Opportunities for Excellence

Typical Section Packages
Design Exception & Variation Reports

This presentation will answer:

- How can we improve the Quality of
  - Typical Section Packages and
  - Design Exception & Design Variation Reports?

- What are the common preparation mistakes?

- How can we get approval with the *first submittal*???

Typical Section Packages

- **Current Guideline:**
  - **Plans Preparation Manual, Volume 1**
  - **Chapter 16**
    - Section 16.2.3 Defines the Typical Section Package Requirements

Topic #625-000-007
Plans Preparation Manual, Volume 1 January 1, 2017

Chapter 16

Design Submittals

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16.2.3 Typical Section Package

All projects that add or alter cross section elements, and all resurfacing projects, require the preparation and concurrence of a typical section package.

The typical section package must be prepared and sealed by the responsible engineer.

Typical Section Packages

What is the main purpose of the Typical Section Package?

The typical section package is the instrument for formal review and concurrence of the proposed project cross sectional elements by the appropriate FDOT District Design Engineer. Review and concurrence of the typical section package by the FHWA Transportation Engineer is required on projects that have FHWA oversight (see ***Chapter 24*** of this volume for determination of FHWA oversight).

The purpose of the typical section package review and approval process is to:

1. Establish typical transverse geometry
2. Consider safety related issues
3. Ensure compatibility between the bridge typical section and the roadway typical section

Ref: PPM Vol. 1, Section 16.2.3

Typical Section Packages

Required information on Roadway Typical Section Drawings.

Proposed Roadway Typical Section Drawing:

1. Design Speed
2. Limits (station limits of the typical section shown if available, may include other limits description, i.e., mile posts, street names, etc.)
3. Lanes (dimension width, show cross slope of each lane, label bike and HOV lanes)
4. R/W Line (graphically show, label and dimension from centerline const.)
5. Shoulder (dimension width, show cross slope, paved shoulder is dimensioned and labeled separately)
6. Curb (graphically show curb, label curb type)
7. Median (dimension width, show slopes, graphically show whether median is typically depressed or raised)
8. Centerline Construction and/or Baseline Survey (graphically show and label)
9. Profile Grade Point (label)
10. Slopes (dimension and label)
11. Border Width (dimension and label for new construction)
12. Ditches (show typical front slope and typical back slope, dimension typical ditch width and depth, and label)
13. Natural Ground Line (graphically show and label)
14. Pavement and Roadbed (graphically show)
15. Barriers (graphically show, dimension, and label)
16. Sidewalk or Shared Use Path (graphically show, dimension, and label)

Ref: PPM Vol. 1, Section 16.2.3

Typical Section Packages

- **True or False:**
  The Typical Section Package Proposed Typical Section Sheets should match *exactly* the Typical Section Sheets shown in the Construction Plans?

False: The Typical Sections in the Construction Plans provide additional construction details not required in the Typical Section Package.

Typical Section Packages

The typical section package consists of a Project Controls Sheet and Project Identification/Proposed Typical Section Sheet. The Project Identification/Proposed Typical Section Sheet should not be confused with the Typical Section Plan Sheet, which is part of the Contract Plans Set and is discussed in ***Chapter 6*** of Volume 2. The Project Controls Sheet contains the project data, which serves as a basis for selecting criteria and establishing project standards for cross sectional elements. The Project

Ref: PPM Vol. 1, Section 16.2.3

- **True or False:**
  The Typical Section Package Proposed Typical Section Sheets should match *exactly* the Typical Section Sheets shown in the Construction Plans?

False: The Typical Sections in the Construction Plans provide additional construction details not required in the Typical Section Package.

Typical Section Packages

Which Typical belongs in a Design Typical Section Package?

Construction

Design

Typical Section Packages

"Match Existing" noted on the Design Typical Section Package, without reference to typical lane cross slopes, will require the package to be returned for correction and resubmittal.

Typical Section Packages

Where there is a range of existing cross slopes for milling & resurfacing Typicals, label the cross slope range per lane.

Typical Section Packages

Note the common construction notes & details that are not required on Design Typical Sections:

Design

Const.

Typical Section Packages

Label Typical Lane Width Dimensions.

Although lane widths may vary, label the proposed typical lane width.

Unless an auxiliary lane is a constant feature within a Typical, there is no need to depict on the drawing – same applies to transition areas.

Typical Section Packages

Design Speed Selection – Projects Using RRR Criteria

- **Scenario:**

  You have a milling and resurfacing project, 4-lane divided, urban principal arterial roadway with curb and gutter. Original Design Speed was 45 mph.

  Prior to your project, a speed study was performed and an increase of Posted Speed from 45 mph to 50 mph was approved for the entire project corridor.

- **What Design Speed do you select?**

Typical Section Packages

Design Speed Selection – Projects Using RRR Criteria

- Design Speed *should* not be less than legal posted speed.
- Design Speed *should* be the original design speed for RRR projects.

Design speed should not be less than the legal posted speed. The design speed used in the original design of the highway should be used for RRR projects. However, there may be situations where the existing posted speed on the highway is different than that used in the original design of the highway. The decision to modify the posted speed limit after the construction of the original project was completed would have been made under the authority of the District Traffic Operations Engineer (DTOE). In this case, the selected design speed must be jointly approved by the District Design Engineer and the DTOE. This is to be documented on the Typical Section Package as described in ***Section 16.2.3*** of this Volume. New project features and the correction of features having a significant crash history must be designed using a design speed equal to or greater than the posted speed and process Design Exceptions or Design Variations for those new design elements that do not meet the criteria for the higher speed. See ***Table 25.4.4.1*** for further guidance.

Contradiction?

Ref: PPM Vol. 1, Section 25.4.4

Typical Section Packages

Design Speed Selection – Projects Using RRR Criteria

- Posted Speeds may change in the future under the authority of the District Traffic Operations Engineer (DTOE).

Design speed should not be less than the legal posted speed. The design speed used in the original design of the highway should be used for RRR projects. However, there may be situations where the existing posted speed on the highway is different than that used in the original design of the highway. The decision to modify the posted speed limit after the construction of the original project was completed would have been made under the authority of the District Traffic Operations Engineer (DTOE). In this case, the selected design speed must be jointly approved by the District Design Engineer and the DTOE. This is to be documented on the Typical Section Package as described in ***Section 16.2.3*** of this Volume. New project features and the correction of features having a significant crash history must be designed using a design speed equal to or greater than the posted speed and process Design Exceptions or Design Variations for those new design elements that do not meet the criteria for the higher speed. See ***Table 25.4.4.1*** for further guidance.

Ref: PPM Vol. 1, Section 25.4.4

Typical Section Packages

Design Speed Selection – Projects Using RRR Criteria

- Conclusion: For the scenario described, select Design Speed = Original Design Speed. For new project features, select a Design Speed equal to or greater than the Posted Speed.

Design speed should not be less than the legal posted speed. The design speed used in the original design of the highway should be used for RRR projects. However, there may be situations where the existing posted speed on the highway is different than that used in the original design of the highway. The decision to modify the posted speed limit after the construction of the original project was completed would have been made under the authority of the District Traffic Operations Engineer (DTOE). In this case, the selected design speed must be jointly approved by the District Design Engineer and the DTOE. This is to be documented on the Typical Section Package as described in ***Section 16.2.3*** of this Volume. New project features and the correction of features having a significant crash history must be designed using a design speed equal to or greater than the posted speed and process Design Exceptions or Design Variations for those new design elements that do not meet the criteria for the higher speed. See ***Table 25.4.4.1*** for further guidance.

Ref: PPM Vol. 1, Section 25.4.4

Typical Section Packages

Design Speed Selection – Projects Using RRR Criteria

Useful reference table for Design Speed Selection on RRR projects.

Table 25.4.4.1 RRR Design Speed vs. Posted Speed

Condition	Establishing the Proposed Project Design Speed (DS_p)
CASE 1	Use the design speed used in the original design of the highway. **$DS_p = DS_o$**
CASE 2	Use the design speed used in the original design of the highway unless a reduced design speed (not less than posted speed) is approved by the DDE and the DTOE. **$DS_p = DS_o$**
CASE 3	Use the design speed used in the original design of the highway unless there is a significant crash history associated with a specific highway feature. If so, then the design speed used in correcting the feature must be equal to or greater than the posted speed. The posted speed must also be used as the design speed for any other new highway features (not replacements). Special attention should be given to curb and gutter sections. **$DS_p = DS_o$** and **$DS_p = PS$** (for design of features that are new or have a significant crash history)

LEGEND
DS_o = Design speed used in the original project
DS_p = Proposed design speed for project
PS = Existing (or proposed if different) posted speed

Ref: PPM Vol. 1, Section 25.4.4

Design Exception & Variation Reports

- **References:**
  - Plans Preparation Manual, Volume 1
  - Chapter 23
- **Central Office Training:**
  - 2017 Training Schedule:

    http://www.fdot.gov/roadway/QA/data/QA-Training-Schedule.pdf
  - Training Materials:

    http://www.fdot.gov/roadway/QA/Training.shtm
- **When in doubt: Call us!**

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Chapter 23

Design Exceptions and Design Variations

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Design Exception & Variation Reports

❖ Crash Analysis – Reminders

- Crash Analysis of the most recent 5-years of approved crash data is required;
- Include original CAR crash data output in the report as an appendix;
- If a crash may be influenced by the substandard element under review, obtain and review the Long Form Crash Report for more details;
- Contributing causes of "Careless Driving" or "Alcohol Drugs – Under the Influence" does not automatically eliminate the crash from further consideration.

Remember: Analysis is defined as "the detailed examination of the elements or structure of something, typically as a basis for discussion or interpretation." (OED)

Crash Analysis should provide a detailed review of the crash data as related to the substandard element; not just a summary of crash statistics.

Design Exception & Variation Reports

❖ Crash Analysis (continued)

- If Long Form Crash Report is included in the Report Appendix, make sure that the personal information is removed – or, better option, do not include the page in the Exception/Variation Report.

Note: PPM Chapter 23, Section 23.7.3 implies that crash analysis may not be required for Design Memorandums; however, for Design Memos crash history should always be reviewed if it is relevant to the element under review.

DOCUMENTS WITH THIS NOTICE SHALL BE USED ONLY FOR PURPOSES OF THE FDOT. SEE TITLE 23, USC, SECTION 409.

FLORIDA TRAFFIC CRASH REPORT

LONG FORM [X] SHORT FORM [ ] UPDATE [ ]

(Electronic Version)

HIGHWAY SAFETY & MOTOR VEHICLES,
TRAFFIC CRASH RECORDS
NEIL KIRKMAN BUILDING, TALLAHASSEE, FL 32399-0537

Date of Crash	Time of Crash	Date of Report	Invest. Agency Report Number	HSMV Crash Report Number
06/Dec/2012 02:24 PM	06/Dec/2012 02:24 PM	06/Dec/2012 12:00 AM	12120094	83452090

CRASH IDENTIFIERS

County Code	City Code	County of Crash	Place or City of Crash	Within City Limits	Time Reported	Time Dispatched
12	42	LAKE	LEESBURG	Yes	06/Dec/2012 02:24 PM	06/Dec/2012 02:27 PM

Time on Scene	Time Cleared Scene	Completed	Reason (if Investigation NOT Completed)	Notified By
06/Dec/2012 02:28 PM	06/Dec/2012 03:06 PM	Yes		Law Enforcement

ROADWAY INFORMATION

Crash Occured On Street, Road, Highway	At Street Address#	At Lattitude and Longitude
SR 44		

At Feet	Or Miles	Direction	From Intersection With Street, Road, Highway	Or From Milepost #
200		East	US 27	

Road System Identifier	Type Of Shoulder	Type Of Intersection
3 State	1 Paved	1 Not at Intersection

CRASH INFORMATION (Check if Pictures Taken) [ ]

light Condition	Weather Condition	Roadway Surface Condition	School Bus Related	Manner Of Collision
1 Daylight	1 Clear	1 Dry	1 No	4 Sideswipe, same direction

First Harmful Event Type	First Harmful Event	First Harmful Event Location	Within Interchange	First Harmful Event Relation to Junction
	14	1 On Roadway	No	1 Non.Junction

Contributing Circumstances: Road	Contributing Circumstances: Road	Contributing Circumstances: Road
1 None		

Contributing Circumstances: Environment	Contributing Circumstances: Environment	Contributing Circumstances: Environment
1 None		

Work Zone Related	Crash In Work Zone	Type Of Work Zone	Workers In Work Zone	Law Enforcement In Work Zone
1 No				

VEHICLE (Check if Commercial) [ ]

Vehicle	Motor Vehicle Type	Hit and Run	Veh License Number	State	Reg. Expires	Permanent Reg.	VIN
1	1 Vehicle in Transport	1 No	[redacted]				

Year	Make	Model	Style	Color	Extent of Damage	Est. Damage	Towed Due To Damage	Vehicle Removed By	Rotation
1996	FORD		4D	GRY	Minor	1000	No	DRIVER	Driver

Insurance Company	Insurance Policy Number
PEAK PROPERTY AND CASUALTY INS. CO.	095587340

Name of Vehicle Owner (Check Box If Business)	Current Address (Number and Street)	City and State	Zip Code
[redacted]			

Trailer One:	License Number	State	Reg. Expires	Permanent Reg.	VIN	Year	Make	Length	Axles

Design Exception & Variation Reports

Mitigation

- Efforts to reduce the severity or negative impact of a substandard element should always be considered and noted.
- The *Mitigation Strategies for Design Exceptions* developed by FHWA is an excellent reference for mitigation measures.

Design Exception & Variation Reports

- **Mitigation (continued)**
  - **Scenario:** You have substandard cross slopes within the project corridor, ranging from flat areas to areas that are just below 0.015. Review of traffic operations indicates no operational issues. Crash history indicates no attributable crashes.
  - **As a cost saving measure, should you recommend no correction?**

Design Exception & Variation Reports

- **Mitigation (continued)**
  - If there are no significant constraints, such as right-of-way, environmental, or utilities, correction of the most severe areas of cross slope deficiency should be considered.
  - Often, the cost of correction is reasonable. Discuss the consideration with your PM and District Design.

Note: Although cross slope is mentioned as an example, consider for other elements as well.

Design Exception & Variation Reports

❖ Presentation / Organization

- Tables, Tables, Tables – Where possible use tables to organize the key data presented such as the deficient element vs. criteria, or crash analysis.
- Focus tabulated data on substandard areas discussed in Report, rather than the entire project corridor.

TABLE 1 – DEFICIENT CROSS SLOPE LOCATIONS ON SR 500 (US 441) SOUTHBOUND TRAVEL LANES

DEFICIENT CROSS SLOPE LOCATION	CROSS SLOPE (ft/ft)	LENGTH (ft)	LANE DESIGNATION	SIDE
MP 14.852 to MP 14.888 Sta. 207+32.74 to Sta. 209+20	0.011 to 0.015	187.26	Outside	Southbound
MP 14.852 to MP 14.888 Sta. 207+32.74 to Sta. 209+20	0.006 to 0.015	187.26	Inside	Southbound
MP 15.119 to MP 15.747 Sta. 221+40 to Sta. 254+60	0.003 to 0.015	3320	Outside	Southbound
MP 15.119 to MP 15.747 Sta. 221+40 to Sta. 254+60	0.002 to 0.015	3320	Inside	Southbound
MP 16.043 to MP 16.691 Sta. 270+20 to Sta. 304+40	0.004 to 0.015	3420	Outside	Southbound
MP 16.043 to MP 16.691 Sta. 270+20 to Sta. 304+40	0.006 to 0.015	3420	Inside	Southbound
MP 17.001 to MP 17.640 Sta. 320+80 to Sta. 354+58.33	0.007 to 0.015	3378.33	Outside	Southbound
MP 17.001 to MP 17.640 Sta. 320+80 to Sta. 354+58.33	0.004 to 0.015	3378.33	Inside	Southbound

(Credit: ICON Consultant Group, Inc.)

Design Exception & Variation Reports

❖ Presentation / Organization

- When including exhibits, such as a Typical Section, illustrate the subject of the Report;
- Avoid selecting the general section from the Typical Section Package, if it does not illustrate the element under consideration.

Signing and Sealing

- Comply with Florida Administrative Code (F.A.C.) Requirements as set forth in 61G15-23.
- Digital or Electronic Signing and Sealing of Typical Section Packages or Design Exception/Variation Reports, not accepted at this time.
- Submittal / Approval Letter for Design Exception / Variation Reports should be viewed as an administrative document – not part of the S&S Report.

Excerpt from 61G15-23.001: If the engineer signing, dating and sealing an engineering report or other document is practicing through a duly authorized engineering business, the printed name, address and certificate of authorization number of the engineering business shall be placed on the signature page or cover letter.

One Final Note: All Typical Section Packages and Design Exception/Variation Reports should be submitted as "complete" and should be signed & sealed.

Thank you!

Questions?

Contact George Borchik:
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