Chapter 1100  Practical Design

1100.01 General

The Washington State Department of Transportation (WSDOT) is committed to context-appropriate, multimodal, performance-based designs. WSDOT’s goal is to optimize existing system capacity and safety through better interconnectivity of all transportation modes. Community engagement is an essential element. This chapter provides an overview of the practical design approach that WSDOT uses to make project decisions. The remaining chapters in Division 11 provide specific design policy details for each procedural step. WSDOT’s practical design approach is context-appropriate, multi-modal and performance-based. Practical design uses appropriate performance metrics, stakeholder input, and agency risk management practices to help identify investments that address a given problem in the most efficient manner possible. As a result, WSDOT’s practical design finds consistency through the procedural process applied rather than pre-determined outcomes for projects.

This chapter provides an overview of practical solutions, practical design, and the different elements that are examined and documented in design decisions.

1100.02 Practical Solutions

Practical Solutions is applicable to everything the agency does, including the way we administer, manage, plan, program, design, construct, operate, and maintain all of our services and program. It is a performance-based approach to transportation and organizational decision making, as outlined in Executive Order (EO) E 1090.01.

The Practical Solutions approach prioritizes innovative, timely, and cost-effective decisions with our stakeholders and partners. It considers each situation and encourages incremental, flexible, and sustainable investment decisions by focusing on identified performance needs and engaging stakeholders at the right time.

This data-driven approach uses tools, data analytics, performance measures, and stakeholder input to (1) seek lower-cost approaches and efficiencies in expanding and operating the multimodal transportation system to reduce travel demand and the need for building costly new infrastructure, (2) identify, evaluate, analyze, and manage risk to WSDOT’s strategic objectives, and (3) identify and implement agency efficiencies. Practical Solutions includes one or a combination of strategies, including, but not limited to, Transportation Systems Management and Operations (TSMO), off-system solutions, Transportation Demand Management (TDM), and incremental strategic capital solutions. The goal is to identify and solve needs and problems as quickly and cost-effectively as possible.
1100.03 Practical Design

Practical design is the design phase component of practical solutions, addressing the transportation-related need that’s identified or evolves during the planning, scoping or design phase of a project. Practical design is data driven, employing performance metrics to seek low-cost approaches and efficiencies in expanding and operating the multimodal transportation system to reduce travel demand and the need for building costly new infrastructure that are identified in collaboration with other agencies, communities, and stakeholders. The objective is to identify low-cost solutions that meet the need(s), while considering benefits to the system as a whole and the role of incremental solutions as a way to address uncertainties identified in future scenarios.

The Basis of Design (BOD) is a template for the process WSDOT uses to document the practical design approach, and may be employed in either the project scoping or design phase.

The process consists of the following seven steps:

1. Assemble a project advisory team as needed (see Section 1100.03(2)).
2. Clearly identify the baseline need. Define it in terms of performance, contributing factors, and underlying reasons for the baseline need (see Chapter 1101).
3. Identify the land use and transportation context (which includes environmental use and constraints) for the location (see Chapter 1102).
4. Select design controls compatible with the context (see Chapter 1103).
5. Formulate and evaluate potential alternatives, including TSMO strategies, that resolve the baseline need for the selected context and design controls (see Chapter 1104).
6. Select design elements that will be included in the alternatives (see Chapter 1105).
7. Determine design element dimensions consistent with performance needs, context, and design controls (see Chapter 1106).

See Section 1100.04(1) for more information about the BOD.

1100.03(1) Community Engagement

WSDOT staff engages the community affected by a project in order to strengthen partnerships, increase credibility, drive priorities, and inform decision-making. Community input informs the project development process from planning to design.

Engaging with the community helps us more fully understand:

- Performance issues and gaps
- Context identity
- Local environmental issues
- Modal priorities and needs

Refer to the WSDOT Community Engagement Plan for more information, and document the findings of community engagement efforts (see Section 1100.04(5)).

1100.03(2) Advisory Team

Collaborative decisions contribute to successful project delivery. Engage external and internal stakeholders providing consent-based outcomes early in project development.

Convene an advisory team who’s members have the skills, knowledge, and responsibilities needed for design decision-making; including planning, project development, environment, traffic, and active transportation.
Consider recommendations offered by the advisory team that involve decisions documented on the Basis of Design, providing an opportunity for feedback on those decisions that involve those recommendations. The project manager has discretion in how to engage internal and external stakeholders in documenting decisions. For more information on organizing, managing, and collaborating with advisory teams, see the WSDOT Project Management Guide: www.wsdot.wa.gov/projects/projectmgmt/onlineguide/preconstructioninitiatealign

1100.03(3) Need and Performance Identification

The need for the project is the primary reason the project has been programmed at the location. Determine performance metrics and targets based on an assessment of this project’s specific need, and other contextual needs developed through community engagement. Perform a contributing factors analysis that refines the identified need so more precise performance gaps and metrics can be identified. Refer to Chapter 1101 and the Performance Based Design guidance document for more information: www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

1100.03(4) Context Determination

Context determination refers to the characteristics, activities, and functions within a geographical area. WSDOT’s context determination process involves two interrelated topics: land use and transportation, referencing both the existing and future conditions. Chapter 1102 provides guidance for determining context.

1100.03(5) Design Control Selection

Design controls provide fundamental constraints for highway design. Five design controls are used to help guide design decisions:

- Design Year
- Modal Priority
- Access Control
- Design Speed
- Terrain Classification

Chapter 1103 presents guidance related to choosing design controls.

1100.03(6) Alternative Formulation and Evaluation

The goal is to develop a solution for the baseline need at the lowest cost. However, it is critical to understand how the solution affects other known or identified needs, termed “contextual needs.” Chapter 1101 provides a discussion on baseline and contextual performance needs, and Chapter 1104 discusses using these needs to develop and evaluate alternatives.

Practical Solutions requires consideration of lower-cost approaches and efficiencies in expanding and operating the multimodal transportation system to reduce travel demand and the need for building costly new infrastructure. The intent is to find low-cost solutions before making large capital investments. To support this goal, Transportation Systems Management and Operations (TSMO) provides a broad spectrum of possible operational and demand management strategies that can be assessed before the pursuit of capacity expansion. TSMO is only one of many potential approaches available to meet specific needs and problems identified.
In some cases, the planning phase will have identified a strategy based on practical solutions planning. Focusing on the preferred strategy can help guide the development of alternative solutions. The Alternative Strategies and Solutions subsection of the Guidance Documents discusses primary TSMO strategies and examples of solutions within those strategies.

Design Support Webpage: https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support

Direct link to the Guidance Documents:
www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

Direct link to Transportation Systems Management and Operations: https://tsmowa.org/

1100.03(7) Design Element Selection and Dimensions

The selection of design elements is based entirely on the alternative selected to address the baseline need while balancing performance trade-offs. Chapter 1105 provides instruction for design element selection. Chapter 1106 provides information related to choosing dimensions for design elements.

1100.04 Documentation Tools

Basis of Design (BOD), Basis of Estimate (BOE), Design Parameter Sheets, and Alternative Comparison Tables are all documentation tools used to record decisions and analyses needed in development of a solution that is consistent with WSDOT’s practical design approach. The tools can be found at:
https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support

1100.04(1) Basis of Design

The BOD organizes information around the practical design procedural steps (see Section 1100.03) necessary to support WSDOT’s practical design approach. It provides a template for documenting each step in the process.

The BOD includes the following information and sections:

- Planning Document Summary
- General Project Information
- Section 1 – Project Needs
- Section 2 – Context
- Section 3 – Design Controls
- Section 4 – Alternatives Analysis
- Section 5 – Design Element Selection

Exhibit 1100-1 shows the major activities associated with WSDOT’s practical design approach and corresponding Design Manual chapters and Basis of Design sections.

Start compiling the BOD as early as possible. During planning or scoping, a BOD may be only partially completed. Information documented on the BOD provides an opportunity for greater consistency between strategies developed in planning and solutions developed in scoping and design. Information documented in the BOD comes through use of consent-based recommendations (see Section 1100.03(2)).

Contact the region Program Management regarding the need to initiate a BOD during the project-scoping phase. Since the BOD is ultimately a document that supports design decisions, the approval of a BOD, which ideally takes place at 30% design level or earlier, is a part of, and included in, the project Design Approval process (see Chapter 300). Note that if a BOD has been prepared for a project and no design elements were changed, ASDE approval of the BOD is not required.
Basis of Design: [https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support](https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support)

### 1100.04(1)(a) Basis of Design Exemptions

See Section 1100.03 for guidance regarding when a BOD is required for scoping projects. For design-phase projects, a BOD supports design decisions and is required on all projects where one or more design elements are changed (see Chapter 1105). Exemptions are listed below.

If the only design elements changed by a project are listed in Exhibit 1105-1, or the changed elements are described and documented in an approved intersection control evaluation (ICE) or crash analysis report (CAR), the need for a Basis of Design (BOD) may be waived with approval of the Assistant State Design Engineer (ASDE). In any request for exemption, describe how the circumstances presented by the project make a BOD unnecessary. Only ICE or CAR documents that describe the project need(s), alternatives considered, and performance tradeoffs used in the alternative selection will be considered documentation suitable to support a BOD exemption. Each request is evaluated on a case-by-case basis.

Note that if the project is a preservation program project, a Basis of Design is not required if the only design elements changed are listed in Chapter 1120, and the criteria/guidance provided in Chapter 1120 is followed. This exemption does not require approval, and is documented in the DDP.

### 1100.04(2) Basis of Estimate

A Basis of Estimate is required for all project estimates, and is updated throughout all phases of project development. Refer to the *Cost Estimating Manual for WSDOT Projects* for additional information on estimating and the Basis of Estimate.

### 1100.04(3) Alternatives Comparison Table

The Alternative Comparison Table (ACT) provides solutions evaluated in accordance with WSDOT’s Practical Solutions approach. This table allows comparison of alternatives to identify the optimum solution. The table enables discussions of performance trade-offs. The Alternative Comparison Table is supplemental documentation for Section 4 of the BOD. Alternative Comparison Table: [https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support](https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support).

### 1100.04(4) Design Parameter Sheets

When a Basis of Design has been completed, prepare Design Parameter Sheets that document the dimensions selected for the various design elements selected, and as also noted in Section 5 of the Basis of Design. Design Parameter Sheet template: [https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support](https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support)

### 1100.04(5) Documenting Community Engagement

Community engagement is a fundamental component of WSDOT’s Practical Solutions strategy, and key to practical design implementation. Community engagement will be consistent with the *WSDOT Community Engagement Plan* (see [www.wsdot.wa.gov/planning/](https://www.wsdot.wa.gov/planning/))

Document community engagement for all projects. There is no strict format for this.
1100.05 References

1100.05(1) Federal/State Directives, Laws, and Codes

Revised Code of Washington (RCW) 47.04.280 – Transportation system policy goals
Revised Code of Washington (RCW) 47.05.010 – The statement of purpose for priority programming of transportation projects
Secretary’s Executive Order 1090.01 – Advancing Practical Solutions

Exhibit 1100-1 Basis of Design Flowchart

Design Manual

Ch. 1101

Ch. 1102

Ch. 1103

Ch. 1104

Ch. 1105

Ch. 1106

Section 1

Section 2

Section 3

Section 4

Section 5

Basis of Design

* Document dimensions on the Design Parameter Sheets

Understand the Project Need including the contributing factors

Consider the Context

Evaluate Design Controls

Formulate & Evaluate Alternatives that meet the need

Document selection of Design Elements

Document selection of Dimensions