

3-1 Risk Management Processes

This chapter provides guidance for risk management as it relates to design-build project delivery and the tools that WSDOT has developed to assist with project risk management.

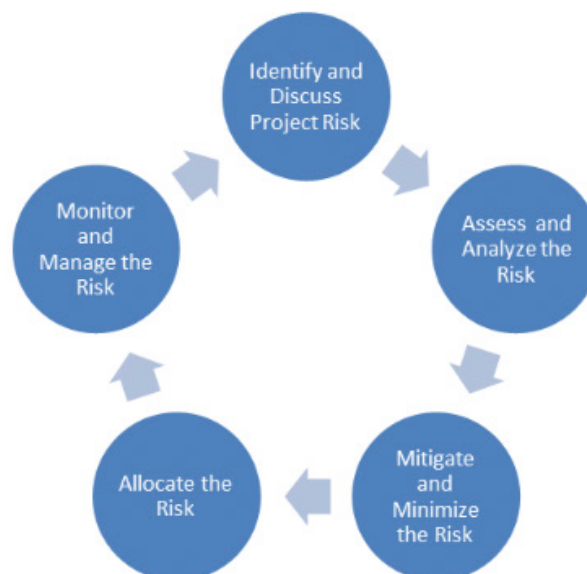
Risk management is the identification, analysis, planning, allocation, and control of project risks. It is a central concept to design-build. The proper allocation of risk to the parties that are best able to manage it is a key attribute of the design-build delivery method. Risks that would otherwise reside with WSDOT in design-bid-build (DBB) can instead be assigned to the Design-Builder.

When risks best managed by WSDOT are transferred to the Design-Builder, increases in contingency pricing and unnecessary increases in the schedule for the project are likely to occur. Improperly assigned risk can jeopardize the success of the project by increasing exposure to claims and litigation.

The risk analysis and management process generally includes the following five steps:

1. Identify and discuss project risk.
2. Assess and analyze the specific risks associated with the project.
 - a. What is the probability of the risk (high, medium, or low)?
 - b. What are the consequences of the risk?
3. Mitigate and minimize the risk.
4. Assign the risk.
5. Monitor and manage the risk.

Exhibit 3-1 Risk Management Process



Risk management should start in the planning phase of a project and continue through the Completion of the project. The five steps are explained in detail below:

1. Identify and Discuss Project Risk

Project risks are identified during WSDOT's Project Delivery Selection Matrix (PDSM) process, which is discussed in [Chapter 2](#) of this manual. Risk assessment is a primary consideration in determining the appropriate method of delivery.

The project risk assessment in the Project Delivery Method Selection Guidance provides a starting point for the development of the initial project risk register. Additional project risks are identified, addressed, and added to the risk register throughout the design development process.

2. Assess and Analyze the Risk

Allocation of the risks inherent in highway projects will also define ownership and responsibility for each task of the design-build process. Though risk management should be a continuous process through the life of the project, there needs to be an especially strong emphasis during the initial design development and Request for Proposal (RFP) development phase of the project. Risk management should drive much of those processes. Risk is identified, assigned, and then mitigated through the development of both the project design and the RFP Technical Requirements.

Because of its importance, WSDOT's technical experts should be involved early on in the project risk discussions.

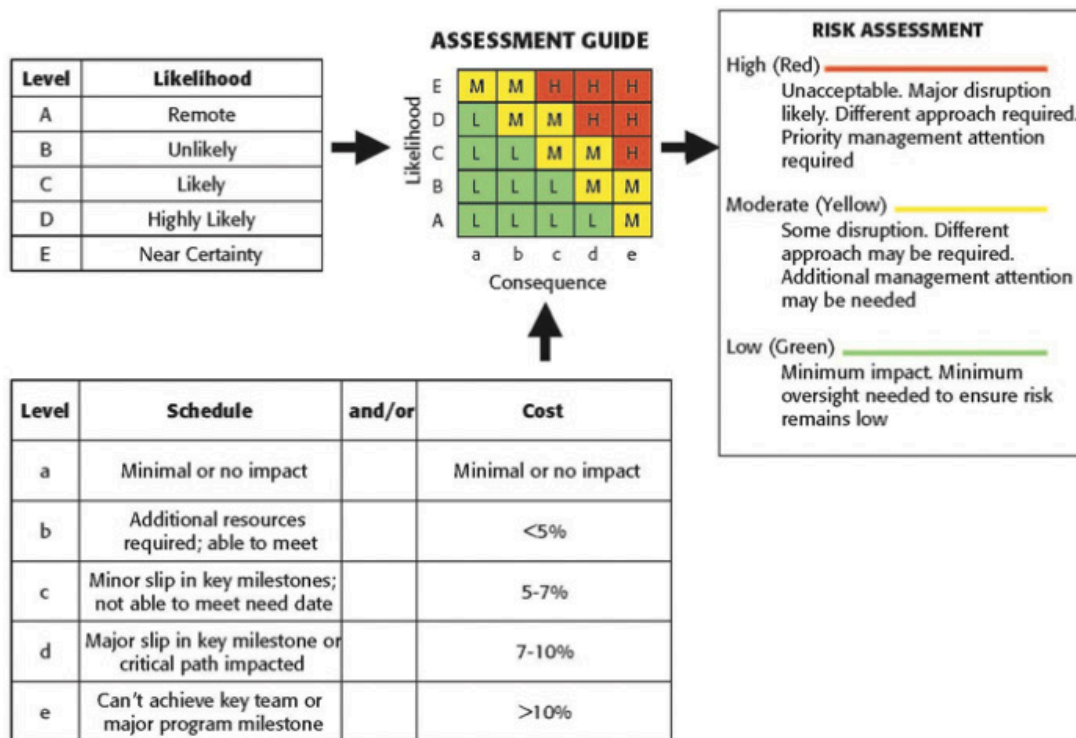
In design-build, the guiding principle should be one of assigning risk to the party (owner or Design-Builder) that can most economically handle the risk. One key question to be answered in risk allocation is, "How much is WSDOT willing to pay a Design-Builder to assume risk that WSDOT typically owns?" This question may be asked for each individual task to tailor the contracting approach to each specific project. Project risk is the defining issue that permeates all decisions related to developing the contract provisions. High-risk items that will typically remain the responsibility of WSDOT and must be addressed prior to awarding a contract include:

- Environmental studies
- Public endorsement
- Interagency agreements
- Utility Agreements
- Right of Way acquisition

Risk mitigation plans may include additional investigations, additional design, and stakeholder coordination activities that the project team performs during the development of the RFP.

Assessment of risk should include an examination of both the probability of the risk and the consequences of the occurrence. Exhibit 3-2 depicts a process for risk assessment.

Exhibit 3-2 Risk Assessment Process (adapted from Federal Highway Administration, *Guide to Risk Assessment and Allocation for Highway Construction Management*, October 2006)



3. Mitigate and Minimize the Risk

Design development by WSDOT should be limited to allow the most design flexibility for the Design-Builder, but needs to be advanced to the extent necessary to ensure project risks can be identified and properly managed and allocated. WSDOT’s design must ensure that the project is well defined, is buildable, and facilitates strong proposal designs with manageable risks. To meet these objectives, every discipline of the design needs to be individually assessed, resulting in differing levels of design development. Some elements of the project may only require a low level of design effort, whereas other elements of the design may require much higher levels of development to define the work and minimize risk.

4. Allocate the Risk

Once a risk has been identified and analyzed, it should be assigned to either WSDOT or the Design-Builder. Risks can be shared or allocated solely to the Design-Builder or WSDOT, however shared risks can lead to disputes and are recommended to be avoided if possible. In situations where it seems that shared risk may be appropriate, the project team should first consider a more detailed assessment of the sub-factors that drive the risk and try to assign each risk associated with the sub-factors solely to the party who is best able to mitigate it.

Exhibit 3-3 provides an example risk allocation matrix displaying how transportation project risks are typically allocated in DBB and in design-build project delivery methods.

Exhibit 3-3 Example Risk Allocation Matrix

RISK ALLOCATION MATRIX	Design-Bid-Build			Change	Design-Build Process		
	Owner	Shared	Contractor		Owner	Shared	Design Builder
RISK							
Design Issues							
Definition of Scope	X				X		
Project Definition	X				X		
Establishing Performance Requirement	X				X		
Preliminary survey/base map	X				X		
Geotech Investigation - Initial Borings based on prel des.	X				X		
Geotech Investigation - Initial Borings based on proposal	X			→			X
Establish/Define initial subsurface conditions	X				X		
Init proj Geotechnical Anal/Report based on prel. Des.	X				X		
Proposal specific Geotechnical Analysis/Report	X			→			X
Plan conformance with regulations/guidelines/RFP	X			→			X
Plan accuracy	X			→			X
Design Criteria	X				X		
Conformance to Design Criteria	X			→			X
Design Review Process	X			→			X
Design QC	X			→			X
Design QA	X			→			X
Owner Review Time	X				X		
Changes in Scope	X				X		
Constructability of Design	X			→			X
Contaminated Materials	X			→	X	X	

During the procurement phase, specified project risks are addressed through the development of the Technical Requirements of the RFP. The Technical Requirements specify the Design-Builder’s responsibilities for managing and resolving the elements of the design and construction of the project and should clearly identify and allocate risk. When there are shared risks between WSDOT and the Design-Builder, the Technical Requirements should also clearly define the risk sharing and the collaborative processes that are required to jointly address the risk.

5. Monitor and Manage the Risk

An important advantage of design-build is the collaborative environment it fosters between WSDOT and Design-Builder during the implementation phase of the project.

Successful projects are dependent on collaboration and partnership in risk management. Through strong collaboration, the project risks are effectively managed to the benefit of the Design-Builder, WSDOT, and the project as a whole.

To facilitate this process, it is valuable to maintain a risk register through the construction of the project and schedule regular management meetings to review the status of risk resolution.

3-2 Risk Register

Early in the project, the design team will begin to identify potential risks associated with the project. Assigning responsibility for each risk is not a one-time task. The project team should continually revisit the risk register as more information becomes available about the project.

Utilize the risk register throughout development and implementation of the project. This register will not only govern the responsible party for each risk, but it will help the project team determine how far to advance each technical element within the preliminary design during development of the RFP.

A collaboratively created risk register is available on WSDOT's Design-Build SharePoint site. The project team will carefully review all elements that could affect the specific project and tailor the register to fit the project. This risk register is not all-inclusive. The register should be open for review throughout the entire RFP development process.

The risk register is a tool used to guide and document the risk management process. The purpose of the risk register is to define and document the risks, identify cost and schedule impacts associated with the risks, and produce mitigation plans. Ideally, the development of the risk register is part the project delivery selection, and it progressively evolves as the project advances through all of its stages to Completion.

The outline and WSDOT template for a typical risk register includes the following:

- **Risk ID Number**
- **Project Title**
- **Risk Name**
- **Risk Description**
- **Disposition** (Active, Retired, etc.)
- **Risk Impacts**
 - Often the description of risk impacts are in terms of schedule and cost, but they can also include stakeholders, product quality, and other elements.
- **Likelihood**
- **Notes and Assumptions**
- **Risk Response Actions (Mitigation, Avoidance, Acceptance, etc.)**
 - A detailed description of the specific actions to execute to manage the risk.

An example risk register is provided in Exhibit 3-4. The example shows a typical risk register process in the early design phases of a project. As the project design becomes more advanced, the risk register becomes more detailed, assigning specific costs and schedule impacts to risks, to both help inform mitigation decisions and to determine contingency pricing needs for the project.

Exhibit 3-4

ID	Project	Risk Name	Risk Description	Disposition	Direct Cost Impact (\$M)	Schedule Impact (Cal. Mo)	Risk Quantification		Flowchart Activity Allocation	Notes / Assumptions	Risk Response
							Likelihood	Impact			
ENV 10.1	see below	Additional NEPA documentation required	The project teams are working through the WSDOT Practical Solutions process. The preferred scenario for each project has not yet been selected by the Executive & Steering Committee. This scenario may be outside of the previously approved Record of Decision and may necessitate a supplement to the EIS or a standalone EA. Mutually-exclusive scenarios: A: Re-evaluation + EA B: Supplemental EIS / updated ROD C: Re-evaluation Only (Base)	see below	see below	see below	see below	see below			
see above	SR 167		NB and SB I-5 aux lanes are not covered under the previous Tier II FEIS (2006) or ROD (2007) and would therefore require additional documentation, which could come in the form of a supplemental EIS or standalone EA. Tolling (which is assumed in all scenarios for the CEVP) might also necessitate supplemental analysis, based on statements from PHVA (Dean Moberg) in meetings with OR SR 167 Project on 8/16/15 and 8/18/15.	Modeled	Scenarios: A: +0.75 B: +1 C: 0	Scenarios A: +9 to +12 B: +9 to +12 C: 0	Scenarios (Tolling+NB/RSB Aux Lanes) A: 40% B: 60% C: 0 NEPA (10.1)		Base duration is 8 months for re-evaluation, assuming January 2017 start.		
see above	SR 509		All planned scope elements have been included in the corridor ROD with the exception of tolling.	Modeled	Scenarios: A: N/A B: +5 C: 0	Scenarios A: N/A B: +6 to +9 C: 0	Scenarios: A: N/A B: 60% C: 40%	NEPA (9.1)	Base duration is 8 months for re-evaluation, assuming January 2017 start.		
	Program	Environmental Justice (EJ) re-initiation	EJ re-initiation may take longer and delay the Ad date.	Retired					2016 CEVP issue resolved, risk retired. Any associated EJ issues are addressed in NEPA		
ENV 10.2	Program	Challenge to environmental clearance or other legal challenge (NEPA)	A successful legal challenge could result in delays to the project due to an injunction and/or requirement for additional NEPA analysis. If a re-evaluation was done, a challenge could require a supplemental EIS to be performed.	Modeled	+0.5	+6 to +12	Re-evaluation: 10% Supplemental: 5%	NEPA (9.1, 10.1)	Some toll opposition exists. Project will follow Benton to believe, so any issues, based on the prior project can be incorporated into the EA. Applies independently to each project, and is dependent upon NEPA documentation outcome (see risk ENV 10.1).		
ENV 20.1	Program	Endangered Species Act (ESA) issues	The list of endangered species may change during the life of the project to include either reclassified on-site species or the unlikely possibility of newly found and listed species. There is no "grandfather" clause that would preclude the effects of this change. Discovery of these newly classified species could result in permit and scope changes. There could be delays to ongoing permit applications or due to the need to revise approved permits. In addition, WSDOT has recently updated the stormwater analysis assumptions (to use the "high run" model). The results of the re-analysis could trigger a formal consultation process.	Modeled	Minor	+9 to +11	15%	NEPA (9.1, 10.1)	Applies independently to each project		
ENV 30.1	Program	Delay in issuance of local/state/federal permits	A variety of major permits will be required, including USACE (404/001), shoreline (local jurisdictions), etc. Base schedule allows 12 months for permitting which should be adequate. However, delays are possible e.g., due to questions from permitting agencies, shoreline permit appeal, etc.	Modeled	Minor	+3 to +6	10%	WSDOT Permits (2.7, 3.7, 4.7, 6.7, 7.7)	Assume independent among stages and projects.		
ENV 30.2	Program	Shoreline permit appeal	Shoreline permits can be appealed and can result in delay due to need for court hearing.	Modeled	Minor	+6	5%	WSDOT Permits (2.7, 3.7, 4.7, 6.7, 7.7)	Assume independent among stages and projects.		
	see below	Archaeological, cultural, or historical discoveries during construction	Low likelihood of significant find. Moderate probability for each Section of some find near water, but impacts to cost and construction schedule for the type of work being performed are not significant in the overall scheme of construction.	see below							

3-3 Design Issues

In design-build, several design responsibilities shift to the Design-Builder. WSDOT is responsible for establishing the scope, project definition, design criteria, performance measurements, and existing conditions of the site.

As the Design Engineer of Record, plan accuracy, design errors, conformance with established standards and contractibility rest with the Design-Builder.

3-4 Typical Design-Build Risks on Transportation Projects

Though each project has unique risks, the risks that follow are present on most transportation projects.

3-4.1 Site Conditions and Investigations

Certain site condition responsibilities can be allocated to the Design-Builder provided they and any associated third-party approval processes are well defined. However, unreasonable allocation of site condition risks result in high contingency pricing by the Design-Builder. At a minimum, site investigations should be performed by WSDOT to minimize overall project risk and provide the necessary base information for Proposers to complete their pursuit designs without redundant investigations being performed by each Proposer. These investigations typically include the following:

- **Basic design surveys** – as necessary for the Proposers to complete their proposal design
- **Contaminated materials and groundwater investigation** – at a minimum to characterize the general nature of mitigation requirements
- **Geotechnical investigations** – as necessary for Proposers to advance the design of structures foundations, retaining walls, and pavements as required for their proposals
- **Utilities investigation** – physical determination of horizontal and vertical locations at critical locations of potential conflicts

3-4.2 Utilities

Utility responsibilities need to be clearly defined in the Technical Requirements and appropriately allocated to the Design-Builder or WSDOT:

- **Private Utilities** - WSDOT needs to define coordination and schedule risks as they are difficult for the Design-Builder to price. It is preferable to have Utilities Agreements executed with each private utility before the completion of the procurement.

The agreements should define the scope of anticipated relocations, relocation responsibilities (both construction and design), and the schedule for relocations.

- **Public Utilities** - If the work and approval processes are fully defined in the Technical Requirements, design and construction risks can be allocated to the Design-Builder.

3-4.3 Environmental Permitting

Typically, environmental permitting can be more effectively managed by WSDOT because WSDOT has stronger working relationships with the permitting agencies and a better understanding of the processes. However, certain environmental approvals and processes that can be well defined can be allocated to the Design-Builder. Agreements or memorandums of understanding (MOUs) with permitting agencies that define approval requirements and processes can significantly reduce risks to the Design-Builder. In situations where permitting can be clearly defined and allocated to the Design-Builder, scheduling benefits can be recognized.

3-4.4 Right of Way

In the majority of design-build projects, WSDOT acquires the Right of Way (ROW) necessary to construct the project. When all of the ROW is not acquired by WSDOT prior to the start of construction, a ROW clearance schedule should be provided in the Technical Requirements to define and minimize schedule risk for the Design-Builder. This schedule becomes part of the contract and provides an assurance to the Proposers that the risk is recognized and allocated to WSDOT. ROW acquisition responsibilities and risk can be transferred to the Design-Builder, with potential schedule benefits, but because WSDOT needs to become involved in any condemnation process, ROW acquisition responsibilities then become a shared risk that must be carefully defined in the Technical Requirements. To avoid the shared risk, preferably WSDOT should perform all of the ROW acquisition.

3-4.5 Railroads

The railroad companies are a particularly challenging third-party to manage in design-build projects. They often require very advanced designs as a condition precedent to their formal approval of grade separation structures over their facilities and before executing construction and maintenance agreements. Their processes introduce a high level of risk to Proposers needing to include the costs and schedules for work that interfaces with the railroad in their proposals. Typically, the risks can be best minimized and managed by WSDOT advancing the designs as much as possible prior to the procurement phase.

3-4.6 *Drainage and Water Quality*

Often project drainage facilities receive flows from outside the project limits and/or release flows to outside the project limits. When the project design is likely to change historic flow patterns or release volumes, it is necessary to negotiate with adjacent owner agencies for the revised conditions. In this situation, WSDOT is usually in a better position to manage the risk. Ideally, MOUs or Intergovernmental Agreements should be developed to define off-site drainage requirements for the Design-Builder.

Water quality requirements are continually evolving and are frequently difficult to define and assess. As a result, water quality is often a high-risk item for the Design-Builder. In most cases, WSDOT has ultimate responsibility for any water that is treated from their ROW, therefore, a prescriptive approach to water quality Technical Requirements that the Design-Builder can rely on minimizes contingency pricing. This allows the Design-Builder to propose more maintenance-efficient and effective alternative systems.

3-4.7 *Third-Party Involvement*

In general, WSDOT can most effectively manage third-party involvement. Railroad companies, the Federal Highway Administration, public utilities commissions, adjacent jurisdictions, funding partners, and other third-parties often have established relationships with WSDOT. In particular, third-party agencies that have contributed funding to the project usually participate in WSDOT's project management organization and decision-making process. In cases where WSDOT can clearly define processes and approval requirements, it can be beneficial to allocate some third-party risks to the Design-Builder, who is in a better position to incorporate those well-defined processes into its design and project schedule.

3-4.8 *Construction*

Many of the traditional materials testing and inspection responsibilities transfer to the Design-Builder. Items such as surveying, spill prevention, and maintenance of traffic shift entirely to the Design-Builder.

WSDOT project personnel are still responsible for procuring the services of law enforcement and ensuring that Local Agency and other agreements are in place prior to execution of the contract.

3-4.9 *Differing Site Conditions*

Differing site conditions for work situations are covered in the *General Provisions*. It is the responsibility of the Design-Builder to prove a Differing Site Condition exists, and that the condition could not reasonably have been worked around as to avoid additional cost.

The party that discover such conditions will promptly notify the other party in writing of the specific Differing Site Condition before it is disturbed or affected by work.

3-4.10 Completion and General Warranty

Ultimately, the final responsibility and ownership of a project will transfer to WSDOT. This final responsibility and ownership may occur at the completion of the project or at the completion of the general warranty.

A contract Completion Date is given once all obligations under the contract (with the exception of warranty work) have been performed by the Design-Builder.

The general warranty for work commences on the day Physical Completion is given, and it remains in effect for the time-period stated in the contract. If at any time during the general warranty time-period, WSDOT determines that any of the work has not met the standards set forth in the contract, then the Design-Builder is obligated to correct the work even if the performance of such correction extends beyond the stated general warranty period.

3-4.11 Local Agencies

Identifying impacts to communities and developing preliminary agreements regarding site access and mitigation requirements are often part of the conceptual design process. If a Design-Builder's specific solution goes beyond the predicted impacts, the resulting communication and coordination can rest with the Design-Builder.

When an improvement project has a direct impact on a Local Agency, establish all mitigation requirements and limitations between WSDOT and the Local Agency prior to sending out the final RFP.

It is WSDOT's responsibility to provide all Local Agency requirements and local standards in the RFP.

3-4.12 Third-Party/Adjacent Property Owners

While WSDOT is in a contractual relationship with the Design-Builder, third-parties and adjacent property owners will expect direct communication with WSDOT. If a third-party benefit is requested (local developer, Local Agency), set up the agreement and establish the performance criteria prior to the RFP.