Chapter 1104 Alternatives Analysis

1104.01 General
Washington State Department of Transportation practical design policy requires formulating and evaluating alternatives while considering acceptable performance trade-offs to meet the need(s) of a project at the lowest level of investment. This chapter discusses how:

- Information determined from planning phases and Chapter 1101, Chapter 1102, and Chapter 1103 is utilized in alternative solution formulation
- To evaluate the alternative solutions developed

1104.02 Environmental Documentation Considerations
This chapter presents methods for developing alternatives. For projects requiring an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), a final proposed alternative may only be determined through the National Environmental Policy Act (NEPA) process and/or the State Environmental Policy Act (SEPA) process (see Chapter 400 of the Environmental Manual for more information). If an EA or EIS has not been initiated under NEPA/SEPA, follow the procedures in this chapter. To help advance the project, consider and use appropriate NEPA/SEPA terminology. Perform public and agency outreach and document all information regarding alternatives development for use later in the NEPA/SEPA process, according to 23 USC 168 (d). Terminology used in this chapter assumes that NEPA/SEPA have not been initiated. In the event that the NEPA/SEPA process has been initiated and an EA or EIS will be required, coordinate with the region Environmental Office staff to make sure that this alternative formulation and evaluation is performed in accordance with NEPA/SEPA guidance.

1104.03 Alternative Solution Formulation
Identify alternatives that address the baseline need while balancing the performance trade-offs identified in the process. This performance-based, data-driven approach can include analysis of multimodal trade-offs and the formulation of multimodal/intermodal solutions, potentially reducing travel demand. Reference need identification and contributing factor analysis (CFA) in the alternative solution formulation (see Chapter 1101 and Contributing Factors subsection of the Guidance Document for more information). Conduct alternative solutions formulation according to the following principles:

- Formulate alternatives that are compatible with context and design controls
- Seek lower-cost approaches and efficiencies, such as Transportation Systems Management and Operations strategies, in expanding and operating the multimodal transportation system to reduce travel demand and the need for building costly new infrastructure.
- Consider incremental, phased solutions.
- Formulate alternatives that address, but do not exceed, the specific needs and problems.
• Form solutions around contributing factors or the underlying root reason(s) identified from CFA. Address the underlying root reason(s) determined from CFA in at least one alternative.
• Evaluate the relative benefit between each alternative against the baseline and contextual performance metrics to determine the optimally performing solution for the least cost. (See Section 1104.04(3) for information on calculating the benefit/cost of alternatives.)

Planning phase corridor sketches or studies may be used to identify WSDOT’s strategy for the corridor. If a planning phase has occurred, develop at least one alternative based on the strategy identified in the planning report. See the Alternative Strategies and Solutions subsection of the Guidance Document for more information regarding different strategies that may be considered.

If a planning study has developed specific alternatives, and those alternatives are still relevant, carry those alternatives into the alternative evaluation process.

1104.04 Alternative Solution Evaluation

Alternative solution evaluation involves analyzing the design year performance benefits provided by a solution with respect to the amortized cost. It is the intent of the alternative solution evaluation process to:

• Compare solutions that resolve the baseline need(s) in consideration with the benefits or impacts associated with the contextual needs.
• Analyze the relative value of each alternative, including associated performance trade-offs. Considerations should also include agency risks, resource constraints, and life cycle operating and maintenance costs.
• Mitigate unacceptable performance trade-offs with proven countermeasures.
• Refine targets if mitigation measures applied yield unacceptable performance trade-offs.

1104.04(1) Alternatives Comparison

WSDOT’s alternatives comparison process is intended to align with performance-based decision-making. The process is complementary to a practical design approach. The process centers around achieving the basic performance need, while understanding and when necessary mitigating for the potential effects to other performance areas.

Use the Alternative Comparison Table (ACT) to assist in evaluating alternatives and identified baseline and contextual performance. The intent of comparing alternatives is to:

• Obtain an alternative solution for the least cost while understanding associated performance trade-offs.
• Compare alternatives against their ability to accomplish the baseline need.
• Evaluate alternatives against their relative effects on contextual needs.
• Provide the opportunity to incorporate mitigation or countermeasures.
• Document alternative formulation and evaluation outcomes that are consistent with the environmental process and expectations.

Note that if there are a large number of contextual needs under consideration, it may be beneficial to prioritize or use a weighted evaluation of the contextual needs in order to expedite the alternative evaluation.

As discussed in Section 1104.03, at least one alternative based on the outcome of Contributing Factors Analysis should be compared against other alternatives.

The Alternative Comparison Table template and examples can be found at: https://wsdot.wa.gov/engineering-standards/design-topics/design-tools-and-support#Tools
1104.04(2) Performance Trade-off Decisions

In performance trade-off decisions, the intent is to give priority to the project’s baseline needs. However, there will be situations where evaluations reveal that trade-offs are too significant, and there is an inability to adequately resolve them with low-cost countermeasures, phased solutions, or general acceptance of the performance trade-off. In these situations, it is appropriate to consider alternatives that still optimize the baseline performance metric, but do not necessarily obtain initial performance targets. Document refined performance targets on the Basis of Design.

1104.04(3) Benefit/Cost Analysis

Inherent with understanding the performance trade-offs being considered, is the overall benefit/cost for the alternatives proposed. Although a factor for all potential alternatives, in some cases, decisions will be based on life cycle operating and maintenance costs, as discussed in Chapter 301. In other cases, perceived benefits are a challenge to quantify and will need analysis such as that discussed in NCHRP Report 642: Quantifying the Benefits of Context Sensitive Solutions: www.trb.org/Publications/Blurbs/162282.aspx

1104.05 Documentation

The Alternative Comparison Table (ACT) is used to assist in evaluating alternatives. Summarize the alternatives evaluated with the ACT in Section 4 of the Basis of Design (BOD). Alternative formulation and evaluation will also be documented through the NEPA process. Environmental staff will help account for consistency with the environmental process, expectations and requirements throughout any alternative formulation and evaluation that occurs within project development.

1104.06 References

1104.06(1) Federal/State Directives, Laws, and Codes

42 United States Code (USC) 4321, National Environmental Policy Act of 1969 (NEPA)
Chapter 43.21C Revised Code of Washington (RCW), State Environmental Policy Act (SEPA)
Chapter 468-12 Washington Administrative Code (WAC), WSDOT SEPA Rules
Secretary’s Executive Order 1090.01 – Advancing Practical Solutions
Secretary’s Executive Order 1018 – Environmental Policy Statement

1104.06(2) Guidance and Resources

Environmental Manual, M 31-11, WSDOT
Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M 21-01, WSDOT
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/
1104.06(3) Supporting Information


www.trb.org/Publications/Blurbs/162282.aspx