

RESEARCH SPOTLIGHT

Project Information

REPORT NAME: Corridor and Systemwide Application of Performance-Based Practical Design

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MDOT Project Manager



Nathan Miller

Road Design Engineer
Roadside Development

MillerN13@Michigan.gov
517-243-5151

RESEARCH ADVISORY PANEL MEMBERS:

Andrew Block, Mark Bott (ret.), Jason Garza, Dean Kanitz, Jan Karttunen, Carlos Libiran (ret.), Krista Phillips, Kristin Schuster, Mark Shulick, and Vladimir Zokvic (ret.).

Design flexibility produces more cost-effective transportation projects

As transportation projects undergo development, seemingly minor variations from the original scope can add significant time and expense. To help keep costs down and maximize limited resources while still prioritizing roadway system performance, mobility and safety, many states have begun to expand the use of practical design strategies in their planning and design processes. This approach marks a deviation from traditional practices, and the Michigan Department of Transportation (MDOT) sought to better understand how states across the country are incorporating new design principles into their existing workflows.

PROBLEM

Federal and state governments have developed design standards to address road and bridge projects on the highway system. These standards are critical for ensuring that transportation infrastructure is properly constructed and will perform as intended for years to come. However, they are written to apply broadly and often do not consider context such as where the infrastructure is located or who will use it.

For a transportation agency like MDOT, designing to meet or exceed specific standards eliminates uncertainties and reduces potential risks. But relying exclusively on these standards can also produce finished projects that go beyond what was originally needed and may not be cost-efficient.



Designing for the needs of a particular area can lead to more effective and cost-efficient infrastructure.

Performance-based practical design, or PBPD, is a shift in mindset. This practice emphasizes designs that prioritize safety and efficiency over precedent, using data to support design decisions and giving designers and engineers greater flexibility to deviate from traditional design standards. For example, an older rural road may not

“When a transportation project is designed specifically for its location and the people who will use it, the result is often a better fit for the community and less costly for MDOT.”

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Project Manager

meet current geometric design standards but has an acceptable safety record. Following the traditional approach, the road might be widened or straightened to bring it in line with today’s standards. Under PBPD, however, the road geometry might be allowed to remain the same unless crash data or other objective evidence demonstrates a clear need for improved performance.

Some elements of the PBPD approach are already in use at MDOT, though they may not be recognized as such. To expand its use of PBPD practices, MDOT sought a review of other states’ best practices and recommendations for applying PBPD tenets more broadly and consistently across the agency.

RESEARCH

A comprehensive review of the literature and other resources that have been published on PBPD provided a better understanding of the current state of practice. A survey of state DOTs provided more detailed insight into their PBPD documentation and how they apply PBPD principles throughout a project’s development process.

Using these findings, the team interviewed business areas within MDOT and identified four areas where PBPD principles could be more easily implemented: safety, operations, pavements, and maintenance. These areas are data-driven disciplines with

performance metrics and data resources already in place.

Finally, a detailed listing of available data sources, tools and procedures supplied MDOT with resources to support its PBPD decision-making.

RESULTS

The research revealed three common themes for incorporating PBPD principles effectively. First, safety should always be the top priority for any project and never compromised. Second, a project’s needs, goals, purpose, and objectives should be clearly stated for successful implementation. Finally, agencies should take a holistic view of their transportation system and avoid focusing on projects individually.

With this insight, the researchers developed key recommendations to help MDOT put PBPD into practice:

Define and document the purpose and need of every project. Formally stating the reasons for the project from the outset, and reiterating them throughout the development process, will help to remind stakeholders of the project’s goals and limit the addition of tasks or features that fall outside of this scope.

Articulate the performance objectives for every project and explain how they will be measured. The data needs and resources required to achieve and maintain MDOT’s goals should also be identified and described clearly early in the project development process.

Apply goals to Michigan’s counties, corridors or regions. Considering the objectives of an entire area will encourage consistency from project to project and reduce abrupt transitions that might negatively affect the user experience.

Identify characteristics of projects well suited to PBPD. While MDOT projects that primarily focus on safety or operational improvements may realize the greatest benefits of PBPD, aspects of PBPD principles can be applied to all projects.

Improve documentation. Updating MDOT’s various design guides and other published resources will support designers in their use of PBPD practices.

IMPLEMENTATION

By following the recommendations outlined in this research, MDOT will be better positioned to apply PBPD principles effectively to develop transportation projects that are more narrowly focused and ultimately cost less.

Research Administration

Principal Investigator

Andrew Ceifetz, P.E., RSP2I

Director, Transportation Safety
WSP Michigan, Inc.
500 Griswold St., Suite 2600
Detroit, MI 48226

andrew.ceifetz@wsp.com
313-963-4653

Contact Us

PHONE: 517-281-4004

E-MAIL: MDOT-Research@Michigan.gov

WEBSITE: Michigan.gov/MDOTResearch

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