

Practical Design Overview and Q&A Forum



What is Practical Design

“A project development philosophy whereby projects are scoped to meet the purpose and need, avoiding the desire to arbitrarily bring the facility up to a maximum level for all design elements. ...using the savings for more projects”

NCHRP Synthesis 443

NCHRP
SYNTHESIS 443

NATIONAL
COOPERATIVE
HIGHWAY
RESEARCH
PROGRAM

Practical Highway
Design Solutions

A Synthesis of Highway Practice
TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES



Evolution of Practical Design

- ◆ Began in Missouri – 2005
- ◆ 6 states Documented Policy
- ◆ 2012 NCHRP Synthesis Project
 - ✓ How states defined & implemented
 - ✓ Barriers & Lessons Learned
 - ✓ Practical Design vs Traditional
 - ✓ Relationships to other initiatives
 - ✓ Application of design exceptions



“Practical” States

- ◆ Missouri – 2005 Design
- ◆ Idaho – 2007 Solutions
- ◆ Kentucky – 2008 Solutions
- ◆ Kansas – 2009 Improvements
- ◆ Oregon – 2009 Design
- ◆ Utah – 2011 Design



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Common themes

Among all 6 Practical Design states

- ◆ Initiated program from a need to maximize existing funds
- ◆ Focused effort around a clearly defined “Purpose & Need” Statement
- ◆ Developed guidance or policy for Practical Design



FDOT Practical Design

- ◆ Visit from “Practical” States @ January 2012 Executive Board
- ◆ List of items for 3R scoping – March 2012
 - ✓ Items eliminated from all resurfacing projects
 - ✓ Items to remain in resurfacing projects
 - ✓ Items to remain in resurfacing projects at Engineer’s discretion
- ◆ Central Office reviews of Interstate 3R projects – Spring 2012
- ◆ Project Management Memo – August 2012



Project Management Memo

- ◆ List of Optional Items to review on 3R projects
- ◆ Target 10% Construction Cost Savings
- ◆ Document decisions, rationale and savings in memo for each evaluated 3R project
- ◆ Submit 3R project review memo's to Production Support Office



New Developments

- ◆ Formation of Practical Design Task Team
 - ✓ Kurt Lieblong, Project Review
 - ✓ Michael Shepard, Roadway Design
 - ✓ Bob Crim, Production Support
 - ✓ John Fowler, Roadway Design
 - ✓ Sean Masters, Project Review
- ◆ Central Office position with emphasis on implementation of Practical Design
- ◆ Changes to Variation Process



Design Variations

 <p style="text-align: center;">Florida Department of Transportation www.flhwy.com 400 Southwest Street Tallahassee, FL 32304-6100</p> <p>ROADWAY DESIGN BULLETIN 13-08</p> <p>DATE: June 5, 2013</p> <p>TO: District Directors of Transportation Operations, District Directors of Transportation Development, District Design Engineers, District Structures Design Engineers, District Consultant Management Engineers, District Construction Engineers</p> <p>FROM: Michael Shepard, P.E., State Roadway Design Engineer <i>Michael Shepard</i></p> <p>COPIES: Tom Eyrone, Brian Blanchard, Duane Brantigan, David A. Sailer, Bob Cline, Tim Latten, Mark Wilson, Bruce Deen, John Kruse, Monica Goodwin (FHWA)</p> <p>SUBJECT: Design Variation Approval Requirements</p> <p>This bulletin revises the Department's policy for the approval of Design Variations.</p> <p>REQUIREMENTS</p> <p>Replace <i>Plans Preparation Manual, Volume 1, Section 23.8</i> with the following:</p> <p>23.8 Design Variation Approval</p> <p>Design Variations only require District approval unless identified as requiring Central Office approval in Section 23.9 (see Exhibit 23-8). Design Variations requiring Central Office approval from the Chief Engineer, State Roadway Design Engineer and/or the State Structures Design Engineer follow the process in Sections 23.4-23.7. Design Variations approved solely by the District may be submitted as a formal Design Variation or as a Design Memorandum.</p> <p>A formal Design Variation is required for any design criteria impacting clear zones, sight distance, or Americans with Disabilities Act (ADA) compliance. The Responsible Engineer or Professional attaches a Submittal Approval Letter (SAL) to a sealed report and submits them to the District or Turnpike Design Engineer. The District or Turnpike Design Engineer then approves or denies the request and notifies the Responsible Engineer or Professional.</p> <p style="text-align: center;">www.dot.state.fl.us</p>	<p style="text-align: right;">Roadway Design Bulletin 13-08 Page 2 of 2</p> <p>District approval of all other Design Variations, not requiring approval by the Central Office, may be submitted as a signed and sealed Design Memorandum and approved by the District or Turnpike Design Engineer. Supporting documentation may be provided through other formal documents such as, but not limited to, Bridge Hydraulic Reports, Typical Section Packages or Pavement Design Reports.</p> <p>At a minimum, all Design Variations must address the following items in the submittal:</p> <ol style="list-style-type: none"> 1. Design criteria versus proposed criteria. 2. Reason the design criteria are not appropriate. 3. Justification for the proposed criteria. 4. Review and evaluation of the most recent certified 5 years of crash history for Central Office approved Design Variations, formal District Design Variations, and for any others as requested by the District. 5. Any background information which documents or justifies the request. <p>BACKGROUND</p> <p>The Office of Design, District Offices and industry partners have been evaluating different ways to provide cost savings during the design process. One of the recommendations is a reduction in the analysis and the documentation requirements associated with Design Variations. This will also bring more consistency, predictability and responsibility to the way Design Variations are developed and processed across the state.</p> <p>IMPLEMENTATION</p> <p>This change allows additional flexibility in the Design Variation process. Implement this policy on all Design Variations that have not yet been submitted for approval.</p> <p>CONTACT</p> <p>Ben Gureff, P.E. Roadway Design Engineer Florida Department of Transportation 400 Southwest Street, MS 13 Tallahassee, FL 32309-6450 Phone (904) 414-4118 Ben.Gureff@dot.state.fl.us</p> <p>MS/RQ</p> <p style="text-align: center;">www.dot.state.fl.us</p>
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Future Activities

- ◆ Finalize Task Team
- ◆ Regular meetings to determine policy & direction
- ◆ Review and update of the 3R list
- ◆ Defining Purpose & Need in project scopes
- ◆ Expand QA to include arterial 3R projects



Practical Design Questions



Practical Design Questions

- ◆ How should designers apply practical design to structural design?



Before Condition



Practical Design Questions

- ◆ How should designers apply practical design to structural design?



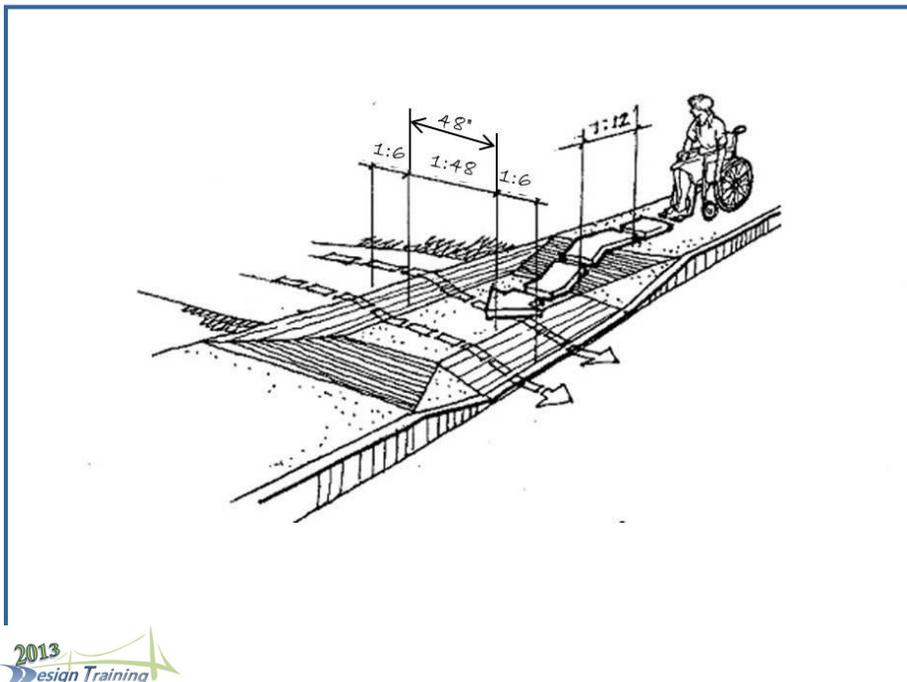
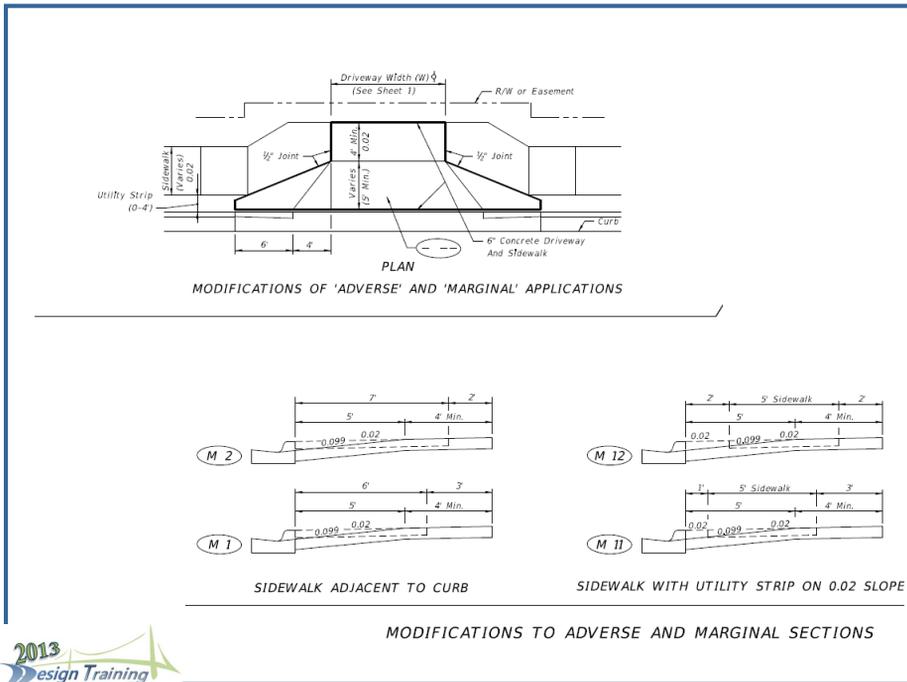
After Condition



Practical Design Questions

- ◆ How should designers apply practical design to structural design?
- ◆ Answer – A structural design that adheres to practical design will consider the purpose and need of the proposed improvement and attempt to marry the required criteria with sound engineering judgment. The previous slides show an off-system bridge that carries 10 vpd. The new structure has one lane, with a 14-foot clear width, 1-foot high timber curbs, and uses timber for the superstructure. The new structure is not a typical FDOT design, and a design exception was required for bridge width. The new bridge fulfilled the purpose and need of the bridge replacement project while integrating fully with the rural character of the surrounding area and the low traffic volumes and speeds of this one-lane dirt road.





Practical Design Questions

- ◆ Should we continue to replace faded signs in design? It is my understanding this is a Maintenance function, but if we don't do it, will it get done? Keep in mind, this is cheap for a post mounted sign, but what about cantilever signs? Once we replace those panels, do we also need to light the sign and meet new windload requirements? That means a whole new sign, which is a big cost.
- ◆ Answer – For post mounted signs if the sign has beaded sheeting and 10 years old, it probably needs replacing. If it's prismatic sheeting, the life span may be closer to 15 years. Generally, don't replace cantilever signs in a RRR project unless specifically called for in the scope. Expect guidance in the next 6 months for cantilever signs.



Practical Design Questions

- ◆ Sometimes the old milling limits fall outside the “50’ from the radius” rule. Can we use our judgment and mill a bit farther when needed?
- ◆ Answer – Absolutely. Practical design encourages the use of sound engineering judgment and discourages a blind reliance on rigid criteria.



Practical Design Questions

- ◆ Are FDOT's project managers going to be able to "let go" of the Plans Preparation Manual (PPM)?
- ◆ Practical design represents a philosophical shift for the Department, and with the proper guidance and training, our PMs will be able to successfully adapt to the new way of thinking. However, FDOT is not "letting go" of the PPM. The standards laid out within the PPM are still (and will continue to be) the Department's minimum standards for highway construction. Situations will exist where these standards do not apply, and sound engineering judgment should be used when applying criteria outside of the PPM's allowable ranges. This in harmony with current guidance in the PPM.



Practical Design Questions

- ◆ Who decides what flies? Will deviations from standard require a variation or exception in each instance?
- ◆ Any deviation from Department standards will still require a variation, and failure to meet AASHTO criteria for any of the 13 controlling design elements will still require an exception. Ideally, the decision of whether or not to pursue a variation or exception will be mutually agreed upon by both the Department and the Engineer of Record.



Practical Design Questions

- ◆ Why can't you use Florida Greenbook standards on state roads? It meets minimum safety criteria but gives designers more leeway than the PPM. If it's good enough for municipalities....
- ◆ Answer – The State Highway System (SHS) is comprised of roadways that generally carry higher traffic volumes and higher percentages of trucks at higher speeds than most city or county roads. The criteria in the PPM were developed specifically with these conditions in mind.



Practical Design Questions

- ◆ I would like to hear more about what would justify cross slope correction on a RRR project. Can you provide examples of what to look for, such as types of crashes that may relate to substandard cross slopes, drainage issues, etc.
- ◆ The factors that would justify correcting cross slope are generally the same factors the would justify not correcting cross slope as part of a design exception, only pointing in the other direction. Examples include:
 - ✓ Design speed, AADT, and truck volume
 - ✓ Crash history, especially wet weather involving hydroplaning
 - ✓ Benefit – cost analysis
 - ✓ Does the roadway drain in rainy conditions?
 - ✓ Are mitigation strategies applicable?



Practical Design Questions

- ◆ Sign replacement on overpasses/bridges and cantilever sign structures – With larger lettering sizes in the MUTCD, do we replace these signs with the same size or go to bigger letter size and panel?
- ◆ Answer – Existing sign panels are not required to be replaced for the sole reason that larger letter sizes are specified in the MUTCD. More guidance will be coming in the next 6 months; however, if the replacement of the cantilever sign structure is specifically called for in the scope, replace according to current MUTCD guidelines.



Practical Design Questions

- ◆ Stop signs at businesses and private drives – Do we replace with full one ways or divided highway panels? Many of these signs do not have dates and may not be required, but are existing in the field.
- ◆ Answer – The Department is not responsible for replacing stop signs on off-system side streets or private drives. If we do a widening and have to remove, we will replace.



Practical Design Questions

- ◆ Do we replace stop bars at businesses and private drives if they are farther than 30' from travel lane?
- ◆ Answer – The Department is not responsible for replacing stop bars on off-system side streets or private drives.



Practical Design Questions

- ◆ If advanced street name signs were installed one or two years ago but were designed under a shorter distance from the intersection, do we remove panels and place at new distances, per the MUTCD warning sign distance table.
- ◆ Answer – The distances changed in the MUTCD are not significant enough to justify replacing; therefore, we would not replace or relocate solely for this purpose.



Practical Design Questions

- ◆ From the current guidance on inlet top replacement, it sounds like designers should notify Maintenance if there is a hazard. Concrete spalls should not be replaced. Is this always the case? If that is the case, when would a designer need to call for inlet top replacement in the plans?
- ◆ If the inlet is not fully functional, then it needs to be fixed immediately, and Maintenance should be notified. If the inlet is still functioning properly, then there should not be a need to replace it, and it should not be included in the plans. There may be instances when ADA or other issues require inlet top replacement as part of the design plans.



Practical Design Questions

- ◆ How will practical design be implemented? The EOR may have a different opinion on practicality.
- ◆ A task team has been formed, and that group is still new and deciding what tasks need to occur first. Written policy and training will be necessary to implement practical design statewide. The EOR is expected to have his/her own opinions and to act according to his/her best judgment. The gist of practical design is that EORs are being asked to rely on their engineering judgment, instead of rigidly adhering to criteria found in manuals.



Practical Design Questions

- ◆ When will the Department begin training engineers on the Florida DOT practical design philosophy in lieu of relying on the “List of Optional Items to Review on RRR Projects?”
- ◆ The development of action items is still ongoing. Training will be critical to implementation of practical design, but the task team has identified the creation of written policy (instead of just having “The List”) as the number one priority. To date, no timeline for these tasks has been set.



Practical Design Questions

- ◆ An engineer undergoes a Design Exception analysis for superelevation correction using a Florida-calibrated Highway Safety Manual (HSM) analysis. This analysis shows that superelevation should be corrected. However, this item is on the “To Be Eliminated from All Resurfacing Projects” list. Do the HSM results trump “The List?”
- ◆ Answer – Neither the HSM nor “The List” should be construed as a rigid policy that must be met at all times. Both are tools to assist engineers with making engineering decisions that are in the public’s best interest. Ultimately, the engineer needs to use his/her best judgment and document the reasoning.

