



PERFORMANCE-BASED PRACTICAL DESIGN

POLICY OP012, EFFECTIVE 2017-05-17

POLICY STATEMENT

MnDOT supports Performance-Based Practical Design (PBPD), and directs its design professionals to apply PBPD criteria where practicable on every project.

PBPD helps better manage transportation investments and serve system-level needs and performance priorities with limited resources. Building on design approaches such as Context Sensitive Solutions, Asset Management, and Value Engineering, PBPD helps focus on improving and evaluating overall system performance.

MnDOT design professionals applying PBPD must use the design flexibility available within and outside the standard ranges of road design criteria. Design professionals must balance the benefits and costs of alternate design approaches by:

- Understanding the purpose, problems and desired outcomes of a project;
- Identifying performance characteristics and measures that align with those outcomes;
- Evaluating the impact of alternative design decisions on performance outcomes;
- Arriving at solutions that achieve the desired outcomes, and
- Documenting the decision-making process

MnDOT design professionals must always act in accordance with the professional standard of care.

REASON FOR POLICY

- The Federal Highway Administration (FHWA) has defined PBPD as a decision-making approach that uses quantitative analyses to guide decision-making through the project development process.
- Direct MnDOT design professionals, acting in accordance with the professional standard of care, to incorporate a flexible, performance-based, and practical approach into their everyday design practice;
- Enhance financial effectiveness by applying PBPD in order to develop innovative and economical projects.
- Achieve the goals of the state transportation system as detailed in [Minnesota Statutes §174.01](#), including:
 - Minimizing fatalities and injuries
 - Providing reasonable travel times for commuters

POLICY OWNER

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POLICY HISTORY

2017-05-17, *Established*

[MnDOT Policy Website](#)

- Providing for the economical, efficient, and safe movement of goods to and from markets
- Maximizing the long-term benefits received for each state transportation investment, and
- Minimizing impact on the environment

WHO NEEDS TO KNOW THIS POLICY?

- MnDOT program delivery managers
- MnDOT staff and consultants responsible for planning and designing transportation projects
- Local agency representatives working with MnDOT on cooperative construction projects

DEFINITIONS

Performance-Based Practical Design combines two highway-engineering terms, *Practical Design* and *Performance-Based Design*.

Practical Design

Describes an approach to road building that makes the best use of financial resources to optimize the performance and physical condition of the overall transportation system and achieve long-term fiscal sustainability.

Performance-Based Design

Uses knowledge about the effects that roadway features have on actual performance (e.g. safety, quality of service, reliability) to help make design decisions. Its procedure emphasizes understanding the problem the project is addressing, the context and the audience (stakeholders and users) and developing a solution focused on addressing those problems and achieving defined goals.

Performance-Based Practical Design

The combination of *Practical Design* and *Performance-Based Design* encompasses the *what* (economic efficiency) and the *how* (performance-based, data-driven methodology), either of which is incomplete without the other.

PROCEDURES

1. Employees must consult known PBPD resources during project development, including:

- [National Cooperative Highway Research Program \(NCHRP\) Report 785](#), *Performance-Based Analysis of Geometric Design of Highways and Streets*
- [Highway Safety Manual](#), *American Association of State Highway and Transportation Officials (AASHTO)*
- [Interactive Highway Safety Design Model](#), *Federal Highway Administration (FHWA)*
- [Highway Capacity Manual](#), *Transportation Research Board (TRB)*
- [NCHRP Report 687](#), *Guidelines for Ramp and Interchange Spacing*
- [NCHRP Report 783](#), *Evaluation of the 13 Controlling Criteria for Geometric Design*
- [NCHRP Project 15-47](#), *A Performance-Based Highway Geometric Design Process*

Planning and design staff will use the [MnDOT Road Design Manual](#), applicable MnDOT Technical Memoranda and the [AASHTO "A Policy on Geometric Design of Highways and Streets"](#). When published, the MnDOT Performance-Based Practical Design Guideline document may supersede certain of those publications' design criteria.

2. Designers must exercise professional judgment, weighing several factors when planning and designing the transportation infrastructure:

- Safety
- Quality of service
- Ease/cost of maintenance, operation and use
- Accessibility
- Reliability

3. Employees must document design decisions:

- Identify the advantages and disadvantages of a design that differs from general MnDOT design standards.

- Analyze benefits and risks in applying PBPD including, but not limited to, safety, mobility, system performance, and cost. Perform this analysis in accordance with the professional standard of care.
- Document design decisions, including decisions to depart from MnDOT design standards. Employees must follow the [MnDOT Records Retention and Disposal Policy](#) and the [MnDOT Retention Schedule](#),

RESPONSIBILITIES

State Design Engineer

- Develop and offer training, technical assistance, and outreach to support MnDOT staff in implementing PBPD
- Implement design policy and criteria that guide design professionals in applying PBPD
- Conduct project design reviews using a PBPD approach as a basis for evaluation

Senior Leadership Team and the District Leadership Teams (District Engineers and Assistant District Engineers)

- Allow and actively encourage design and traffic engineering staff to participate in MnDOT's Advanced Flexibility in Design, Complete Streets, and Context Sensitive Solutions classes

Planners

- Employ PBPD especially the focus on purpose, need and intended outcome, when performing planning studies and scoping
- Understand and be able to communicate the PBPD approach to non-technical audiences

Project Managers

- Ensure design decisions support the needs and goals identified and ties directly to performance characteristics and measures
- Utilize PBPD to make scoping decisions as part of a system-wide and fiscally sustainable approach

Designers

- Focus on identified project needs and goals when making design decisions
- Consider alternative concepts and designs
- Use PBPD resources where available to understand the safety, performance, and cost impacts including operating costs, of alternate design concepts and decisions
- Develop a working knowledge of the Highway Safety Manual and the Interactive Highway Safety Design Model sufficient to understand their capabilities and perform rudimentary analyses
- Use design flexibility and the design exception process where appropriate to achieve practical, cost-effective, and context sensitive design solutions

Traffic Engineers

- Perform project related tasks using a PBPD approach, most notably project safety reviews (PSRs).
- Develop expertise in the use of the [Highway Safety Manual](#) and the [Interactive Highway Safety Design Model](#), and serve as expert resources for planning and design staff working on projects.

RELATED INFORMATION

[MnDOT Complete Streets Policy](#)

[MnDOT Public Engagement Policy](#)

POLICY OWNERSHIP AND AUTHORIZATION

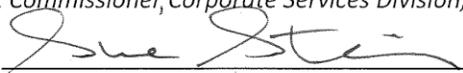
Policy Owner

Thomas Styrbicki, P.E., Director, Office of Project Management & Technical Support

Signature and Date  5/10/2017

Governance Council

Sue Stein, Assistant Commissioner, Corporate Services Division, on behalf of the Governance Council

Signature and Date  5-11-17

Susan M. Mulvihill, P.E., Deputy Commissioner/Chief Engineer

Signature and Date  5/17/17