



Overview and Background

- ▶ Practical Design Background
 - Other States
 - NCHRP Synthesis
- ▶ Practical Design at FDOT
- ▶ Practical Design Results to Date

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

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



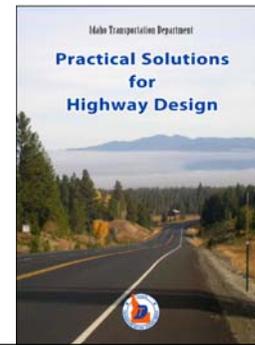
Missouri – Practical Design

- ▶ “Building good projects everywhere – rather than perfect projects somewhere”
- ▶ Projects with design elements that addressed identified deficiencies
- ▶ Define Scope by focusing on Purpose & Need
- ▶ Ground Rules: Safety, Communication & Quality
- ▶ Guidelines integrated into “Engineering Policy Guide”



Idaho – Practical Solutions

- ▶ “Build cost-effective projects to achieve a good, safe and efficient transportation system”
- ▶ Properly define scope by focusing on Purpose & Need.
- ▶ Challenge traditional standards.
- ▶ Goal – “best value for least cost”
- ▶ “Practical Solutions for Highway Design” Guidelines



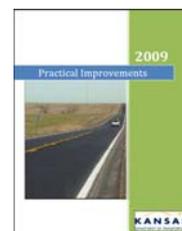
Kentucky – Practical Solutions

- ▶ “Consider and examine a range of approaches and determine which solution meets the purpose and need with least cost”
- ▶ Define & clarify the Purpose & Need
- ▶ Balance among operational efficiency, safety, project constraints and costs
- ▶ “Practical Solution Concepts for Planning and Designing Roadways in Kentucky”



Kansas – Practical Improvements

- ▶ “To maximize the use of available transportation funds, cost-effective solutions must be developed to meet project needs”
- ▶ “Common sense” approach that combines flexibility within current criteria with choices outside those criteria
- ▶ Consider purpose and need in developing project scope.
- ▶ “Practical Design Guidebook”

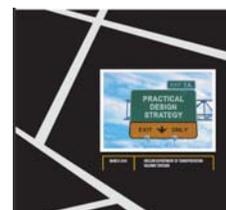


Oregon – Practical Design

- ▶ “Provide the **Right Projects...at the Right Time...at the Right Cost...in the Right Way**”
- ▶ Optimize the Highway system
- ▶ Solutions that address purpose and need
- ▶ Designs that make system better
- ▶ “Practical Improvements Guide”

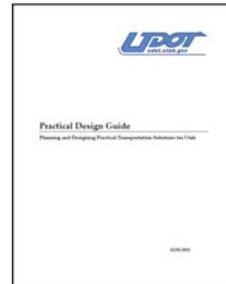


OREGON.gov



Utah – Practical Design

- ▶ “Appropriately allocate limited resources to maximize system wide improvements”
- ▶ Goals
 - Optimize the transportation system
 - Meet the goals of the project objective statement
 - Design most efficient method to achieve Objective statement
- ▶ Use exception process to obtain flexibility
- ▶ “Practical Design Guide”



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

Value Engineering

- ▶ Performed by a multi-disciplined team
- ▶ Performed on large or complex projects
- ▶ VE looks for solutions to satisfy a project's basic function at the lowest life cycle cost without compromising safety or performance.

Similar philosophy

Purpose & Need → Basic Function

Other States

NCHRP Synthesis 443

- ▶ States considering Practical Design Policy
 - Alabama
 - Florida
 - New York
 - Washington
 - Wisconsin

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



PROJECT MANAGEMENT MEMORANDUM 12-02

DATE: August 29, 2012

TO: District Design Engineers and District Consultant Project Management Engineers

FROM: Robert W. Criss, II, P.E., *Robert W. Criss, II*
Manager, Production Support Office

COPIES: District Director of Transportation Development, Four Rivers, District Strategist

SUBJECT: Resurfacing, Restoration and Rehabilitation (3R) Project Review

This memorandum establishes requirements for Districts to submit copies of completed 3R project review status reports, or other review documentation to the Production Support Office.

BACKGROUND
To date, the Districts were provided a “List of Optional Items to Review on 3R Projects” for use in reviewing all 3R projects bid as November 2011 and beyond. The list consists of 20 items grouped as follows:

1. To the extent possible, all Districts are to use this list for all 3R projects. A copy of an analysis shows that the savings in construction would be outweighed by the savings from operational with the 2011 implementation.
2. To Districts in Resurfacing Districts, there are items that are generally necessary to 3R projects and are not in the list, safety and security requirements of materials upgrade to the safety of the facility.
3. To Districts in Resurfacing Districts, there are items that are not in the list, safety and security requirements of materials upgrade to the safety of the facility.

The objective of this list is to identify project cost savings through a structured review approach to many of the items on the list. This approach, along with a request for information and a list of 20 items, was provided to the Districts’ management team at the March 2011 Executive Meeting. The project review, the Districts and input regarding the review, and the request for information on the list, are included in the project review memorandum in a separate appendix for each 3R project review.

PROJECT MANAGEMENT MEMORANDUM 12-02
Page 2
August 29, 2012

IMPLEMENTATION
Each District shall provide copies of completed 3R project review status and any other review documentation to Production Support Office. This information will be used to compile cost savings data, and identify Practical Design concerns, questions and concerns. The details and decisions documented in the 3R project reviews will be summarized, shared with the District, and used to establish a consistent approach to the review process. These requirements will remain in effect until notified otherwise.

<http://www.dot.state.fl.us/officeofdesign/CPR/ProjectScopingfor3RWork.shtm>

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

FHWA Guidance on Design Exceptions

“We encourage State DOT’s and local agencies to consider using design exceptions as a useful tool to achieve a design that balances project and user needs, performance, cost, environmental implications, and community values. State DOT’s or local authorities must evaluate, approve and, document design exceptions.”

Effective Oct 1, 2012, All NHS projects under Map-21 must meet FHWA approved standards or receive approved Design Exceptions.

Design Variations

 <p>Florida Department of Transportation <small>6885 University Blvd Tallahassee, FL 32310-4020</small></p> <p>ROADWAY DESIGN BULLETIN 12-08</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 Wynn, Brian Blanchard, Deane Brantigan, David A. Saffler, Bob Criss, Tim Lathan, Mark Wilson, Bruce Dena, John Kravac, Monica Goodwin (DTRSA)</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><i>Replaces Plans Preparation Manual, Volume 1, Section 21.8 with the following:</i></p> <p>21.8 Design Variation Approval</p> <p>Design Variations only require District approval unless identified as requiring Central Office approval in Section 21.1 (see Exhibit 21-8). Design Variations requiring Central Office approval shall be: Chief Engineer, State Roadway Design Engineer, and/or the State Structures Design Engineer. Follow the process in Section 21.8.21.7. Design Variations approved solely in 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 Substantial Approval Letter (Exhibit 21-4) to a sealed report and submits them to the District or Tampa Bay Design Engineer. The District or Tampa Bay Design Engineer then approves or denies the request and notifies the Responsible Engineer or Professional.</p> <p><small>www.dot.state.fl.us</small></p>	<p>Small text at top right of page: Roadway Design Bulletin 12-08, Page 1 of 7</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 Tampa Bay 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>As 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 3 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 repeatability 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 Carroll, P.E. Roadway Design Engineer Florida Department of Transportation 625 Northwestern Street, MS 73 Tallahassee, FL 32310-4020 Phone (904) 414-4318 Benjamin.Carroll@fldot.state.fl.us</p> <p>MSWQ</p> <p><small>www.dot.state.fl.us</small></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

Results

Results – Interstate RRR

- ▶ All Interstate RRR projects subject to Central Office review
 - Request plans around 90% (Phase III)
 - Review is comprehensive: Roadway, Structures, Signing & Pavement Marking, Signalization, etc.
 - Not based solely on the List of Optional Items – all items included in the design are subject to review
 - Process typically takes about 2–3 months.
 - Cost savings vs. Cost to redesign
- ▶ Timing is not ideal – goal is to implement during project scoping

Results – Interstate RRR

- ▶ Typical Questions or Comments
 - Project need is not immediately clear
 - Response should demonstrate need based on engineering data
 - “Because the manual says so” does not demonstrate a need
 - Was a variation/exception considered?
 - Were alternative improvements considered?
 - Mitigation strategies
 - The Department is willing to save even minor amounts of money

Results – Interstate RRR

- ▶ Cost Savings
 - Lettings May 2012 – October 2013
 - Reviewed 15 Interstate RRR projects
 - \$4.2 million in cost savings
 - Approximately 6.5% of the projects' cost

- ▶ “Put more product out on the street”

Results – Interstate RRR

- ▶ Observations
 - Big ticket items = more opportunity for cost savings
 - Pavement
 - Structures
 - Drainage improvements
 - Fencing
 - Signing
 - Areas of focus:
 - Cross slope correction
 - Front slope correction
 - Sign replacement
 - Pavement thickness

Results – Arterial RRR

▶ Review Checklist

- To be completed for every RRR project starting with September 2012 letting
- Submitted to Central Office Production Support
- Optional items being included in RRR projects should be supported with engineering observations

PART 1 – To Be Eliminated from All Resurfacing Projects

N/A	Not Included	Included	To Be Eliminated
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Milling and resurfacing of travel lanes in areas where the only deficiency is due to ride, typically due to manholes and utilities. (We have ride only projects that can be programmed to address manhole/utility issues.)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Placing FC-5 in median crossovers of multi-lane, high-speed facilities (By policy, this practice is currently optional. Districts choose to pave crossovers to avoid complaints after construction.)
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Minor cross slope correction (see new PPM for flexibility).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Minor super-elevation correction (see new PPM for flexibility).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Continuous post-and-beam concrete bridge railing thrie-beam retrofits (when bridge railing has never been hit).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Upgrade existing guide rail to picket rail when drop-off hazard is less than 5'-0" (continuous picket rail OK if drop-off hazard varies and at least 60" in height at some locations).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Milling and resurfacing paved side streets beyond the return radius/right-of-way line unless needed for harmonization of public side streets (but not greater than 50').
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Barrier selection for aesthetic not safety reasons (e.g., choosing to install barrier wall instead of guardrail because it is more aesthetically pleasing. In addition, guardrail reduces g-forces experienced by drivers when impacted).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rock bags for inlet protection in curb and gutter areas (see new Erosion and Sediment Control Manual).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cross drain extensions that are beyond shoulder standards but within the clear zone and have no significant crash history (determined by District Safety Engineer).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Side drain end treatments outside the clear zone when not needed for a hydraulic purpose.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Removing nonstandard drainage structures and slope protection that are still functioning.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Side drain safety upgrades (within 30' of each other, replacing with pipe and a ditch bottom inlet).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Replacing functional ditch pavement.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Upgrade of functioning pedestrian detectors (push-buttons) with newer models (unless we are touching the ped heads/ped poles, then ADA kicks in).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Upgrades at driveway flares when not required.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Construction of curb ramps in areas without sidewalk.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Enhanced landscaping.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Patterned pavement crosswalks (unless the funding and maintenance of these are the local agency's responsibility).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Project-wide sign replacement without evaluation.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Repairing concrete spalls at curb inlets, MESs, headwalls, etc. (unless these create a hazard themselves).
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mowing and litter removal on pavement only projects.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Paving gore areas with FC-5.

Results – Arterial RRR

- ▶ Cost Savings 9/12 – 3/13
 - 47 projects submitted checklists
 - Total initial cost: \$195.5 million
 - Cost savings: \$3.9 million (2.0%)
- ▶ Individual Project Statistics
 - 23 of 47 reported no cost savings
 - Individual project savings ranged from \$1,112 to \$693,993

Results – Arterial RRR

- ▶ Moving Forward
 - More review, QA, and direction is needed
 - Practical Design needs to be considered during scope development rather than at final plans

Case Studies

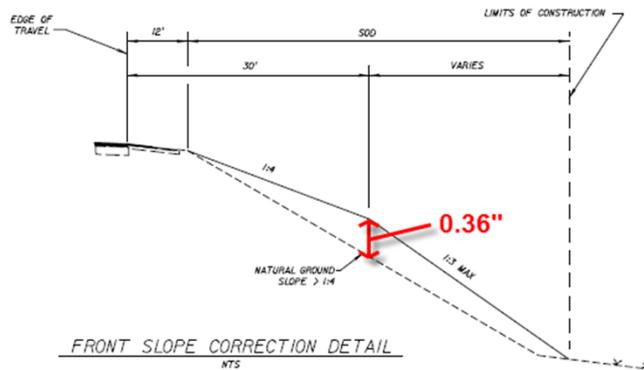
▶ Rural Interstate RRR – Front Slope Correction

SUMMARY OF FRONT SLOPE CORRECTION			
LOCATION		P	F
STA. TO STA.	SIDE	FILL (CY)	FILL (CY)
973+50.00 TO 974+50.00	LT.	29	
973+50.00 TO 974+50.00	RT.	6	
983+50.00 TO 984+50.00	RT.	1	
988+50.00 TO 989+50.00	RT.	2	
1089+50.00 TO 1090+50.00	LT.	35	
1089+50.00 TO 1090+50.00	RT.	17	
1108+50.00 TO 1109+50.00	RT.	1	
1114+50.00 TO 1115+50.00	RT.	3	
1114+50.00 TO 1115+50.00	RT.	6	
1118+50.00 TO 1119+50.00	RT.	3	
1165+50.00 TO 1166+50.00	LT.	4	
1165+50.00 TO 1166+50.00	RT.	20	
1168+50.00 TO 1169+50.00	LT.	1	
1168+50.00 TO 1169+50.00	RT.	16	
1177+50.00 TO 1178+50.00	RT.	4	
1178+50.00 TO 1179+50.00	LT.	1	
1180+50.00 TO 1185+50.00	LT.	62	
1180+50.00 TO 1184+50.00	RT.	23	
TOTAL FRONT SLOPE ESTIMATED FILL =		234	

Case Studies

▶ Rural Interstate RRR – Front Slope Correction

- 18' wide x 100' long = 1800 ft² = 200 yd²
- 1 CY = 0.18 in average depth



Case Studies

- ▶ Rural Arterial RRR – Cross Slope Correction
 - Only correcting cross slope < 1.5% or > 3.0%
 - District used engineering judgment to decide to correct cross slope
 - High speed facility (design speed = 55 mph)
 - High truck percentage (%T = 12%)
 - Crash history (129 crashes and 4 fatalities over 5 years)
 - Unique vehicle mix (truckers, commuters, agricultural)
 - Existing deficiencies for shoulder width and guardrail clearance that will not be corrected

Case Studies

- ▶ Rural Interstate RRR – Overhead Sign Replacement
 - Replace 28 overhead cantilever signs
 - Existing signs were constructed around 2001–2002 (only ten years old!)
 - 2007: New LRFD requirements
 - Scope: Upgrade signs
 - Practical Design review question: “Why are sign structures being replaced?”
 - 25 of the 28 sign structures were not replaced
 - \$1.9 million cost savings

