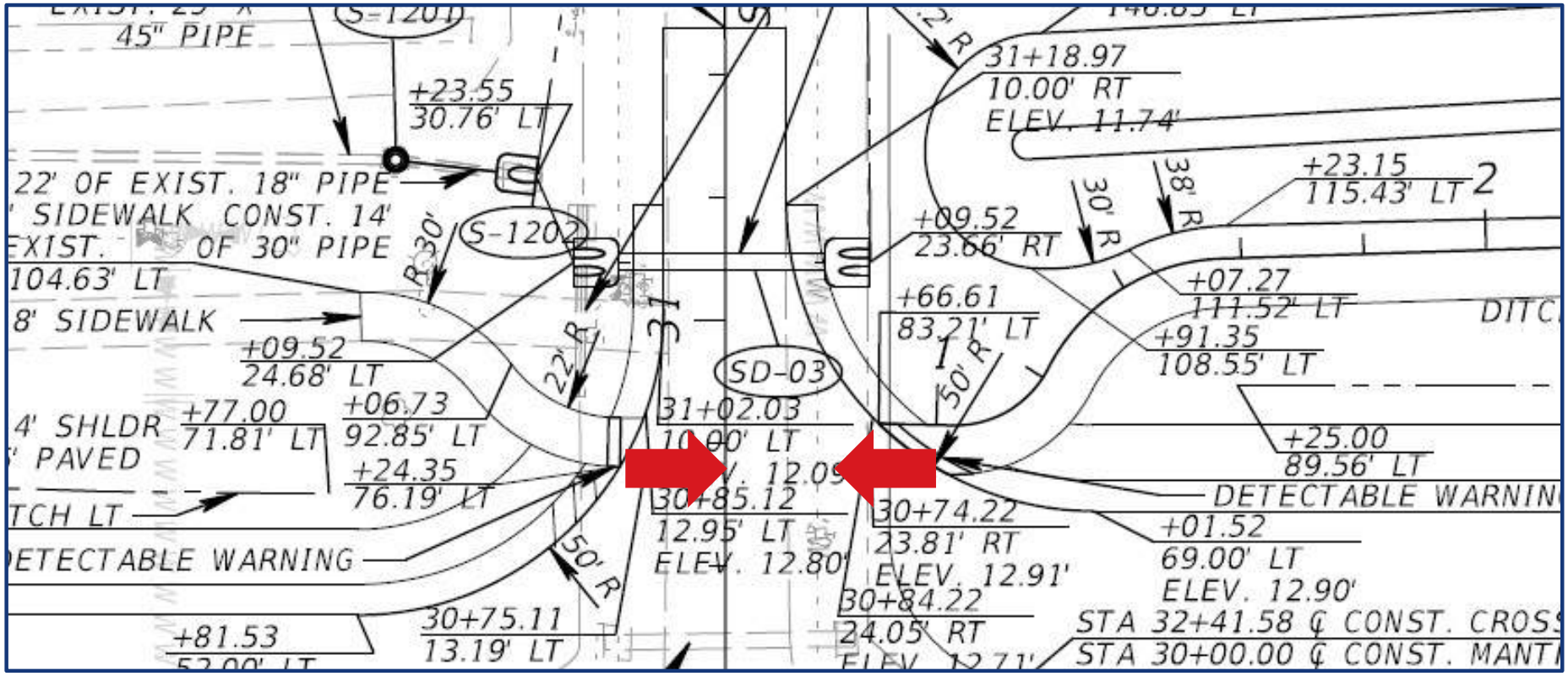
Pedestrian Facilities Requiring ADA

- **Helpful Recommendations**
  - Curb ramps should be in line with the crossing



Pedestrian Facilities Requiring ADA

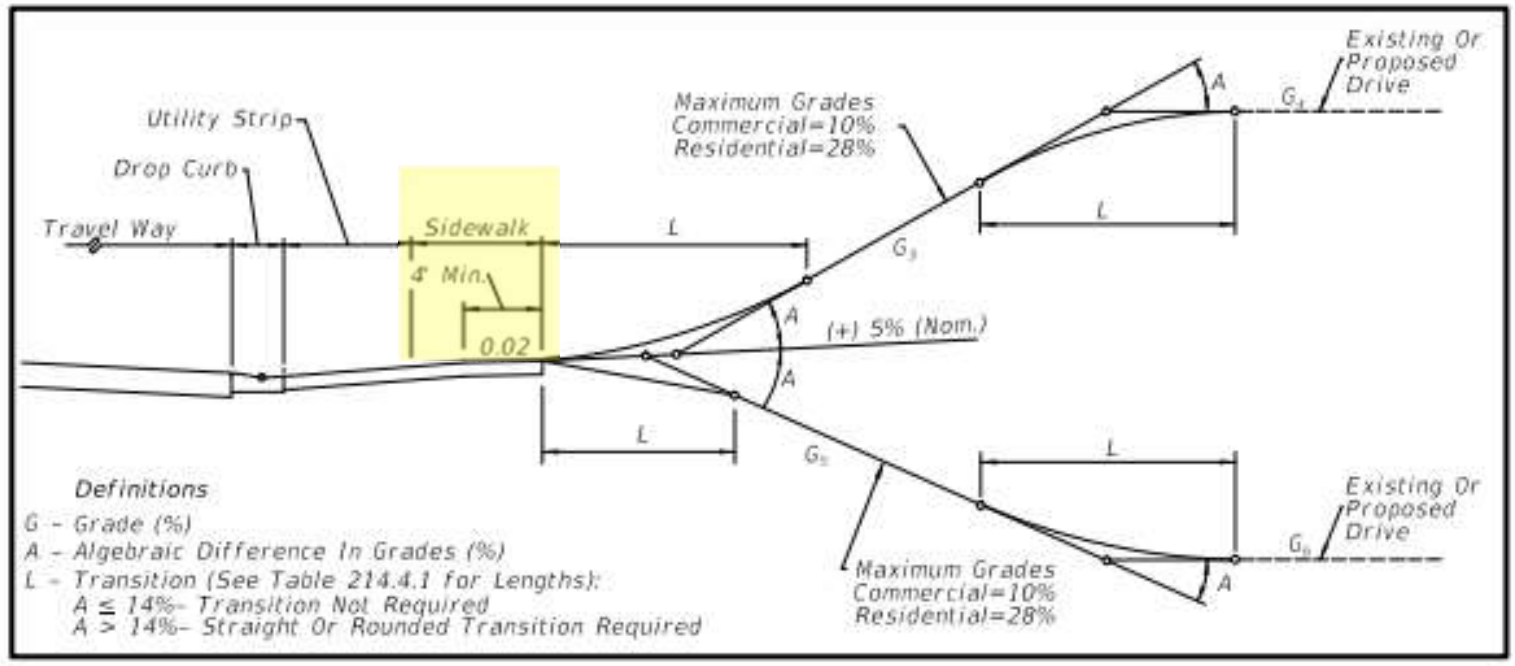
- **Helpful Recommendations**
  - Curb ramps should be in line with the crossing



Pedestrian Facilities Requiring ADA

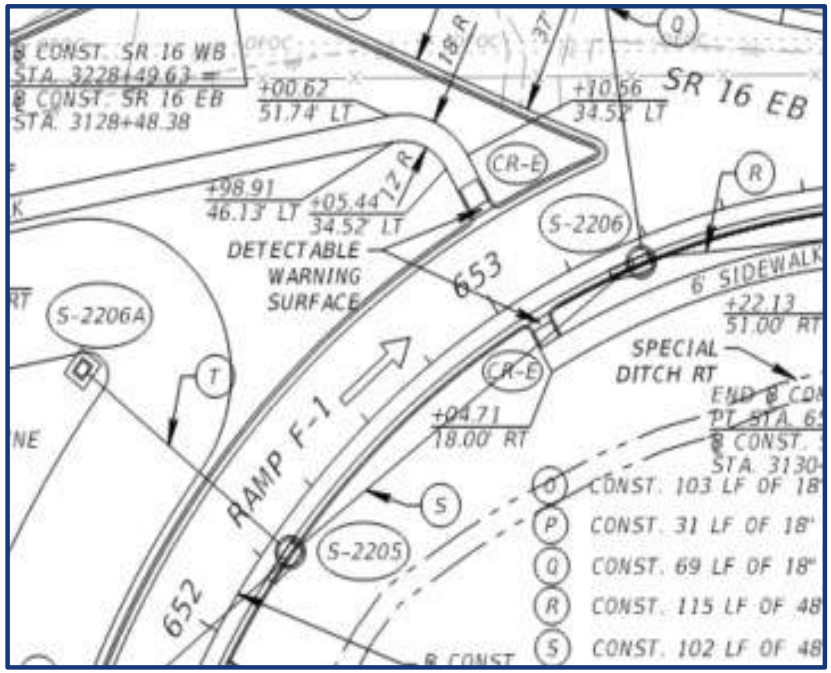
- **Helpful Recommendations**
  - Maintain 2% max cross slope through driveways w/ R/W constraints

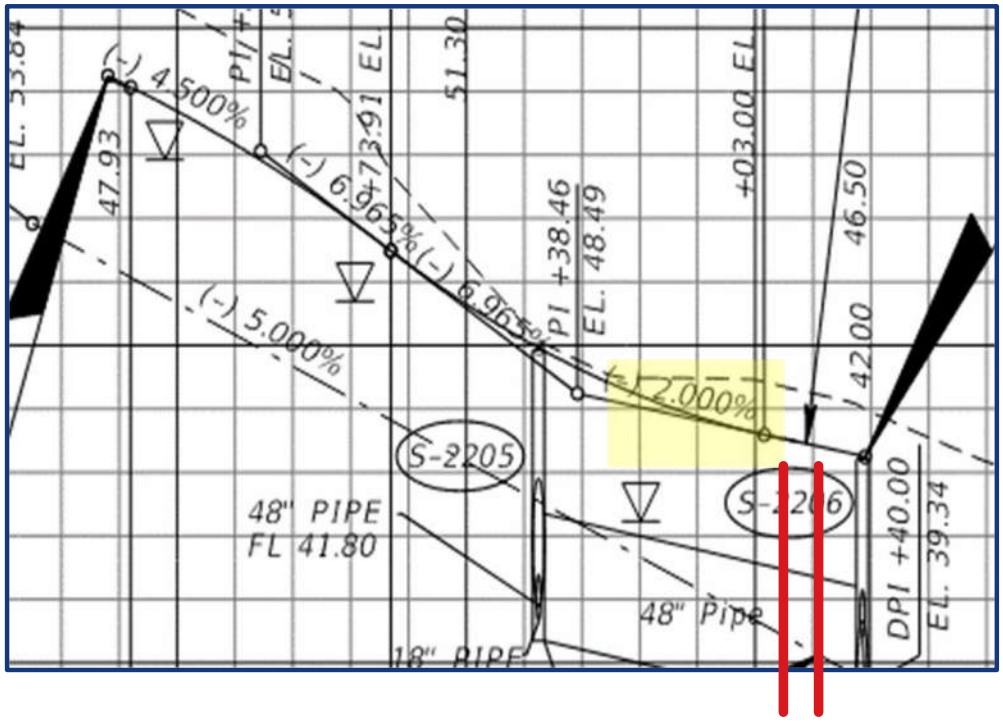
Figure 214.4.2 Curbed Roadway Driveway Profiles



Pedestrian Facilities Requiring ADA

- **Helpful Recommendations**
  - Maintain 2% max cross slope





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Level I Maintenance of Traffic

Mike Molkenbur, P.E.
Florida Department of Transportation
District 2 Consultant Project Manager

Level I Maintenance of Traffic – References

- FDM Chapter 240 – Transportation Management Plan
- FDM Chapter 241 – Lane Closure Analysis
- FDM Chapter 242 – Traffic Pacing Design
- FDM Chapter 243 – Portable Changeable Message Signs
- FDM Chapter 321 – Temporary Traffic Control Plan
- Standard Plans Index 102-100 through 102-120 (Barrier Walls)
- Standard Plans Index 102-600 through 102-680 (TTCP Setup)

Level I Maintenance of Traffic – Scope/Negotiations

- **Scope Section 2.1**
- **Negotiations**
  - Design Staff Hour Estimation Forms
    - Tabs 4 & 5 – Tasks 4.10, 4.11, 5.17, 5.18 & 5.19

Task No.	Task	Units	Staff Hour Range	Basis for Staff Hour Range
4.10	Temporary Traffic Control Plan (TTCP) Analysis	LS	See Basis for Staff Hour Range	Includes all work necessary to develop a TTCP concept, such as determining the usage of lane closures, traffic pacing, detours, diversions, lane shifts, temporary drainage, temporary signals, retaining walls, and pedestrian TTCP. See FDM for guidance and requirements. (Level I) Includes all analysis necessary to develop a TTCP concept, such as determining lane configurations, lane closure analysis, traffic pacing analysis, and creating a pedestrian TTCP concept.(LS) 16-80 hours. (Level II and Level III) Includes all analysis necessary to develop a TTCP concept, such as determining lane configurations, lane closure analysis, traffic pacing analysis, detour usage, diversions usage, lane shift usage, and creating a pedestrian TTCP concept. (LS) 40-160 hours. Add Ons: Temporary Signalization: Analysis for any temporary signalization. Structural analysis not included. This may include adjustment of signal heads on existing poles/span wire or new temporarily installed signals including development of any sheets or details when no other signalization work is included on the project. This effort shall be included in the signalization plans activity when there are other signalization efforts included on the project. (LS) 4-40 hours per location. Cross sections: Analysis and development of TTCP cross sections, including any temporary profiles, criteria development, etc. (LS) 40-80 hours per mile per phase based on 100 ft. cross section spacing. Frontage roads or Collector Distributors: Effort required for analysis should be negotiated on a case by case basis. Temporary drainage and temporary highway lighting to be included in the plans should be negotiated on a case-by-case basis. Analysis for Temporary Drainage and Temporary Highway Lighting to be included in the respective activities.
4.11	Master TTCP Design Files	LS	See Basis for Staff Hour Range	Develop master TTCP files showing each phase of the TTCP. Includes all work necessary for designing lane configurations, diversions, lane shifts, signing and pavement markings, temporary traffic control devices, and temporary pedestrian ways. Vehicular TTCP (for Level II and Level III only): 32-48 hours per mainline mile per phase. Pedestrian TTCP (for work involving temporary pedestrian ways): 8-80 hours per phase of pedestrian facility work. Temporary drainage and temporary highway lighting to be placed in the Master TTCP Design Files should be negotiated on a case-by-case basis.
5.17	Temporary Traffic Control Plan Sheets	Sheet	2 to 6	If double panel plan sheets are utilized, each panel is considered a plan sheet.
5.18	Temporary Traffic Control Cross Section Sheets	EA	0.25 to 0.5	Includes minor labeling and modifications to sections.
5.19	Temporary Traffic Control Detail Sheets	Sheet	6 to 12	Includes work for developing details and CADD work. Includes all other TTCP sheets except Plan and Cross Section Sheets.

2.1 Project General and Roadway (Activities 3, 4, and 5)

Public Involvement: N/A

Other Agency Presentations/Meetings: N/A

Joint Project Agreements: N/A

Specification Package Preparation: *Specs on the Web*

Value Engineering: N/A

Risk Assessment Workshop: N/A

Plan Type: Plan

Typical Section: Rural Divided 6-12ft lanes with variable width (40 ft) vegetation median, 2-10ft inside shoulders, 2-10ft outside shoulders

Pavement Design: To be provided by the consultant

Pavement Type Selection Report(s): N/A

Cross Slope: Evaluate for correction as needed

Access Management Classification: Class 1

Transit Route Features: N/A

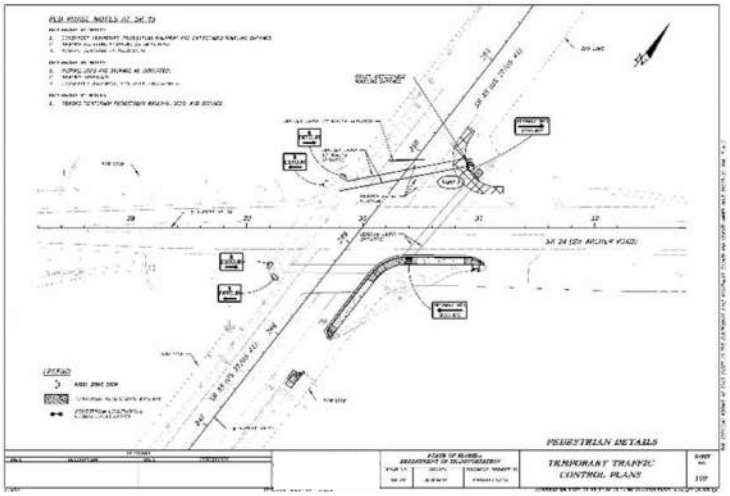
Major Intersections/Interchanges: Resurface all pavement within Limited Access Right of Way at SR 136 interchange including ramps and state road.

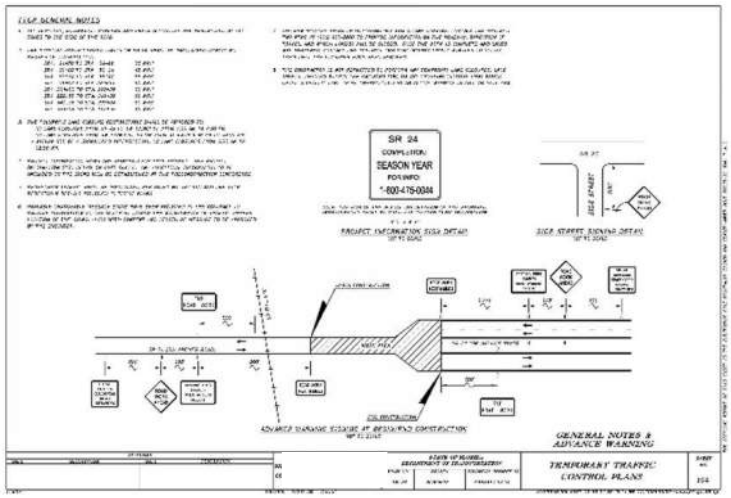
Roadway Alternative Analysis: N/A

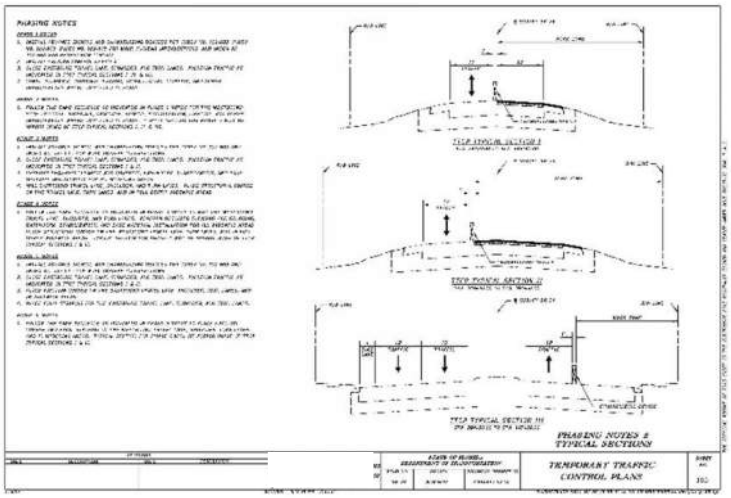
Level of TCP Plans: 1

Level I Maintenance of Traffic – Design Requirements

- **FDM 321.4.1 Level I**
  - General Notes
  - Phase Typical Section(s)
  - Minimal Special Details
  - Pedestrian Special Details or Phasing Plans
  - Bicycle Special Details or Phasing Plans







Level I Maintenance of Traffic – Design Requirements

- **FDM 321.4.1 Level I**
  - General Notes
    - FDM 241 Lane Closure Analysis
      - Final determination of Lane Closure Restrictions by FDOT Construction

THE EXISTING POSTED SPEED LIMITS ON SR 24 SHALL BE MAINTAINED DURING ALL PHASES OF CONSTRUCTION.

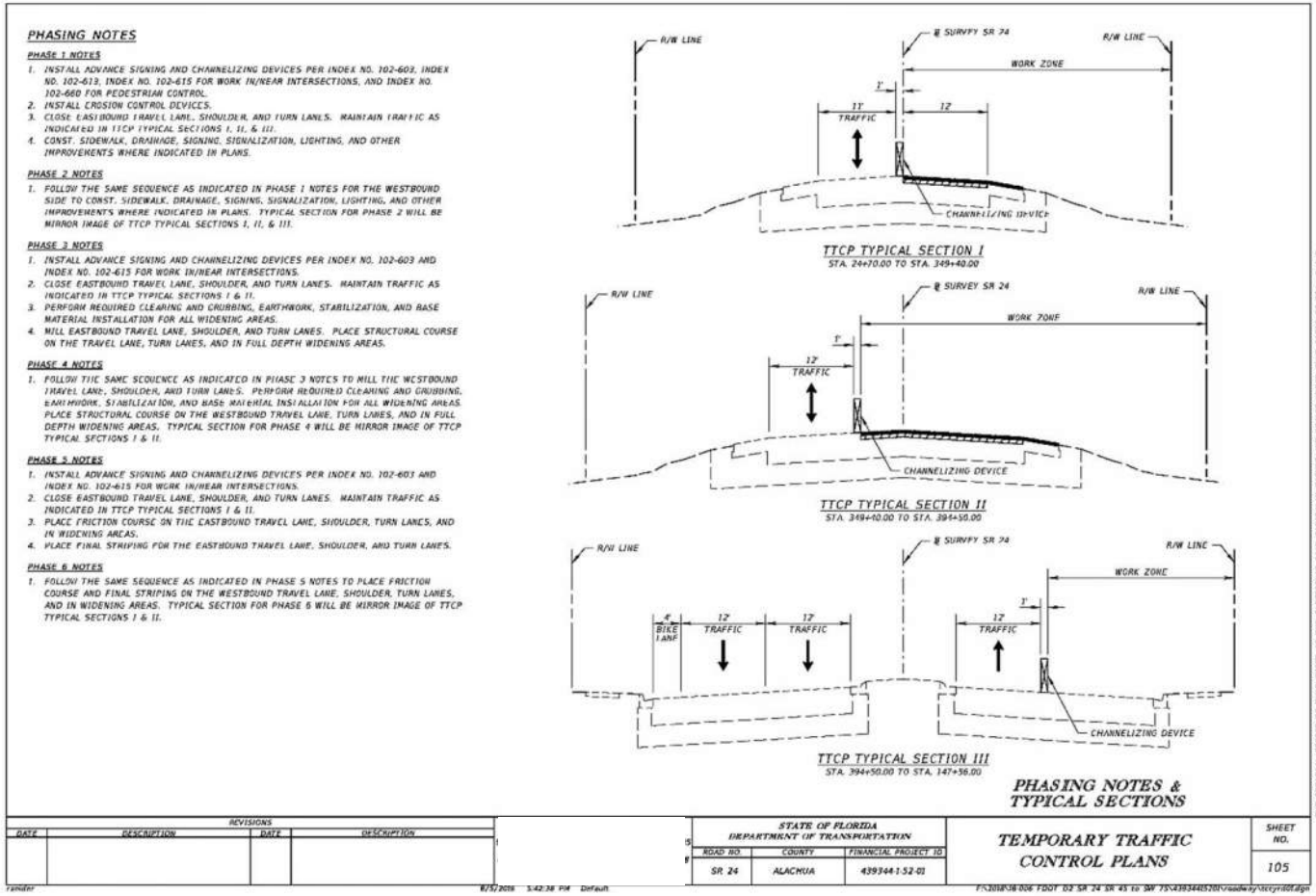
STA. 24+70 TO STA. 39+88	*35 MPH*
STA. 39+88 TO STA. 50+34	*45 MPH*
STA. 50+34 TO STA. 58+42	*55 MPH*
STA. 58+42 TO STA. 204+53	*60 MPH*
STA. 204+53 TO STA. 222+59	*50 MPH*
STA. 222+59 TO STA. 341+35	*60 MPH*
STA. 341+35 TO STA. 399+04	*50 MPH*
STA. 399+04 TO STA. 147+56	*45 MPH*

THE FOLLOWING LANE CLOSURE RESTRICTIONS SHALL BE ADHERED TO:

- *NO LANE CLOSURES FROM SR 45 TO SW 132ND ST FROM 7:00 AM TO 7:30 PM.*
- *NO LANE CLOSURES FROM SW 132ND ST TO SW 75TH ST FROM 6:30 AM TO 10:00 PM.*
- *WITHIN 600' OF A SIGNALIZED INTERSECTION, NO LANE CLOSURES FROM 5:30 AM TO 12:00 AM.*

Level I Maintenance of Traffic – Design Requirements

- **FDM 321.4.1 Level I**
  - Phase Typical Sections



PHASING NOTES

PHASE 1 NOTES
1. INSTALL ADVANCE SIGNING AND CHANNELIZING DEVICES PER INDEX NO. 102-603, INDEX NO. 102-613, INDEX NO. 102-615 FOR WORK IN/NEAR INTERSECTIONS, AND INDEX NO. 102-660 FOR PEDESTRIAN CONTROL.
2. INSTALL EROSION CONTROL DEVICES.
3. CLOSE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. MAINTAIN TRAFFIC AS INDICATED IN TTCP TYPICAL SECTIONS I, II, & III.
4. CONST. SIDEWALK, DRAINAGE, SIGNING, SIGNALIZATION, LIGHTING, AND OTHER IMPROVEMENTS WHERE INDICATED IN PLANS.

PHASE 2 NOTES
1. FOLLOW THE SAME SEQUENCE AS INDICATED IN PHASE 1 NOTES FOR THE WESTBOUND SIDE TO CONST. SIDEWALK, DRAINAGE, SIGNING, SIGNALIZATION, LIGHTING, AND OTHER IMPROVEMENTS WHERE INDICATED IN PLANS. TYPICAL SECTION FOR PHASE 2 WILL BE MIRROR IMAGE OF TTCP TYPICAL SECTIONS I, II, & III.

PHASE 3 NOTES
1. INSTALL ADVANCE SIGNING AND CHANNELIZING DEVICES PER INDEX NO. 102-603 AND INDEX NO. 102-615 FOR WORK IN/NEAR INTERSECTIONS.
2. CLOSE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. MAINTAIN TRAFFIC AS INDICATED IN TTCP TYPICAL SECTIONS I & II.
3. PERFORM REQUIRED CLEARING AND GRUBBING, EARTHWORK, STABILIZATION, AND BASE MATERIAL INSTALLATION FOR ALL WIDENING AREAS.
4. MILL EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. PLACE STRUCTURAL COURSE ON THE TRAVEL LANE, TURN LANES, AND IN FULL DEPTH WIDENING AREAS.

PHASE 4 NOTES
1. FOLLOW THE SAME SEQUENCE AS INDICATED IN PHASE 3 NOTES TO MILL THE WESTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. PERFORM REQUIRED CLEARING AND GRUBBING, EARTHWORK, STABILIZATION, AND BASE MATERIAL INSTALLATION FOR ALL WIDENING AREAS. PLACE STRUCTURAL COURSE ON THE WESTBOUND TRAVEL LANE, TURN LANES, AND IN FULL DEPTH WIDENING AREAS. TYPICAL SECTION FOR PHASE 4 WILL BE MIRROR IMAGE OF TTCP TYPICAL SECTIONS I & II.

PHASE 5 NOTES
1. INSTALL ADVANCE SIGNING AND CHANNELIZING DEVICES PER INDEX NO. 102-603 AND INDEX NO. 102-615 FOR WORK IN/NEAR INTERSECTIONS.
2. CLOSE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. MAINTAIN TRAFFIC AS INDICATED IN TTCP TYPICAL SECTIONS I & II.
3. PLACE FRICTION COURSE ON THE EASTBOUND TRAVEL LANE, SHOULDER, TURN LANES, AND IN WIDENING AREAS.
4. PLACE FINAL STRIPING FOR THE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES.

PHASE 6 NOTES
1. FOLLOW THE SAME SEQUENCE AS INDICATED IN PHASE 5 NOTES TO PLACE FRICTION COURSE AND FINAL STRIPING ON THE WESTBOUND TRAVEL LANE, SHOULDER, TURN LANES, AND IN WIDENING AREAS. TYPICAL SECTION FOR PHASE 6 WILL BE MIRROR IMAGE OF TTCP TYPICAL SECTIONS I & II.

PHASING NOTES & TYPICAL SECTIONS

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 24	ALACHUA	439344-1-52-01

TEMPORARY TRAFFIC CONTROL PLANS

SHEET NO. 105

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

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Level I Maintenance of Traffic – Design Requirements

- **FDM 321.4.1 Level I**
  - Phase Typical Sections

PHASING NOTES

PHASE 1 NOTES

1. INSTALL ADVANCE SIGNING AND CHANNELIZING DEVICES PER INDEX NO. 102-603, INDEX NO. 102-613, INDEX NO. 102-615 FOR WORK IN/NEAR INTERSECTIONS, AND INDEX NO. 102-660 FOR PEDESTRIAN CONTROL.
2. INSTALL EROSION CONTROL DEVICES.
3. CLOSE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. MAINTAIN TRAFFIC AS INDICATED IN TTCP TYPICAL SECTIONS I, II, & III.
4. CONST. SIDEWALK, DRAINAGE, SIGNING, SIGNALIZATION, LIGHTING, AND OTHER IMPROVEMENTS WHERE INDICATED IN PLANS.

PHASE 2 NOTES

1. FOLLOW THE SAME SEQUENCE AS INDICATED IN PHASE 1 NOTES FOR THE WESTBOUND SIDE TO CONST. SIDEWALK, DRAINAGE, SIGNING, SIGNALIZATION, LIGHTING, AND OTHER IMPROVEMENTS WHERE INDICATED IN PLANS. TYPICAL SECTION FOR PHASE 2 WILL BE MIRROR IMAGE OF TTCP TYPICAL SECTIONS I, II, & III.

PHASE 3 NOTES

1. INSTALL ADVANCE SIGNING AND CHANNELIZING DEVICES PER INDEX NO. 102-603 AND INDEX NO. 102-615 FOR WORK IN/NEAR INTERSECTIONS.
2. CLOSE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. MAINTAIN TRAFFIC AS INDICATED IN TTCP TYPICAL SECTIONS I & II.
3. PERFORM REQUIRED CLEARING AND GRUBBING, EARTHWORK, STABILIZATION, AND BASE MATERIAL INSTALLATION FOR ALL WIDENING AREAS.
4. MILL EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. PLACE STRUCTURAL COURSE ON THE TRAVEL LANE, TURN LANES, AND IN FULL DEPTH WIDENING AREAS.

PHASE 4 NOTES

1. FOLLOW THE SAME SEQUENCE AS INDICATED IN PHASE 3 NOTES TO MILL THE WESTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. PERFORM REQUIRED CLEARING AND GRUBBING, EARTHWORK, STABILIZATION, AND BASE MATERIAL INSTALLATION FOR ALL WIDENING AREAS. PLACE STRUCTURAL COURSE ON THE WESTBOUND TRAVEL LANE, TURN LANES, AND IN FULL DEPTH WIDENING AREAS. TYPICAL SECTION FOR PHASE 4 WILL BE MIRROR IMAGE OF TTCP TYPICAL SECTIONS I & II.

PHASE 5 NOTES

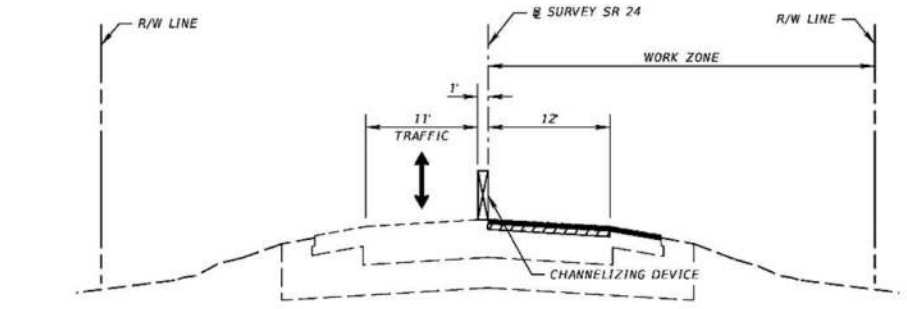
1. INSTALL ADVANCE SIGNING AND CHANNELIZING DEVICES PER INDEX NO. 102-603 AND INDEX NO. 102-615 FOR WORK IN/NEAR INTERSECTIONS.
2. CLOSE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES. MAINTAIN TRAFFIC AS INDICATED IN TTCP TYPICAL SECTIONS I & II.
3. PLACE FRICTION COURSE ON THE EASTBOUND TRAVEL LANE, SHOULDER, TURN LANES, AND IN WIDENING AREAS.
4. PLACE FINAL STRIPING FOR THE EASTBOUND TRAVEL LANE, SHOULDER, AND TURN LANES.

PHASE 6 NOTES

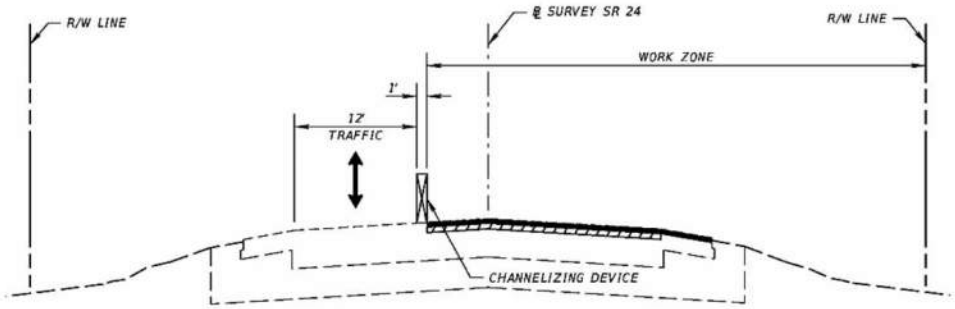
1. FOLLOW THE SAME SEQUENCE AS INDICATED IN PHASE 5 NOTES TO PLACE FRICTION COURSE AND FINAL STRIPING ON THE WESTBOUND TRAVEL LANE, SHOULDER, TURN LANES, AND IN WIDENING AREAS. TYPICAL SECTION FOR PHASE 6 WILL BE MIRROR IMAGE OF TTCP TYPICAL SECTIONS I & II.

Level I Maintenance of Traffic – Design Requirements

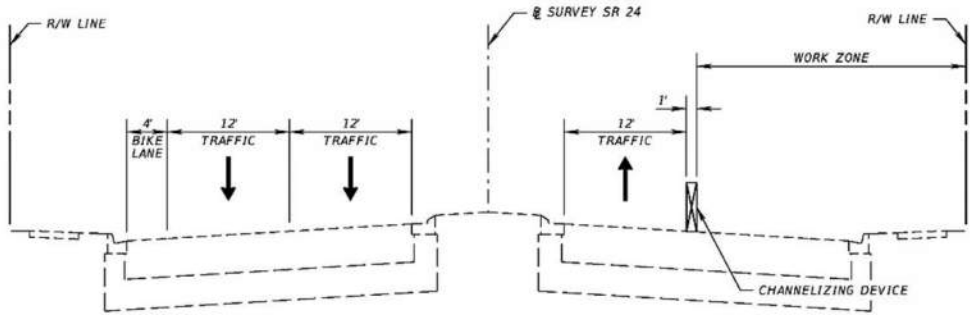
- **FDM 321.4.1 Level I**
  - Phase Typical Sections



TTCP TYPICAL SECTION I
STA. 24+70.00 TO STA. 349+40.00

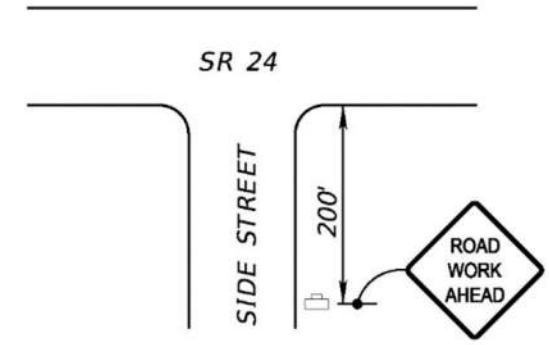


TTCP TYPICAL SECTION II
STA. 349+40.00 TO STA. 394+50.00

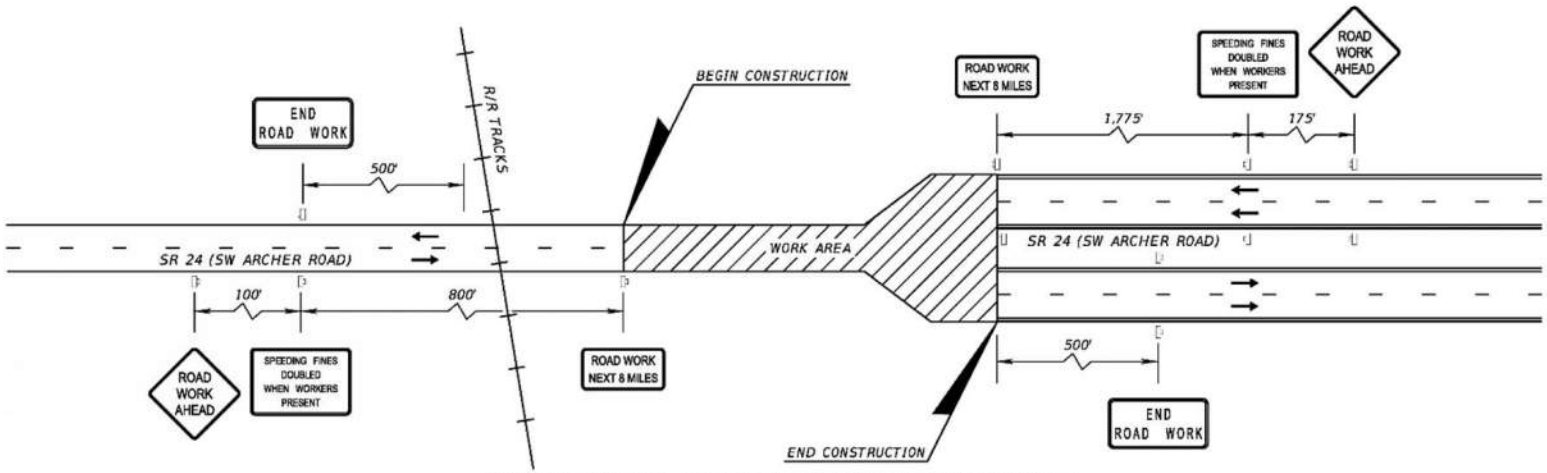


Level I Maintenance of Traffic – Design Requirements

- **FDM 321.4.1 Level I**
  - Minimal Special Details



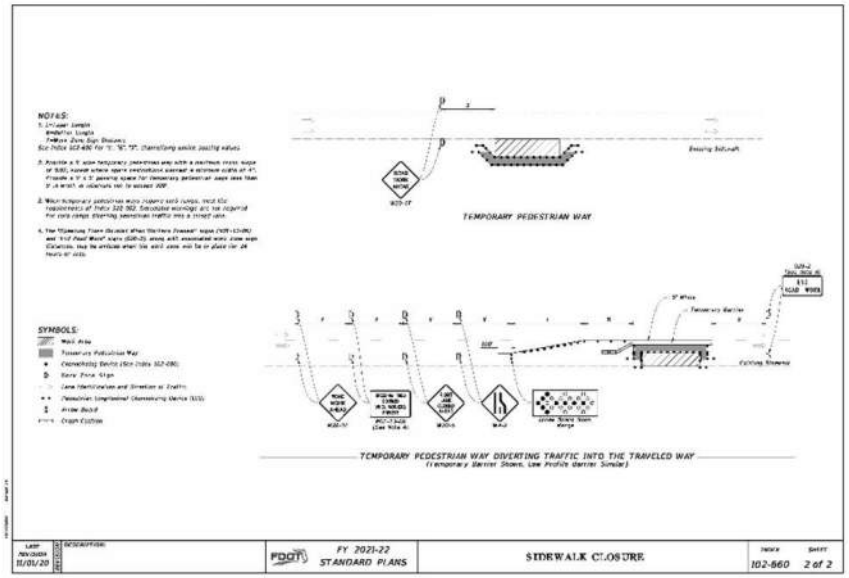
SIDE STREET SIGNING DETAIL
NOT TO SCALE

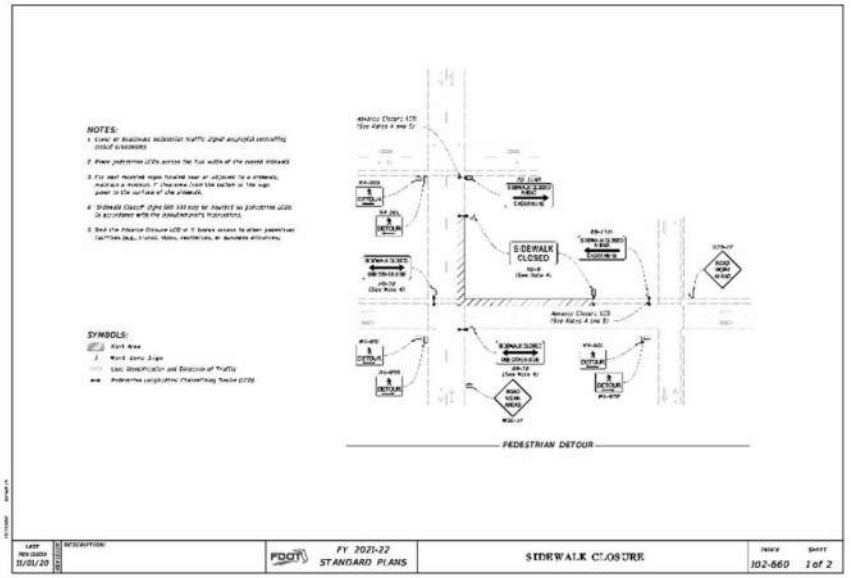


ADVANCE WARNING SIGNING AT BEGIN/END CONSTRUCTION
NOT TO SCALE

Level I Maintenance of Traffic – Design Requirements

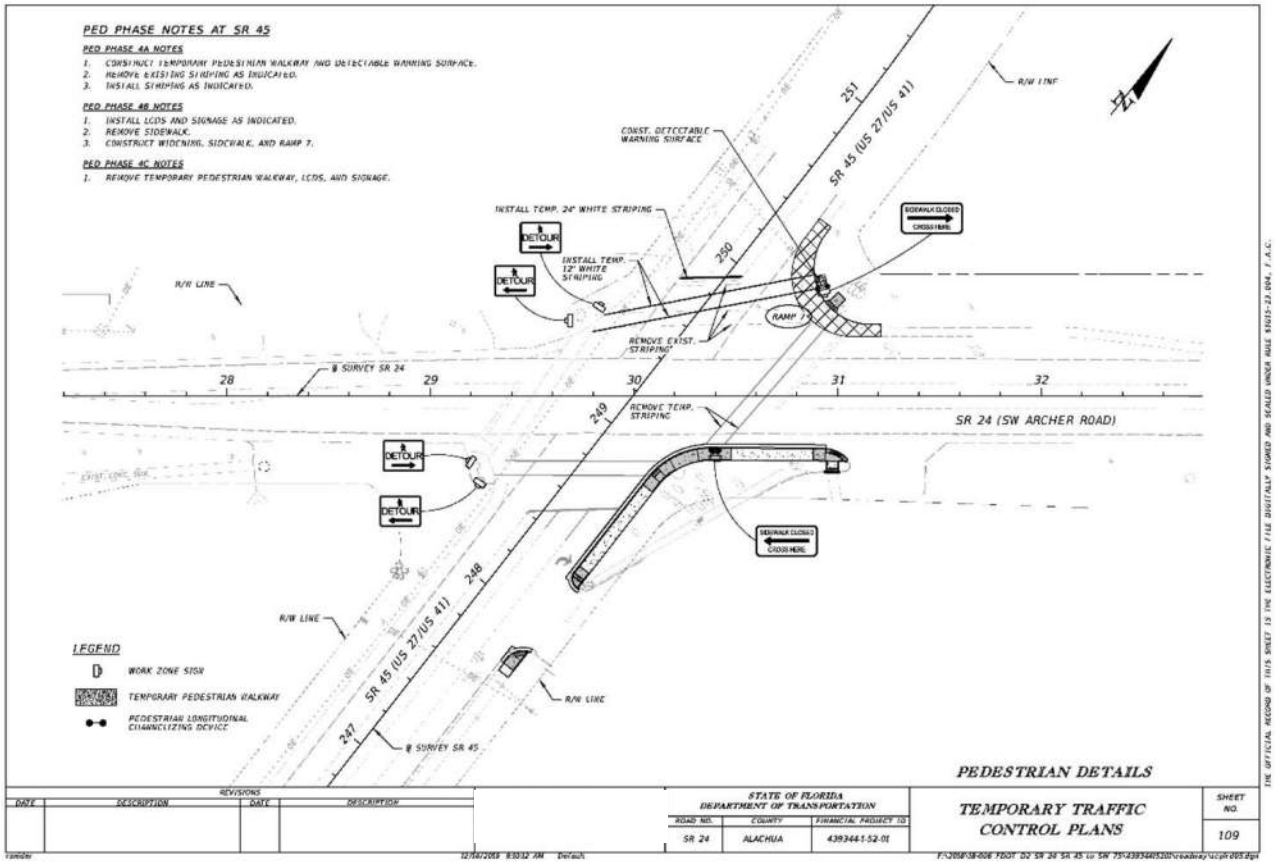
- **FDM 321.4.1 Level I**
  - Pedestrian Special Details or Phasing Plans
  - Standard Plans Index 102-660 (General Guidance)





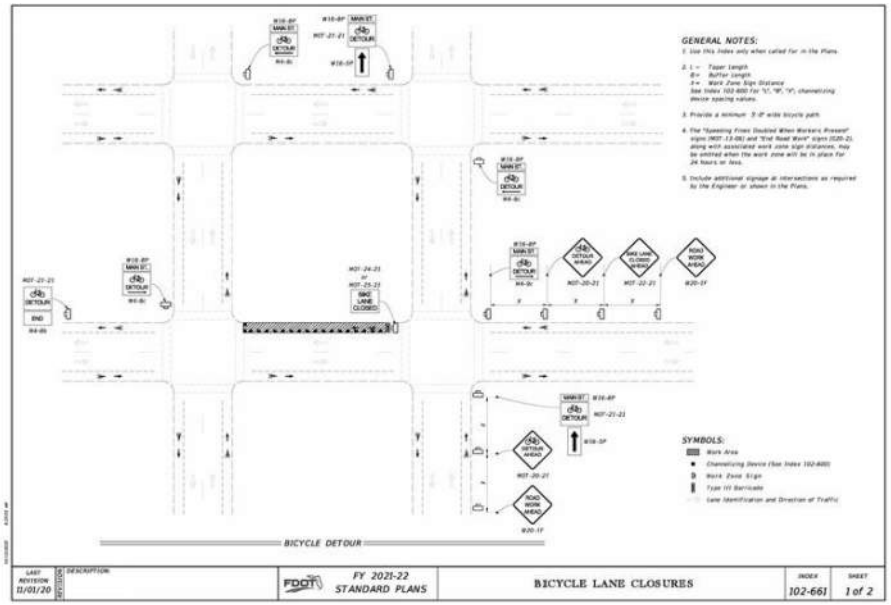
Level I Maintenance of Traffic – Design Requirements

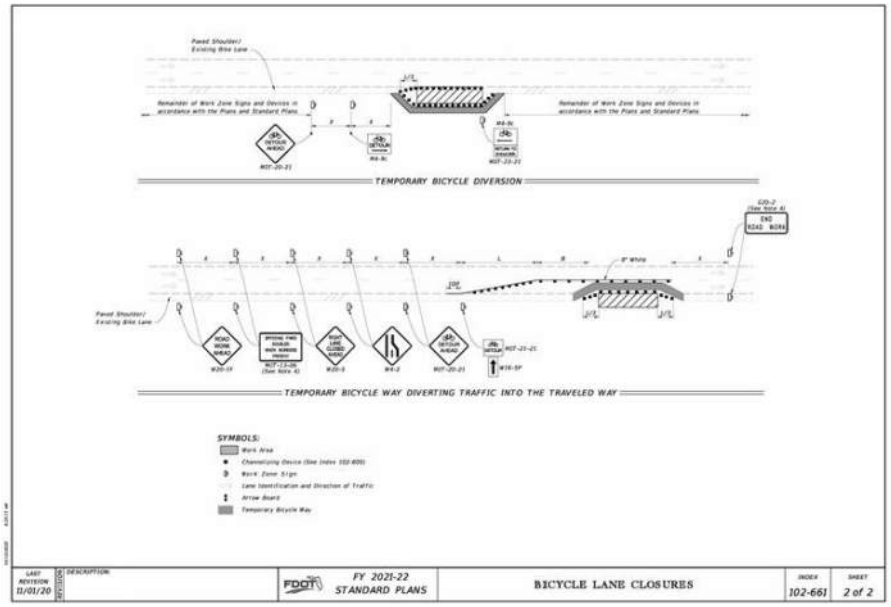
- **FDM 321.4.1 Level I**
  - Pedestrian Special Details or Phasing Plans



Level I Maintenance of Traffic – Design Requirements

- **FDM 321.4.1 Level I**
  - Bicycle Special Details or Phasing Plans
  - Standard Plans Index 102-661 (General Guidance)





Level I Maintenance of Traffic – D2 Specific Requirements

- **General Notes**
  - RTMC Contact Note
  - PCMS Note

FIFTEEN MINUTES PRIOR TO INITIATING MOT FOR A LANE CLOSURE, CONTACT THE DISTRICT TWO RTMC AT (904) 903-2000 TO PROVIDE INFORMATION ON THE ROADWAY, DIRECTION OF TRAVEL, AND WHICH LANE(S) WILL BE CLOSED. ONCE THE WORK IS COMPLETE AND LANES ARE REOPENED, CONTACT THE DISTRICT TWO RTMC WITHIN THIRTY MINUTES TO NOTIFY THEM THAT THE CLOSURES HAVE BEEN REMOVED.

PORTABLE CHANGEABLE MESSAGE SIGNS HAVE BEEN INCLUDED IN THE CONTRACT TO PROVIDE INFORMATION TO THE MOTORIST DURING THE MAINTENANCE OF TRAFFIC PHASES. LOCATION OF THE SIGNS, ALONG WITH CONTENT AND LENGTH OF MESSAGE TO BE APPROVED BY THE ENGINEER.

Level I Maintenance of Traffic – D2 Specific Requirements

- **ERC District Documents**
  - Contract Time Memo

Peer Exchange Topic: CON-0002, Contract Time Memo

Description: Confusion has arisen regarding who is responsible for providing the various elements of the Contract Time Memo. Revisit responsibilities for completing contract time memo: who is responsible for what?

Determination: Information below outlines Contract Time Memo responsibilities for Project Manager and EOR, the Plans Review Engineer and District Construction Staff, as well as Resident Office Staff and Operations Center Staff.

Contract Time Memo – The Take Away

Responsibilities – Contract Time Memo Development		
Project Manager Engineer of Record	**Plans Review Engineer District Construction Staff**	**Resident Office Staff Operations Center Staff**
Specifically request Contract Time Memo for projects without Phase III Review.	Set contract duration	Assisting in setting time and acquisition time
Deliver a good set of 90% plans	Set acquisition time	Partnering (yes or no)
Provide pay item quantities to work with	Delayed start approval process, if requested	Disputes Review Board (Regional or Project Specific)
Perform Lane Closure Analysis and recommend lane closure restrictions	Setting up Mandatory Pre-Bid Meeting, if requested	Critical Path Scheduling (yes or no)
After time is set, notify Plans Review Engineer of scope changes that may change time.	Pile driving restrictions	Lane Closure Restrictions
All out attempts to get utility relocations completed prior to Construction Contract start	Speed and Law Enforcement Officer (on CTM)	Field Office (yes or no)
	Filing and delivering the Official Contract Time Memo	Special Events list
	Revise CTM after discussion with Resident Office / Operations Center staff	

Retrieving a "lost" Contract Time Memo

Hummingbird
- Profile Search
- Construction
  - Financial ID # (xxxxxxx5201)
  - Document Group (Pre-Letting)
  - Document Type (Establishment of Contract Time)

E-doc Search
- Financial Project Number (xxxxxxx5201)
  - Location (D2)
  - Business Area (Construction)
  - Document Group (Pre-Letting)
  - Document Type (Establishment of Contract Time)

PSEE
- Project Number
  - Documents

Ask us

July 23, 2015 Production/Operations – Peer Exchange & Coordination NLB

Level I Maintenance of Traffic – Tips for Design

- **Mill and Resurfacing**
  - Ensure entire pavement surface is covered with min. lane widths maintained
  - Maintain Positive Drainage
- **Widening**
  - Minimum 2’ width
  - Address drop-off conditions
- **Temporary Striping**
  - Account for all lifts of striping (including milled surface)
  - Include Temp RPM’s
  - Removal of Temp Striping outside of project limits

FDOT ACEC

PM ACADEMY

Q&A Session

J.W. Hunter, P.E.
ACEC District 2 Liaison

Q&A Session

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Yaffee
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FDOT ACEC

PM ACADEMY

Quantities

Courtney Hance, P.E.
RS&H, Inc.
Transportation Engineer

Quantities – Helpful Resources

- **Basis of Estimates (BOE) Manual**
  - Chapter 2 – States the Units and the Layout of Units
  - Chapter 8 – Summary Boxes and Summary Tables
  - BOE Index – Lists Pay Items 000-1999
- **FDOT Design Manual (FDM)**
  - 902 – Estimated Quantities Report
- **FDOT Standard Plans**
  - Identifies payment for types of work
- **FDOT Specifications**
  - Identifies Basis of Payment
- **FDOT Training Youtube Channel**
  (https://www.youtube.com/c/FDOTTraining/featured)

Quantities – Project Negotiations

- Design Staff Hour Estimation (SHE) Guidelines
- Design Staff Hour Estimation Forms
- EQ Report Staff Hours Calculator

Lower End of Range Projects
· Rural 2-lane 3R (Minor safety, earthwork and utility involvement)
· Rural 4-Lane 3R (Minor safety, earthwork and utility involvement)
· Urban 3R (Minor safety, earthwork and utility involvement, primarily only milling & resurfacing)
· Multi-Lane limited access resurfacing (no 3R improvements and minimal interchange involvement)
Middle of Range Projects
· Rural 2-Lane 3R (Major safety, earthwork and utility involvement)
· Rural 4-Lane 3R (Major safety, earthwork and utility involvement)
· Urban 3R (Major safety, earthwork and utility involvement)
· Rural 2-Lane to Multi-Lane Widening/Resurfacing (Minor ROW, earthwork and utility impacts)
· Rural 2-Lane New Construction (New alignment, ROW, earthwork and utility impacts)
· Rural 2-Lane to Urban Multi-Lane Reconstruction (Minor ROW and utility impacts, minimal intersection involvement)
· Rural or Urban 4-Lane to 6-Lane Widening/Resurfacing (Widening in median, minor ROW earthwork and utility impacts, minimal intersection involvement)

Quantities – Project Negotiations

- EQ Report Staff Hours Calculator Input Values

Project Info			Complexity Range	
Project Name			Roadway	Low
FPID			S&PM	Low
Project Length	0.5	miles	Landscaping	N/A
	2,640	feet		
	2	1,500' units	Per unit hours is halved for units exceeding 40	

Components	Included?	Number of Elements?		Optional Phase II Submittal Included?
☑ Roadway	Yes	1	Interchanges	☐ Roadway
☐ Drainage	No	0	MH, Inlets	☐ Drainage
☐ Structures	No	0	Bridges	☐ Structures
☑ S&PM	Yes	1	Interchanges	☐ S&PM
☑ Signalization	Yes	1	Intersections	☐ Signalization
☑ Lighting	Yes	6	Poles	☐ Lighting
☐ Landscaping	No			☐ Landscaping
☐ ITS	No	0	ITS Intallations	☐ ITS
Number of components	4			

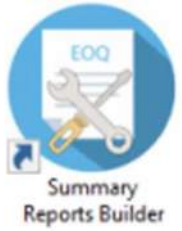
Task No	Task Description	No. Hrs	Phase II EQR Submittal	Recommended Hours to Begin Negotiations
3.3.2	EQ Report	38	0	38
4.16	Roadway	84	0	84
6a.16	Drainage	0	0	0
9.8	Structures	0	0	0
19.7	S&PM	17	0	17
21.1	Signalization	20	0	20
23.8	Lighting	20	0	20
25.7	Landscaping	0	0	0
33.13	ITS	0	0	0
		Total Hours for Quantities and EQR:		179

Refer to FDOT EQ Report Staff Hour Calculator Training

Quantities – Process

- **Long Range Estimates (LRE)**
  - Utilized in beginning phases of projects to determine Work Program Funding ahead of having exact quantities and pay items
  - Must attend FDOT LRE Training

- **Estimated Quantity (EQ) Report PDF**
  - Required for projects that began design phase after January 2021.
  - The EQ Report will contain all pay item and quantity information for the project
  - Prepared for Phase III (90%) Submittal.
  - Summary of Quantities, Tabulation of Quantities, and Summary of Pay Items are no longer included in the Contract Plans. Instead, an EQ Report is prepared and provided.
  - Generated using the Summary Report Builder Application.



  - Includes signature page and series of summary tables, as defined by the BOE Manual, the CADD Manual, Structures Manual, and FDM 902.

Quantities – Process

- **Estimated Quantity (EQ) Report PDF (Signature Page)**

ESTIMATED QUANTITIES REPORT

Financial Project ID: 209543-5-52-01
Contract Number: T2877
Project Description: Beach & Eunice Improvements

This document has been digitally signed and sealed by:

on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

RS&H, Inc.
10748 Deerwood Park Blvd. South
Jacksonville, FL 32256
Courtney Wells Hance, P.E. No. 92097

The estimated quantities contained in this document:

1. Were developed in compliance with Florida Department of Transportation procedures, processes, and requirements.

2. Contain no known errors or omissions.

3. Match the pay item numbers and quantities in Designer Interface for AASHTOWare Project Preconstruction™.

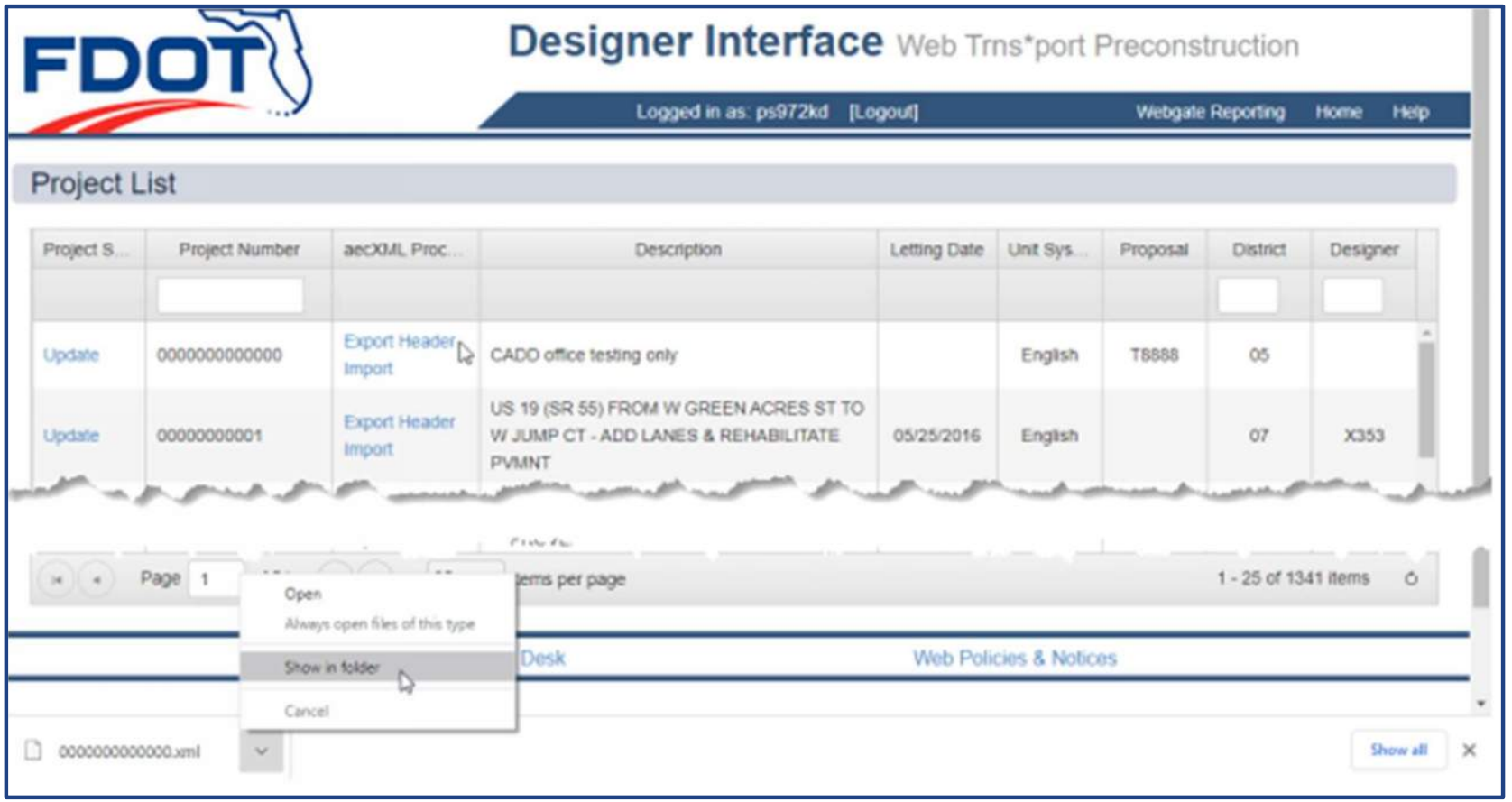
Quantities – Process

- **Estimated Quantity (EQ) Report PDF (Summary Table)**
  - Generated by the Quantity Takeoff Manager (QTM)

Summary of Pavement												
Pay Item Number	Pay Item Description	Units of Measure	Quantity		Total Quantity		Location				
			P	F	P	F	Alignment	Begin Station	End Station	Location Description	Side
0160 4	Type B Stabilization	SY	18.6		314		BL_SR136	552+54.45	552+79.38	Widening	RT
			19.7				BL_SR136	A 566+65.17	A 566+87.46	Widening	LT
			118.9				BL_SR93	1703+06.00	1705+02.00	Widening	RT
			157.1				BL_SR93	1704+73.00	1707+32.00	Widening	LT
0285701	Optional Base, Base Group 01	SY	14.1		30		BL_SR136	552+55.21	552+78.27	Widening	RT
			15.7				BL_SR136	A 566+65.98	A 566+86.70	Widening	LT
0285704	Optional Base, Base Group 04	SY	118.9		276		BL_SR93	1703+06.00	1705+02.00	Widening	RT
			157.1				BL_SR93	1704+73.00	1707+32.00	Widening	LT

Quantities – Process

- **Designer Interface Quantities Builder Process**
  - Step 1: Export Project Header and move to Lead Component Discipline folder



FDOT

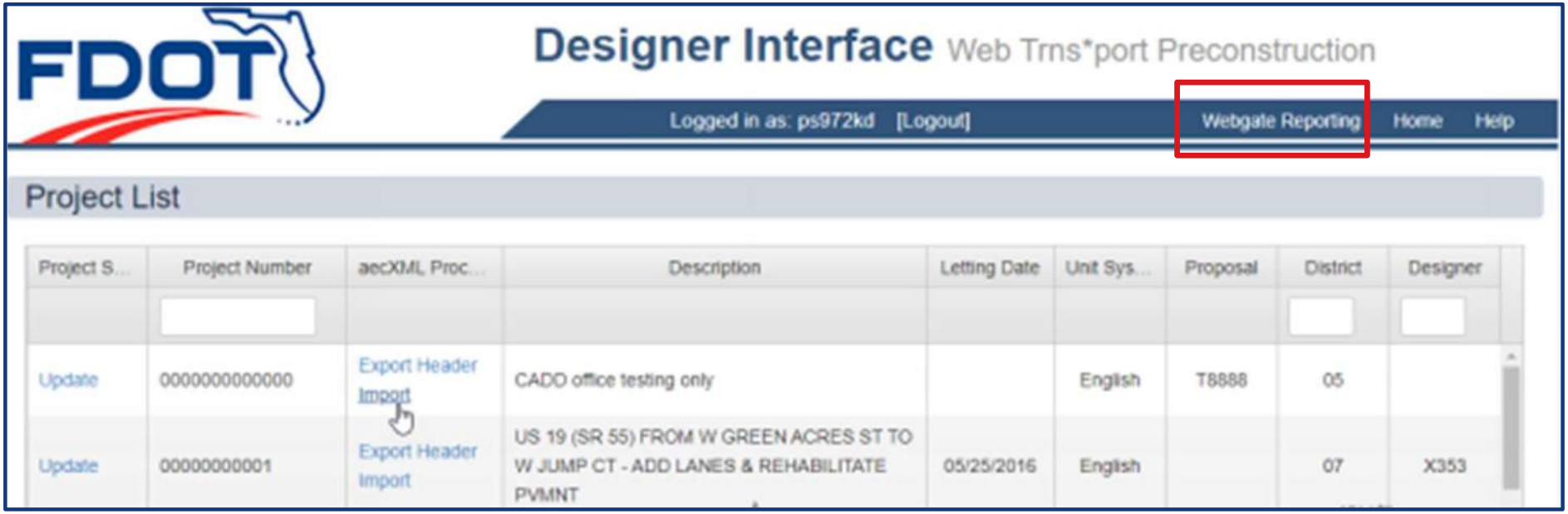
Quantities – Process

- **Designer Interface Quantities Builder Process**
  - Step 2: Utilize the Designer Interface Quantities Builder Application to generate an Output File (XML)
  - Step 3: Import Output File (XML) into the Designer Interface to upload pay item numbers and quantities.

FDOT

Quantities – Process

- **Designer Interface Quantities Builder Process**
  - Step 4: Download Summary of Pay Items Report File within FDOT Webgate Reporting



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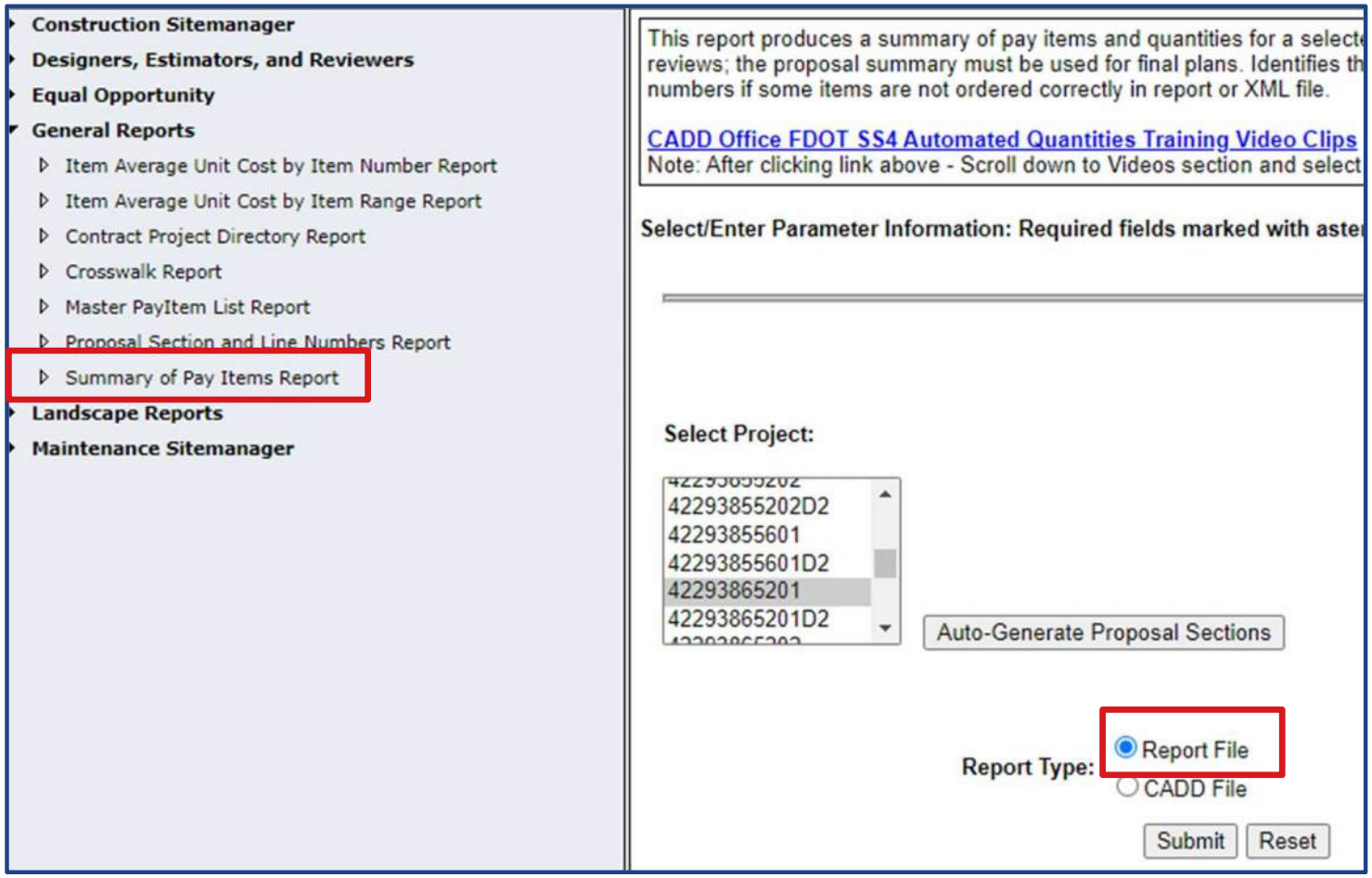
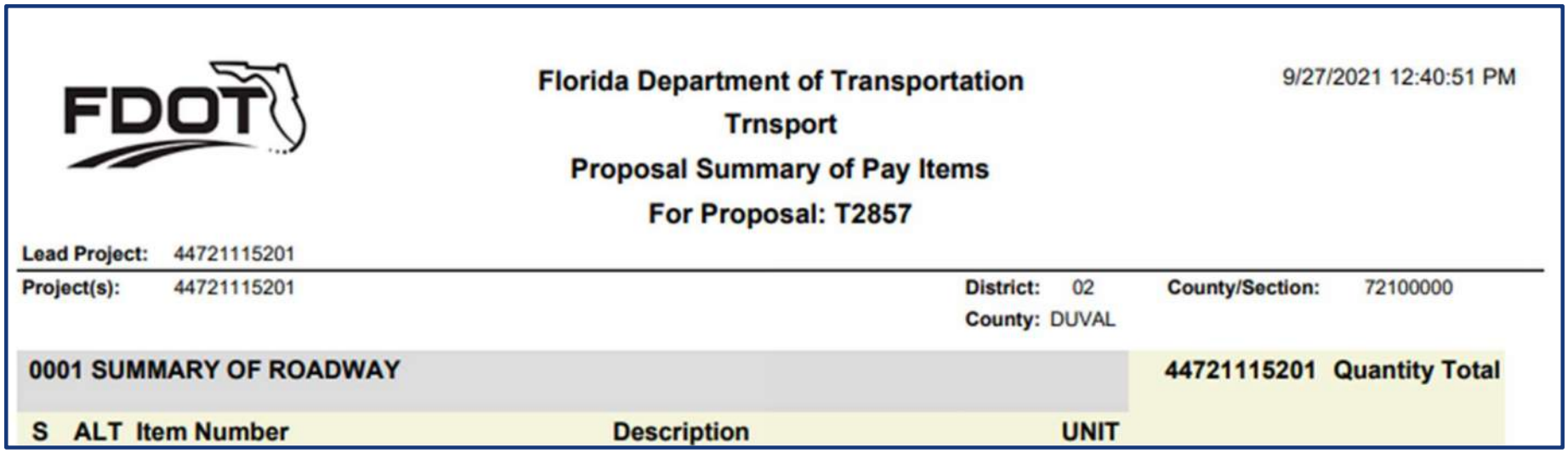
Quantities – Process

- **Designer Interface Quantities Builder Process**
  - Step 4: Download Summary of Pay Items Report File within FDOT Webgate Reporting



Quantities – Process

- **Designer Interface Quantities Builder Process**
  - Step 4: Download Summary of Pay Items Report File within FDOT Webgate Reporting



FDOT

Florida Department of Transportation
Trnsport
Proposal Summary of Pay Items
For Proposal: T2857

9/27/2021 12:40:51 PM

Lead Project: 44721115201

Project(s): 44721115201 District: 02 County: DUVAL County/Section: 72100000

0001 SUMMARY OF ROADWAY			44721115201 Quantity Total
S ALT Item Number	Description	UNIT	

FDOT

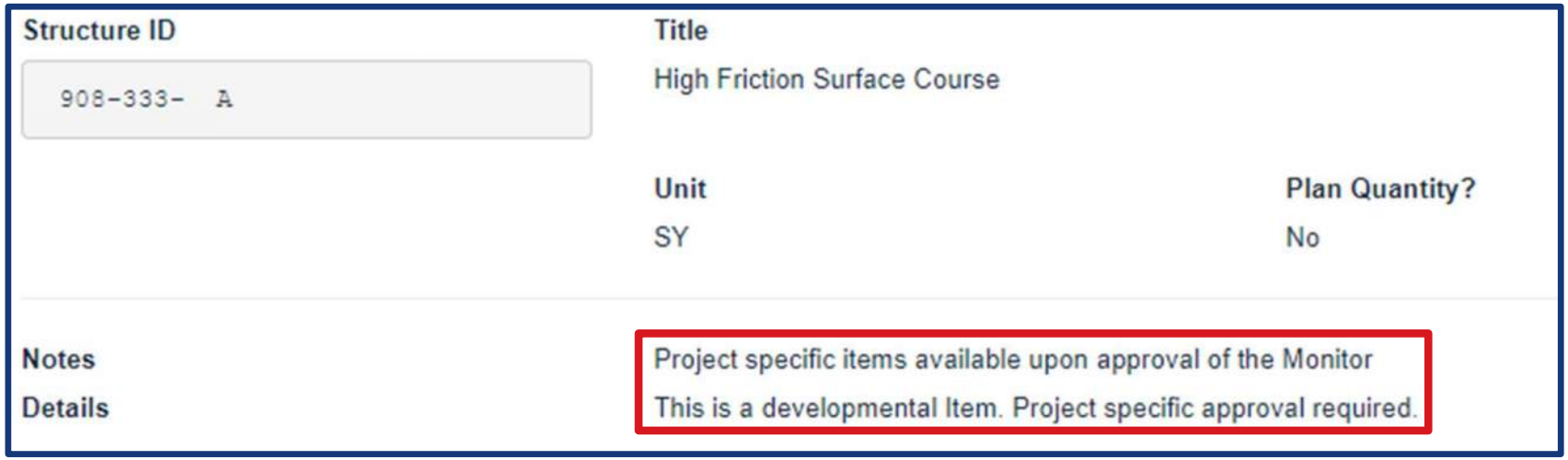
Quantities – Notes to Remember

- **Ensure all Pay Items in the project are in accordance with the Design Standards for each project**
- **Push-Button vs Traditional Project Pay Items**
  - No Lump Sum Pay Items to be included in Push-Button Work Document contracts
- **Always determine if a pay item will require a TSP or can be addressed with a Plan Pay Item Note. TSPs are required to be submitted with the Phase IV Submittals. The BOE will state whether a TSP would be required with a specific pay item.**
  - For Example, Pay Item 639-6-1 (Power Service Transformer, for the power connection at new signals):

Item	Description	Unit	Spec Type
0639 6 1	ELECTRICAL POWER SERVICE- TRANSFORMER FURNISH & INSTALL	EA	T

Quantities – Notes to Remember

- **Pay Item Notes should only be included in the plans for project specific information and should not repeat the FDOT Specifications**
- **Project Specific Pay Items may be required and opened upon approval by FDOT Specifications and Estimates Office for specific projects. Minor Design Project examples include:**
  - Pay Item 908-333-A (High Friction Surface Course)
  - Pay Item 920-714-A (Green-Colored Pavement Markings)



Structure ID	Title	
908-333- A	High Friction Surface Course	
	Unit	**Plan Quantity?**
	SY	No
Notes	Project specific items available upon approval of the Monitor	
Details	This is a developmental Item. Project specific approval required.	

Quantities – Notes to Remember

- **Plan Quantity vs Final Measurement (Field) Quantity**
  - Determine designation in BOE Manual and Standard Specifications
  - Example – Concrete Shoulder Gutter vs Superpave Asphalt

Structure ID	Title	Unit	Plan Quantity?
520- 6-	Concrete Shoulder Gutter	LF	Yes

Structure ID	Title	Unit	Plan Quantity?
334- 1- AA	Superpave Asphaltic Concrete	TN	No

Quantities – Notes to Remember

- **Monitoring Existing Structures (Refer to FDM 117 and FDOT Spec 108)**
  - Consultant PM is responsible for providing the Department PM a list of structures that warrant consideration for monitoring, prior to including pay items in the project.
  - FDM 117.1 General

> ***Pay item 108-1*** is to be used to mitigate the risk for damage occurring to an existing structure due to settlement.
>
> ***Pay item 108-2*** is to be used to mitigate the risk for interfering with the intended use of an existing structure. This pay item is not typically used for residential properties.
>
> ***Pay item 108-3*** is to be used only when recommended by a geotechnical firm and concurred with by the District Geotechnical Engineer. The use of this pay item is not common.

  - FDM 117.2 Inspection and Settlement Monitoring

> There are three general types of construction activities of concern:
>
> - Foundations for miscellaneous structures
> - Work associated with structures other than miscellaneous structures
> - Compaction operations

  - Resurfacing projects may include a note stating that compaction is limited to static mode only, and therefore do not need to include these pay items.

PM ACADEMY

Electronic Review Comment (ERC) System

Rusty Snider, P.E.
Peters and Yaffee, Inc.
Transportation Engineer

Electronic Review Comment (ERC) System

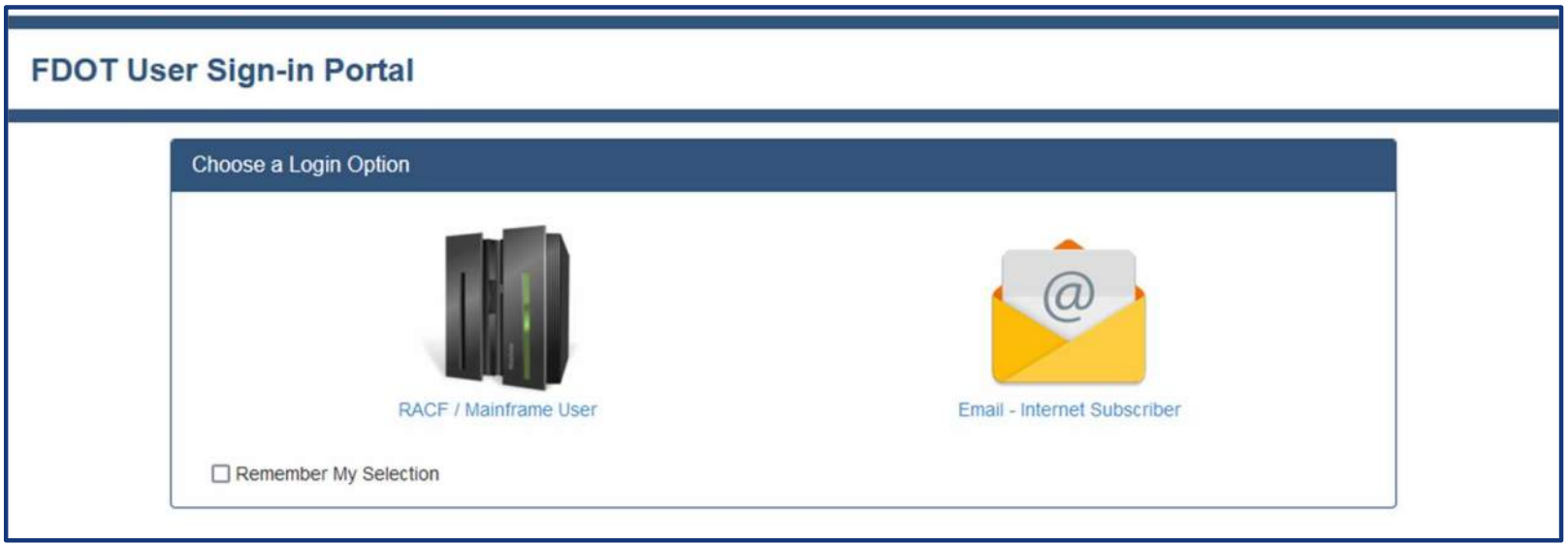
FDOT

What is the ERC System?

- **ERC stands for "Electronic Review Comments"**
- **The ERC System is an FDOT website used for providing comments and responses for project submittals**
  - Plans (All Phase Submittals)
  - RRR Reports
  - Typical Section Packages
  - Pavement Design Packages
  - Design Exceptions and Design Variations
- **The Design Project Manager will respond to each comment submitted**
- **Allows for communication on a comment until it is resolved**
  - Coordination through phone and email is encouraged to prevent back and forth responses between the Reviewer and the Design Project Manager
- **Comments and responses are kept as a record and are used during subsequent submittals to insure that comments have been addressed**

ERC System – Login

- **There are two ways to log into the ERC System**
  - RACF/Mainframe User
  - Email Internet Subscriber



ERC System – RACF/Mainframe User

- This type of login is typically used by Design Project Managers and Reviewers to access/provide comments and responses
- FDOT Employee's User Logins also serve as their RACF/Mainframe User login
- For Consultants, this requires approval from FDOT Project Manager
- When a project submittal is created in ERC, the FDOT Project Manager assigns Reviewers and the Design Project Manager

ERC System – Email Internet Subscriber

- Anyone can create a login using their email address
- Users who login with their emails will have access to the District Documents Tab
- It is encouraged to have your engineers and designers who do not have a RACF/Mainframe User Login to create a login using their email address in order to access the District Documents Tab

ERC System – District Documents

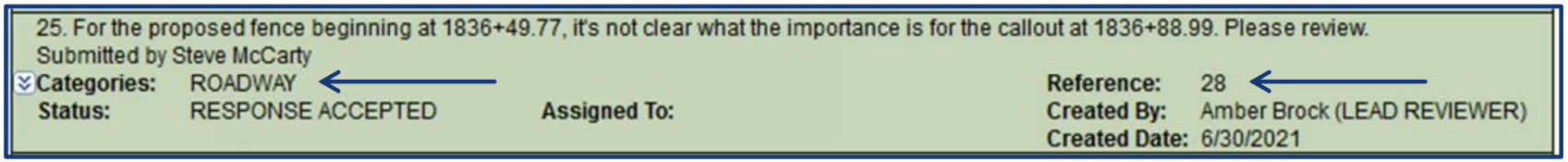
- Some Districts utilized the District Documents tab in ERC

ERC System – FDOT Project Manager

- **The FDOT Project Manager is responsible for setting up the Submittal Reviews in the ERC System**
- **These responsibilities include:**
  - Creating the Submittal or Document Review within the ERC System
  - Uploading the Documents/Files that are to be reviewed and any Supporting Documents that the Reviewer will need to perform their review
  - Assigning the appropriate Reviewers for the type of Submittal
    - Example: The Reviewers needed for a Plans Phase Submittal is/may be different than those needed for a Pavement Design Package Submittal
  - Closing out the Submittal once all the comments have been closed

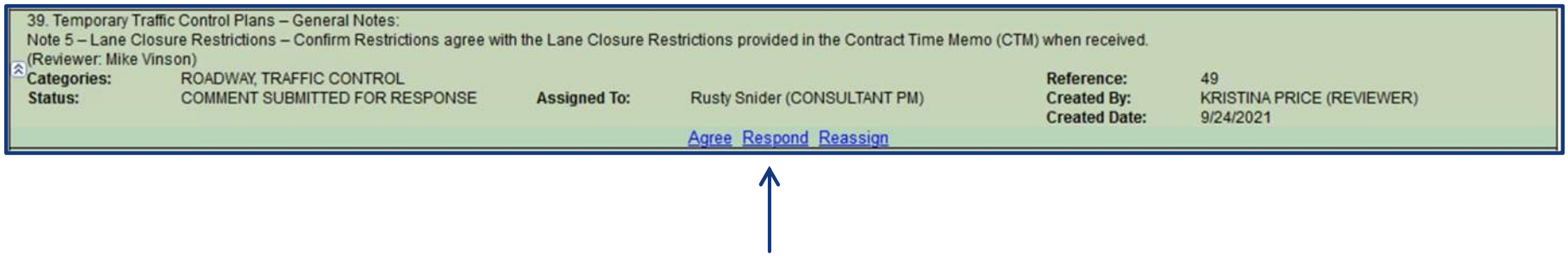
ERC System – Comments (Reviewers)

- **Reviewers provide comments based on their discipline review**
- **Helpful Recommendations**
  - Provide the appropriate Categories for each comment
  - Provide the sheet/page number(s) for each comment in the Reference Section
  - This assists the Design Project Manager in delegating comments to the correct disciplines
- **Reviewers need to review the responses to their comments and close out each comment if the response is satisfactory**



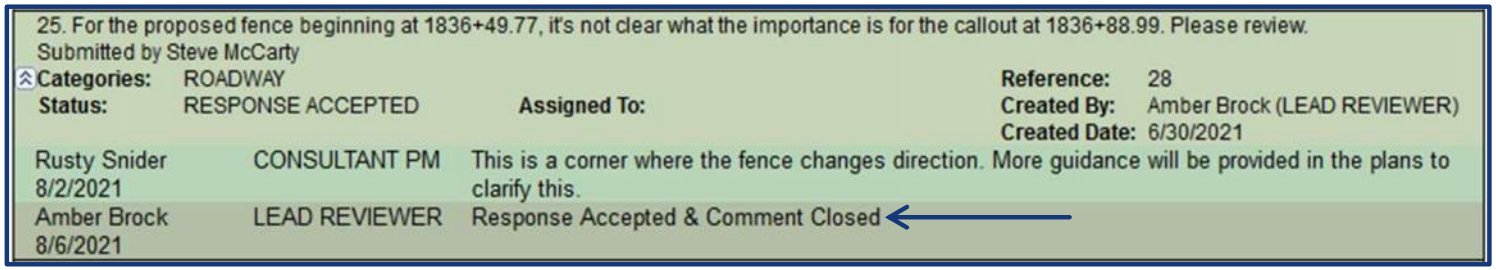
ERC System – Responses (Design Project Manager)

- **The Design Project Manager is responsible for providing responses to each comment**
- **Helpful Recommendations**
  - When responding to a comment, the Design Project Manager should use the “Respond” button as opposed to the “Agree” button
  - The “Agree” button does allow the Design Project Manager to add a response; however, it closes the comment and doesn’t allow the Reviewer to respond

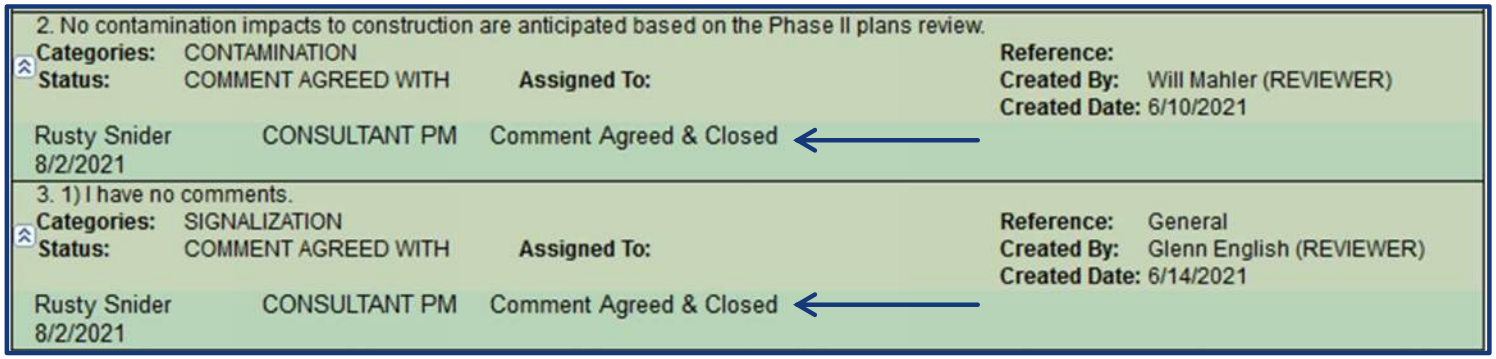


ERC System – Responses (Design Project Manager)

- **Helpful Recommendations**
  - By using the “Respond” button, this allows the Reviewer the opportunity to review the response to determine if it satisfies their comment and then close the comment

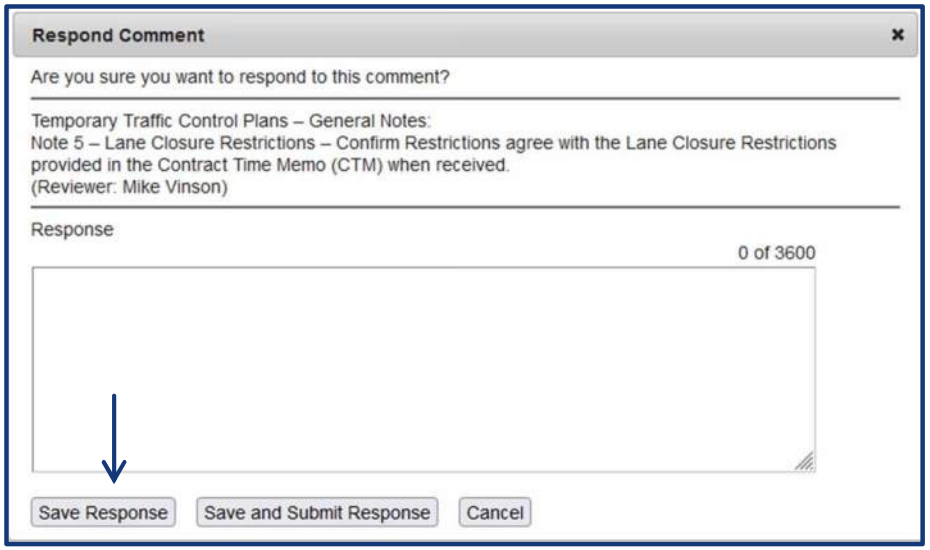


  - The “Agree” button can be used to close “No Comment” comments
    - This is preferred as it will not require the Reviewer to come back and close the comment



ERC System – Responses (Design Project Manager)

- **Helpful Recommendations**
  - When submitting responses to comments, it is highly recommended that you do not use the “Save and Submit Response” button after entering your response
    - This will send an email to you, the FDOT Project Manager, and the Reviewer for each comment
  - By using the “Save Response” button on each response and using the “Submit All Responses” or “Submit Selected Responses” at the end, this will greatly reduce the amount of automated emails that the ERC System will send out



FDOT ACEC

PM ACADEMY

Certifications

Brandi Vittur, P.E.
Florida Department of Transportation
District 2 Consultant Project Management Engineer

Minor Design Certifications

- **Needed to meet Production Date and for PS&E #1 submittal**
- **Right-of-Way Certification**
  - Typically, a No Right-of-Way Certification
  - Temporary Construction Easement is still right-of-way
  - Minor design schedules typically do not allow the time needed to secure right-of-way
- **Utilities Certification**
  - Check and coordinate conflicts early and often
- **Railroad Certification**
  - Check TTCP – need MOT items (cones, etc) within RR Right-of-way?
- **Permit Certification**
  - Need to know early
  - USACE Section 404 delegation to FDEP
- **Environmental Certification**
  - National Environmental Policy Act (NEPA) requirements met

FDOT ACEC

PM ACADEMY

Open Discussion

J.W. Hunter, P.E.
ACEC District 2 Liaison

Open Discussion

- **Presenters**

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- **Chat Box Moderators**

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- **Additional training - Project Management webinar series:**
https://www.fdot.gov/designsupport/pm/webinarseries.shtm

Thank you for attending!