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1100.01 General

The Washington State Department of Transportation (WSDOT) has adopted practical design as an approach to making project decisions. This chapter provides a process and informational overview of practical design and implementation expectations with this approach. This chapter will introduce terminology, general information, and a procedural process overview, while the remaining chapters in Division 11 provide specific design policy details for each procedural step. WSDOT's practical design approach is based on context sensitive solutions and performance-based design, which utilize a collaborative approach, design flexibility, and a high likelihood of variable solutions. As a result, WSDOT's practical design finds consistency through the procedural process applied rather than specific project-type outcomes.

This chapter provides:

- An overview and description of the WSDOT Practical Solutions initiative.
- An overview of the practical design process and the relevant chapter information necessary to complete each process step.
- Information regarding the importance of design control selection.

1100.01(1) *Practical Solutions*

Practical Solutions is a two-part strategy that includes least cost planning and practical design, which WSDOT defines in [Executive Order \(EO\) E 1090](#).

WSDOT deploys this strategy to enable more flexible and sustainable transportation investment decisions. It encourages this by: (1) increasing the focus on addressing identified performance needs throughout all phases of development, and (2) engaging local partners and stakeholders at the earliest stages of scope definition to account for their input at the right stage of the development process. Practical Solutions includes one or a combination of strategies, including, but not limited to, operational improvements, off-system solutions, transportation demand management, and incremental strategic capital solutions.

1100.01(1)(a) Least Cost Planning

Least cost planning is an approach to making planning decisions that consider a variety of conceptual strategies to achieve the desired system performance targets for the least cost. Central to least cost planning is a process that identifies regional and corridor performance areas, engages communities to ascertain local contexts and needs, and applies methods to evaluate and implement short- and long-term solutions.

The outcome of least cost planning is a recommended set of multimodal strategies that are cost-effective and balance the goals and objectives of state and local needs. This approach informs practical design solutions by providing the following potential outcomes:

- Identify performance gaps for a corridor segment now and in the future.
- Integrate inputs from partners that support corridor segment performance.
- Define what is known about context and what may happen on and around a corridor.
- Identify sets of potential strategies to address the gaps at certain time frames.
- Reduce the need for higher-cost mobility capital solutions by first identifying and ranking operational improvements and demand management strategies.

[Executive Order \(EO\) E 1090](#) instructs that the solution may or may not be on a state corridor.

1100.01(1)(b) Practical Design

Practical design is an approach to making project decisions that focuses on the specific problem the project intends to address. This performance-based approach looks for lower-cost solutions that meet outcomes that WSDOT, partnering agencies, communities, and stakeholders have identified. Practical design is a fundamental component to the Vision, Mission, Values, Goals, and Reforms identified in [Results WSDOT](#), the department's Strategic Plan. The primary objectives of the practical design approach are: (1) focusing on project need, and (2) seeking the most reasonable low-cost solution to meet that need.

Practical design allows flexibility and freedom to innovate, and considers incremental solutions to address uncertainties in future scenarios. Practical design can be applied at all phases of project development; however, it is most effective at the scoping level or earlier, where key decisions are made as to what design controls and elements are affected by alternatives and how they can best be configured to meet the project and contextual needs.

With practical design, decision-making focuses on the maximum benefit to the system, rather than the maximum benefit to the project. Practitioners are to “design up,” starting with minimal design element dimensions and increasing those values until acceptable cost-effective performance is obtained. Focusing on the specific project need minimizes the scope of work for each project so that systemwide needs can be optimized through individual project savings.

1100.02 Practical Design Procedure

Practical design, despite its name, is not always fully confined to the conventional design phase. It begins when a location under evaluation moves from a discussion of strategies to one of potential solutions within those strategies. The practical design procedures apply when a location under evaluation in planning moves from a discussion of strategies to one of potential solutions within those strategies, when scoping phase requires a Basis of Design, or when the

preliminary engineering phase for a funded project is initiated. In each of these situations, practical design procedures apply whether or not least cost planning has occurred. Exhibit 1100-1 shows the documentation needs correlated to individual procedural steps.

WSDOT's practical design process consists of seven primary procedural steps:

1. Assemble a project advisory team as needed (see [1100.04](#)).
2. Clearly identify the baseline need, 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 that resolve the baseline need and are bound by the selected context and design controls (see [Chapter 1104](#)).
6. Select design elements employed and/or changed by the selected alternative (see [Chapter 1105](#)).
7. Determine design element dimensions consistent with the alternatives performance needs, context, and design controls (see [Chapter 1106](#)).

The Basis of Design (BOD) is used to document the outcomes of applying these procedural steps. It also serves as a management tool throughout the design phase, to keep a project team focused on the baseline performance need and agreed performance trade-offs in order to prevent scope creep. A BOD is required on all projects, unless design elements are not employed or changed (see [Chapter 1105](#)). A BOD is only required on scoping projects as determined by the Capital Program Development and Management (CPDM) Office. See [1100.10\(1\)](#) for further information about the BOD.

1100.03 Community Engagement

WSDOT has a strategic goal of engaging the community in order to strengthen partnerships, increase credibility, drive priorities, and inform decision-making. Involving the community is essential to fully understand the performance gaps, context identification (see [Chapter 1102](#)), local environmental issues, and modal needs and priorities.

WSDOT encourages recognition of individual community contexts, values, and needs. WSDOT uses best practices and the flexibility available to engage communities in developing transportation solutions. We will do so in order to enhance public trust and develop targeted designs that provide for the performance needs of the state, regional, and local transportation systems. – [Executive Order 1096](#)

Use the [WSDOT Community Engagement Plan](#) and document the findings of community engagement efforts (see [1100.10\(6\)](#)).

1100.04 Multiagency, Interdisciplinary, and Stakeholder Advisory Team

Collaborative decisions contribute to success in project delivery, and are emphasized through the context sensitive design approach in WSDOT's practical design policies. Provide for consent-based outcomes early in the project development timeline as indicated in WSDOT [Executive Order 1096 - WSDOT 2015-17: Agency Emphasis and Expectations](#) and [Executive Order 1028 – Context Sensitive Solutions](#). Convening a Multiagency, Interdisciplinary and Stakeholder Advisory Team (MAISA) Team is an accepted approach to meet the intent of these policies. The MAISA Team is a collaborative body that provides recommendations to the WSDOT project manager and engineer of record, specifically in these areas:

- Need Identification
- Context Identification
- Design Control Selection
- Alternative Formulation
- Performance Trade-off Decision Preferences (including weighing environmental constraints and regulatory issues)
- Alternative Evaluation

The Engineer of Record or project manager convenes the MAISA Team, basing its membership on the kind of skills, knowledge, and responsibilities indicated by the issues pertinent to design decision making; including planning, project development, environment, modally oriented designs, and context sensitive design. In addition, include WSDOT members on the MAISA team who have positional or delegated authority to make decisions associated with the areas outlined in this chapter. Key decisions made by the engineer of record are based on recommendations made by the MAISA Team. These recommendations and decisions are documented in the appropriate sections of the Basis of Design, and provide fundamental boundaries for the project team to work within as design concepts move forward. The justification for whether or not each MAISA Team recommendation will be incorporated into the project are also provided in writing separately to the MAISA Team, in order to provide the Team an opportunity for feedback, and attached to the Basis of Design prior to its approval.

For more information on potential methods for organizing, managing, and collaborating with the MAISA teams, see the WSDOT Project Management Online Guide:

www.wsdot.wa.gov/projects/projectmgmt/onlineguide/preconstructioninitiatealign.

For additional guidance regarding MAISA teams, see the guidance document *Multiagency, Interdisciplinary, and Stakeholder Advisory Team* [found on the Design Support website](#):

www.wsdot.wa.gov/Design/Support.htm.

Direct link to guidance:

www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

1100.05 Need and Performance Identification

The most fundamental function of practical design is to focus on the primary reason a location is under evaluation. Ask why there is a project under consideration at this location, and identify the specific need. If it is a mobility project; why is there a mobility need and what is specifically contributing to that need? WSDOT's practical design approach requires that the need be translated into specific performance metrics and that targets be selected to be achieved by the design. A contributing factors analysis (see [Chapter 1101](#)) is used to better define what to focus

on in order to resolve the specific performance problem, helping to define the potential scope of project alternatives.

[Chapter 1101](#) provides details on how performance needs are identified and utilized in practical design. However, understanding performance and associated performance terms is critical to the application of [Chapter 1101](#). It is recommended that various teams and partners collaborating on the project view the guidance document *Performance Based Design* before proceeding with application of [Chapter 1101](#). [Direct link to guidance document:](#)
www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

1100.06 Context Identification

Context identification refers to understanding the characteristics, activities, and functions within a geographical area. WSDOT is committed to providing context sensitive solutions (see [E 1028](#)), and context identification is a key component required to implement practical design. WSDOT's context identification process requires that two interrelated context facets be identified: land use and transportation. It also requires that a context condition be selected for design—either existing, future, or transition between existing and future contexts. [Chapter 1102](#) provides the context identification information.

1100.07 Design Control Selection

Design controls are specific design elements that create significant boundaries and influence on all other design elements. WSDOT has identified five primary design controls:

1. Design Year
2. Terrain Classification
3. Modal Priority
4. Access Control
5. Target Speed

[Chapter 1103](#) presents more information related to these design controls.

1100.08 Alternative Formulation and Evaluation

Under practical design, the goal is to develop a solution for the baseline need at the least 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 how these needs are utilized to develop and evaluate alternatives.

WSDOT's Practical Solutions approach requires that operational and demand management strategies are considered prior to implementing a capital strategy. The intent is to account for low-cost solutions being applied before making large capital investments.

In some cases, the planning phase will have identified a strategy based on least cost planning analysis. Focusing on the preferred strategy can help guide the development of



alternative solutions. The guidance document *Alternative Strategies and Solutions* discusses the three primary strategies and examples of solutions within those strategies.

The guidance document is found on the Design Support website:

<http://www.wsdot.wa.gov/Design/Support.htm>.

Direct link to guidance document:

www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

1100.09 Design Element Selection and Dimensions

Design element selection is based entirely on the alternative selected to resolve the baseline need and balance performance trade-offs. [Chapter 1105](#) provides instruction for design element selection. [Chapter 1106](#) provides information related to choosing dimensions for design elements.

1100.10 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.

1100.10(1) Basis of Design

The BOD is organized around the practical design procedural steps (see [1100.02](#)) necessary to support WSDOT's practical design approach. It provides a template for documenting each step in the process. The BOD includes the following base information and sections:

- Planning Document Summary
- General Project Information
- Section 1 – Project Need
- Section 2 – Context
- Section 3 – Design Controls
- Section 4 – Alternative 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.

Where it's anticipated or known that a BOD will be used, project design, scoping, and planning teams are encouraged to start the BOD at the earliest stages possible. Although a BOD may be only partially completed during the planning or scoping phase, 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 on a BOD, whether that work is performed during planning, scoping, or design, is determined only through the use of consent-based recommendations (see [Section 1100.04](#)).

Contact the Region Program Management Office 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 is a part of, and included in, the project Design Approval process (see [Chapter 300](#)).

The Basis of Design form can be downloaded at: www.wsdot.wa.gov/Design/Support.htm.

1100.10(1)(a) Basis of Design Exemptions

A BOD may be used to support design decisions on any project, but is required on all projects where one or more design elements are employed or changed (see [Chapter 1105](#)), except as provided in the following sections.

1100.10(1)(a)(1) All Projects

If the only design elements changed or employed by the project are listed in Exhibit 1105-1, then a Basis of Design (BOD) may not be needed. The Assistant State Design Engineer (ASDE) must concur with the request to exempt the BOD requirement. Submit a request by email explaining the reasons the exemption from the BOD requirement is warranted. The request should explain the unique circumstances that make use of the BOD unnecessary. Each project will be evaluated on a case by case basis. In situations where a BOD has been prepared for the project and no design elements were employed or changed, an ASDE approval of the BOD is not required.

1100.10(1)(a)(2) Preservation Projects

A Basis of Design form is not required for Preservation projects when the only design elements changed or employed are listed in [Chapter 1120](#), and the criteria and guidance provided in [Chapter 1120](#) for those design elements is followed.

1100.10(1)(a)(3) Safety Projects

Safety projects (developed under the I-2 funding program) may not require a BOD even though design elements are changed or employed. However, the Assistant State Design Engineer (ASDE) must provide concurrence to exempt the project from the BOD requirement. Submit a request to the ASDE by email explaining the reasons that an exemption from the BOD requirement is warranted. The request should explain the unique circumstances that make use of the BOD unnecessary. Each project will be evaluated on a case by case basis.

Circumstances that may contribute to a decision to exempt a safety project from the need to prepare a BOD include:

- A programmatic project endorsed by the WSDOT Highway Safety Panel (e.g. FHWA Intersection Improvement Program ISIP treatments, Rumble Strips, etc.)
- A Collision Analysis Report (CAR) was approved by the WSDOT Highway Safety Panel AND:
 - The CAR clearly identifies the project need.
 - The CAR compared and rated alternatives.

1100.10(2) Basis of Estimate

A Basis of Estimate will always be required, and it should be updated throughout all phases of development. Refer to the [Cost Estimating Manual for WSDOT Projects](#) for additional information on estimating and the Basis of Estimate.

1100.10(3) Alternative Comparison Table

The Alternative Comparison Table (ACT) is designed to provide solutions evaluated in accordance with WSDOT's Practical Solutions approach. This table is used to evaluate solutions accounting for the resolution of the baseline performance need at the least cost, with an understanding of the effects on other contextual performance metrics. The table also enables discussions to occur around performance trade-offs that may be necessary depending on the range of potential solutions being considered and their benefits or impacts across all performance metrics identified. The Alternative Comparison Table is supplemental documentation for Section 4 of the BOD, and can also be used to document the need to refine performance targets (see [Chapter 1106](#)). The ACT can be downloaded from:

www.wsdot.wa.gov/Design/Support.htm.

1100.10(4) Design Parameter Sheets

While a primary function of the BOD is to select the design elements that will be employed or changed in a project (see [Chapter 1105](#)), a primary function of the design parameter sheets is to document the dimensions selected for the various design elements selected and noted in Section 5 of the Basis of Design. A design parameter sheet template can be found at the following link: www.wsdot.wa.gov/Design/Support.htm.

1100.10(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 (www.wsdot.wa.gov/planning/).

In order to be consistent with the *Community Engagement Plan*, as well as to provide source documentation for teams working on the project, a Community Engagement Documentation Package (CEDP) is suggested for use. Note that there is no strict format for the CEDP. The general elements for the CEDP package can be found in the guidance document *Documenting Community Engagement* on the Design Support website:

www.wsdot.wa.gov/Design/Support.htm

Direct link to guidance document:

www.wsdot.wa.gov/publications/fulltext/design/ASDE/Practical_Design.pdf

1100.11 References

1100.11(1) *Federal/State Directives, Laws, and Codes*

Revised Code of Washington (RCW) 47.04.280 – Transportation system policy goals

<http://apps.leg.wa.gov/rcw/default.aspx?cite=47.04.280>

Revised Code of Washington (RCW) 47.05.010 – The statement of purpose for priority programming of transportation projects

<http://apps.leg.wa.gov/RCW/default.aspx?cite=47.05.010>

Engrossed Substitute House Bill 2012 (Passed Legislation amending RCW 47.01 for Practical Design – link not available by publication)

Secretary's Executive Order 1090 – Moving Washington Forward: Practical Solutions

<http://wwwi.wsdot.wa.gov/publications/policies/fulltext/1090.pdf>

Secretary's Executive Order 1096 – WSDOT 2015-17: Agency Emphasis and Expectations

<http://wwwi.wsdot.wa.gov/publications/policies/fulltext/1096.pdf>

Secretary's Executive Order 1028 – Context Sensitive Solution

<http://wwwi.wsdot.wa.gov/publications/policies/fulltext/1028.pdf>

Exhibit 1100-1 Basis of Design Flowchart

