Performance-Based Practical Design

The State of the Practice and a look ahead

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Why it is essential for transportation professionals to gain expertise in practical design

Agencies are adopting this practice— in growing numbers.

FHWA/AASHTO endorse it – not likely to go away.

It’s a sound approach – and an improvement.
Times are changing, but why?

We’ve come a long way

Interstate system - done

National design guidance has improved consistency

Design process has become more efficient

Decades of safety research

Vastly improved roadway safety

New analysis tools are available
Why change is happening

Higher standards are not always **safer** (e.g. urban streets)

Higher standards may not fit the **context**

Higher standards may not be **affordable**

Cookbook standards approach to design diminishes **judgment**

Optimum design approach – **maximize performance** based on each roadway context
Practical Design: A new mindset – from ‘Bigger is Better’ to ‘Less can be More’

What it is:

• Focuses on satisfying project purpose and need with minimum acceptable standards
• ‘Design up’ from existing instead of beginning with ideal (maximum) standards
• Similar to VE – a value-for-money philosophy, approach

What it is not:

• Does not compromise safety
• An excuse to diminish environmental concerns or stakeholder engagement
• Should not be independent of context
Differences between the ‘standards driven’ and new practical design approaches:

**Standards-driven:**
- Design to standards
- Begins with ‘ideal’
- Prescriptive
- Converges from outset toward ‘best’ solution

**Practical design:**
- Begins by ‘building up’
- Standards adapted
- Design to budget
- Flexible
- Considers alternatives, iterates to ‘best’ solution
One step up...

Performance-Based Practical Design

Practical Design
Performance-based practical design

Performance-based: measure deficiencies, set targets, measure outcomes

Formulate and test alternatives

Utilize flexibility in design guidance

Eliminate non-essential elements (important environmental or contextual elements may be essential)

Use data, tools, performance measures to support decisions – and to evaluate outcomes

Fully consider: safety and operational performance, context sensitivity, life-cycle costs, long-range corridor goals, livability, and sustainability (scalable)
So many buzzwords… different names reflecting similar or identical principles….

Context-Sensitive Design*

Practical Design

Practical Solutions

Common-Sense Design

Performance-Based Practical Design

Practical Improvement

Etc….  

*Context-Sensitive Solutions (with a separate history) embodies all Practical Design Principles with added emphasis on sensitivity to “beyond the pavement” context
Barriers Perceived . . .

**Design Exceptions** – Now a positive indicator of flexible thinking, despite the added burden

**Liability** – Strict adherence to standards is not a protection. (Document analyses of costs/benefits/impacts and objective judgments in support of design decisions)

**Easier** – The best professionals like to think creatively, consider options, use judgment as opposed to a cook-book

**Faster** – Often takes much longer when high costs or impacts result in re-design

**Resistance to Change** – Many professionals are energized by opportunity for creative and thoughtful design
The HSM is a key tool that enables the transition from standards-based to performance-based design.

The HSM provides methodologies to calculate and predict future crashes and crash severities.
HSM Applies to All Phases of Project Development
Existing Conditions

Alternative 1

Alternative 2

Alternative 3
Nominal Safety (standards-based) Versus Substantive Safety (performance-based)

Expected or Actual Crash Frequency and Severity
2016 AASHTO SCOH
Administrative
Resolution:
Direction on Flexibility in Design Standards
Research supporting guidance changes

NCHRP Report 785, Performance-Based Analysis of Geometric Design of Highways and Streets

NCHRP Research Report 839, A Performance-Based Highway Geometric Design Process

NCHRP Research Report 855, An Expanded Classification System for Highways and Streets

NCHRP Research Report 880, Design Guide for Low-Speed Multimodal Roadways

NCHRP Project 15-47, An Improved Highway Design Process
In Conclusion

• Performance Based Practical Design is a growing trend and becoming standard practice.

• Research underway will support future changes to guidance documents.

• A basic familiarity with the principles of PBPD and CSS are important throughout the project development process.
Questions?
Thank you!

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