

## Risk Management – All Project Phases

### **Purpose of Risk Management:**

Risk management is one of the primary knowledge areas of project management to be applied throughout the lifecycle of projects. Project Management Institute (PMI) defines project risk as: Risk management occurs at both project and portfolio levels. This document focuses primarily on project level risk.



*“an uncertain event or condition that, if it occurs, has a positive or negative effect on a project’s objectives”.*

For ODOT, “risk” means more specifically:

- The potential for positive or negative impacts to scope, schedule, budget or quality (some risks can be opportunities)
- Things that are not part of our base assumptions or have not been realized
- Things that are in our control and influence vs. what’s outside our control and influence
- Lifecycle flow from planning through maintenance

The key steps to Risk Management are:

1. Identification – what are the potential risks?
2. Assessment of probability – what is the likelihood of risk occurrence?
3. Decision-making – what strategy is needed to manage each risk?
  - a. Avoidance/Elimination – get rid of it
  - b. Mitigation – take steps to reduce/minimize
  - c. Transfer – move risk to another entity such as a consultant or contractor
  - d. Acceptance – absorb the risk and build contingency plan, and adjust the budget and/or schedule accordingly
4. Monitoring – what is occurring in terms of risk?

Documentation of identified risks, risk assessment, decisions made and outcomes is needed throughout the life of the project to inform each phase. Managing our risks deliberately, consistently and proactively, ODOT can more consistently reduce overall project risks to acceptable levels and increase our capacity to eliminate or reduce the impacts of some threats and capitalize on opportunities.

### **Primary Input to Risk Management:**

The primary input to the project risk management process is the draft [Business Case](#) (from “Define Local/State Needs”) which defines the purpose of the proposed project and establishes the project’s need and value, ‘the why.’ The Business Case begins to identify and document potential risks which can then be managed throughout the lifecycle of a project.

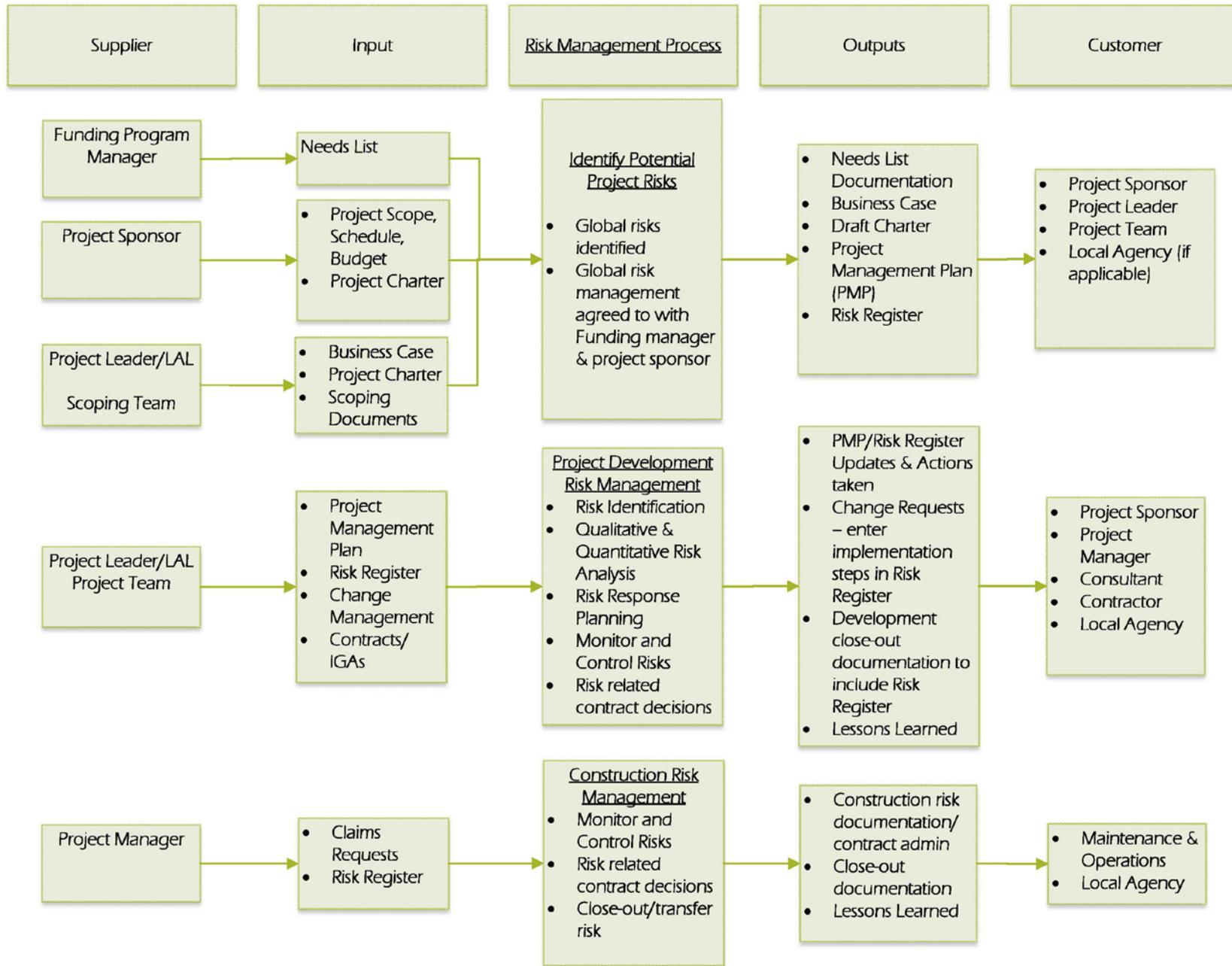
### **Primary Output of Risk Management:**

The primary output of Risk Management is a [Risk Register](#) or other documentation that identifies the associated risks and risk management strategies needed or deployed. Because some risks flow through the lifecycle of project, it is critical to develop sufficient and accessible documentation to communicate the risks and opportunities throughout the various phases of a project. Risk Management also provides contributing outputs for the Project Charter, Project Management Plan, Public Involvement Plan, contracting documents, etc.

### **Project Risk Management Triggers & Key Questions**

The chart on the next page and subsequent information describes key project risk management trigger points, as well as inputs and outputs to the risk management process.

## Project Risk Management Process SIPOC



## Planning to Project Initiation

- Risk and opportunity identification at earliest possible point (between needs list and 150% list)
- Business Case development (including scoping)
- Project selection (150% - 100% list) - cost, schedule, assumptions (locking in and quantifying risks); identify risk mitigation concepts
- Project Charter development – validate risks and opportunities from selection/portfolio discussions; risk assessment and tool identification (i.e. VE, Risk Workshop, etc.)
- Project Management Plan (PMP) development – identify risk management strategy; determine risk management tools

### KEY QUESTIONS:

See [Scoping Expectations Framework](#) for risk and opportunity related questions.

## Project Initiation through Design Acceptance

- Project Team Kick off
  - Triple constraints/trade-off analysis: Are there opportunities or risks that were not previously identified? Have there been changes since original Business Case?
  - Ensure understanding, buy-in and commitment: ODOT, Consultant, Local - all on same page regarding risks and opportunities
  - Final Project Charter and PMP – risk and opportunity review, update, validate; final risk management strategy
- Design Acceptance
  - Assumptions, risks, and opportunities, etc. review: Are these still valid? Have they been addressed? Are there new assumptions, risk, opportunities?
  - Risk management strategy refinement: Adjust and/or use different tools?
  - Risk tool implementation (i.e. VE, Risk Workshop, constructability evaluation etc.)
  - Contractibility review: Are there opportunities for alternative contracting?
  - Maintainability review: What risks or opportunities exist for future maintenance?
  - Design Acceptance Memo: address risks/opportunities
  - “13 month lock-in”: Is there a risk to the schedule?

### KEY QUESTIONS:

- Are the scoping assumptions and decisions still valid?
- Have there been changes to the project scope/schedule/budget and what types of risks are associated with those?
- Have there been changes to policies, practices or design criteria since scoping that will affect the project?
- Do I have the appropriate resources (project delivery team) needed to deliver the project?
- Do I have the right budget?
- Does the proposed schedule achieve the program need, have the resources delivering the project committed to the schedule and does it meet the general expectations of the Project Sponsor?
- What changes to scope, schedule, and/or budget could impact stakeholder expectations?
- Have I reviewed lessons learned from similar project types and projects in the corridor?
- Have we checked in with maintenance on any issues?
- Are there changes to the project or program budget that would require modifications to the delivery of this project?
- What type of risk management tools will apply to this project?
- Do we need to conduct value engineering, constructability, and/or maintainability reviews?

## Design Acceptance through Ad, Bid & Award

- Advanced Plans
  - Constructability review: What risks or opportunities exist for construction?
  - Contractability review: have new contracting opportunities arisen? How will risks be paid for in construction?
  - Anticipated items and contingencies determination
- PS& E submittal –risk discussion in terms of seasonal fluctuation, material cost increases, new specs, etc.)
- Ad, Bid, Award
  - Mandatory pre-bids: potential bidder-identified risks; contract and construction risk
  - Addendums and risk clarification responses
  - Bidder acceptance
  - Risk determination based on engineering estimates, bids, etc.

## KEY QUESTIONS:

- Have there been significant changes to previous assumptions and decisions?
- Has the delivery or bidding method changed?
- Are there any unique risks associated with an alternative delivery contracting method?
- Is contractor pre-qualification and/or a mandatory pre-bid needed to manage risk?
- Have the risks identified during the project initiation and design acceptance phases been appropriately identified, managed and the decisions made around risk been adequately documented?
- Have the project impacts (such as temporary protection and direction of vehicular and non-motorized traffic, mobility, property owners, etc.) been identified and appropriately addressed?
- Does the project outcome still meet the project intent and is it consistent with the Funding Program Manager(s), Project Sponsor, or other stakeholder expectations? Have any changes been communicated?
- Do we have what we need for right-of-way property rights and utility certification?
- Are all permits, agreements and rail crossing orders (if applicable) in place for the project to proceed timely?
- Are there any construction conditions or schedule considerations that warrant mitigations beyond what is in the current project scope?
- Has the evolution of the project estimate (from scoping thru PS&E) been reviewed, including contingencies, and significant variances been discussed and documented by the project team?
- Have any special resourcing needed for construction to manage risk been identified (i.e. railroad flaggers, any third party services, work-zone enforcement, public engagement, etc.)?

## Construction through Maintenance

- Different or fluctuating site, weather, environmental conditions than originally planned
- Undiscovered or need to relocate utilities
- Delay of bid and award
- Errors and omissions
- Contractor or consultant (outsourced CE) challenges
- Contractor VE or cost reduction proposals
- Technology changes/failures
- Change orders
- Claims
- QA/QC Program
- Maintainability review/owner acceptance: Risks for future maintenance?
- Construction close out
  - Lessons learned from risk management strategy
  - What risks were actually realized? Did strategy succeed in managing the risks?

## KEY QUESTIONS:

- Has a comprehensive transition from design to construction occurred? (to communicate key decisions, commitments to stakeholder/public, risk register, contact lists, etc.)
- Do we have the right people at the table for the pre-construction meeting? (project leader, engineer of record, utility representatives, railroads, work-zone enforcement, etc.)
- Has a plan been developed to anticipate site conditions or weather impacts? Does the construction schedule include these?
- Is the contractor on schedule to meet all civil rights related requirements? (i.e. DBE)
- Is the contract clear about who owns what risks?
- Have we allowed flexibility on contractor means/methods that could impact scope, schedule, budget or have other project impacts?
- Are there any specialty materials ordering issues that could impact the schedule?
- What changes to conditions and/or assumptions occurred during construction?
- Have we held a “Lessons Learned” on the final construction project? What take-away’s should be considered on future projects?
- Has the Contract Change Order (CCO) list and Project Narrative been distributed to the project team for future consideration?
- Does the final project meet the original project intent?
- Has a comprehensive transition from construction to maintenance occurred? (to communicate key decisions, commitments to stakeholder/public, risk register, contact lists, etc.)

## **Project Risk Documentation**

It is important to ensure that risk management information is **documented** in a consistent and accessible way so it can be utilized by future users along the lifecycle of the project.

**NOTE:** It is recommended that risk management documentation be saved in the region server files that have been created for project initiation. Click [here](#) for links.

## **Project Risk Management Tier Assessment**

The level of effort needed to manage project risk largely depends on the level of risk associated with the project. Using a tiered approach helps in developing an effective risk management strategy. The [Risk Management Tier Assessment Guide](#) provides general guidance on selecting an appropriate tier, based on the unique needs of each project. Not all projects will fit neatly into a specific tier as described – use the tier information to help determine the level of effort and risk management strategies and tools most applicable to the project.

## **Project Risk Management Tools**

A variety of industry-standard tool and best practices are available to help identify and manage risk. The enclosed list includes some of the most commonly used tools for Transportation Projects. While a few tools listed are required for all projects or for specific project situations, most of the tools are recommended for consideration, depending on tier levels and individual project needs. Most tools are scalable and adjustable to be used with any tier level. Be sure to consider the appropriate level of effort needed to manage risk for each project and select the tool (or tools) that best fit the individual project needs.

## **Additional Resources**

Additional information can be found on the Project Risk Management

website: <http://transnet.odot.state.or.us/hwy/TSpdlt/Pages/Project-Risk-Management.aspx>

## PROJECT RISK MANAGEMENT TOOLS - BY TIER

The following list includes some of the most commonly used risk management tools for Transportation Projects. Most of the tools are recommended for consideration, depending on tier levels and individual project needs, and are scalable/adjustable to any Tier level. Determine the appropriate level of effort needed to manage risk for each project and select the tool (or tools) that best fit the individual project needs.

Tools	When/Why to Use	Tier	Tier	Tier	Tier
Business Case and Project Charter	150% - 100% list through project initiation; identify potential risks/opportunities	R	R	R	R
Project Management Plan (PMP)	Project initiation - use to identify and document risks/opportunities	R	R	R	R
Maintainability Review	Design Acceptance – Advanced Plans; Identify future risks/opportunities for maintenance	X	X	X	X
Project Lessons Learned	Review prior project lessons learned at project initiation; include current project lessons learned in close out/transition packets at the end of each project phase	X	X	X	X
Risk Register	Project Initiation - Construction; assess risk probability; document risk management strategies and actions (acceptance, transfer, mitigation, etc.); scale to project need; can be subset of PMP		X	X	X
RASCI Matrix	Project initiation; document specific roles (Responsible, Accountable, Support, Consent, Inform); for less complex projects, this may be included in Charter or PMP			X	X
Value Engineering Study	Design Acceptance – Advanced Plans; peer review to assess and identify risk gaps; <u>Required</u> for total project cost over \$30M Bridge/\$40M Other		X	R	R
Alternative Hierarchy Process (AHP)	Any time decisions are needed to select between multiple or conflicting risk management strategy options.		X	X	X
CS <sup>3</sup> Matrix for Alternatives	Similar to AHP; weight alternatives against criteria to select an option.		X	X	X
Constructability Review	Design Acceptance – Advanced Plans; use informal process for less complex risk issues; use formal process when more complex risks are probable		X	X	X
FHWA SHRP2 Tool	Project Initiation – Construction; for in depth cost and schedule risk analysis; effective workshop style		X	X	
Quantitative Risk Analysis tool (i.e. “CVEP” - WashDOT)	Project Initiation – Construction; in depth risk analysis; <u>Required</u> if meets FHWA “Mega-Project” definition)				R
Independent Third-Party Quality Consultant	Project Initiation – Construction; strategy to manage risks related to quality			X	X
Contractibility Review	Design Acceptance – PS&E; assess for alternative contracting methods/specialty considerations			X	X
Other Risk Management tools as required	As determined or <u>required</u> by FTA, FRA, etc.			X	X

**R = Required   X = Recommended**

## PROJECT RISK MANAGEMENT TIER ASSESSMENT GUIDE

*Use this tool as a guide to assess projects/potential projects for risk management needs.*

Assessment Area	Tier 1	Tier 2	Tier 3	Tier 4
Location	Rural unpopulated	Rural or sparsely populated community (few residences, businesses, schools, etc.)	Populated area - suburban or urban setting Within MPO	Densely populated urban setting; within a MPO; Bi-state effort/connection
Stakeholders	No distinguishing project-specific issues identified	Few/minor project-specific issues exist and some targeted or special outreach/input activities are reasonably accomplished	Significant project-specific issues and stakeholders that require a comprehensive public involvement plan with special outreach/input activities	Complex and significant project-specific issues and governmental, business and other stakeholders. Public involvement and outreach includes special committees and special full-time attention
Delivery Method	Traditional design-bid-build by ODOT	Traditional design-bid-build by ODOT or Consultant	Traditional design-bid-build with prequalification; A+ bidding option anticipated Alternative delivery by ODOT or Consultant	Very large or mega-project that uses multiple types of delivery types and multiple contracts Consultant delivery with additional ODOT oversight team
Technical	Uncomplicated, simple repair or maintenance 1R projects No detours or major closures	Complicated or complex repair Preservation, replacement or modernization 3R projects VE may be requested Simple traffic signals Minor detours or closures General access impacts; interchange ramp	Complicated & complex special repairs (e.g. Trunnion) Replacement and modernization Full 3R and 4R projects VE is required Complicated interconnected traffic signals New interchange design; Access impacts	Full modernization and replacement 4R projects Complicated interstate construction, frontage roads Includes multiple complex interchanges/ramps Complicated access impacts and issues
Rail	No Railroad issues	Simple railroad issues may exist	Multiple, typical railroad issues exist	Railroad work included; multiple railroads involved
Utility	No Utility issues	Simple utility issues may exist	Multiple, typical utility issues exist	Multiple Utilities with conflicts and relocations needed
Environmental	Program Categorical Exclusion (PCE), or most basic CATX (no SHPO, Environmental Justice, HAZMAT, etc.)	CAT-x some simple additional efforts (no 4f/6f, no SHPO, no Environmental Justice, no HAZMAT)	CAT-x with additional issues; 4f/6f, TS&E species; SHPO; HAZMAT and/or Environmental Justice Land Use Action may be needed	Requires an EA or EIS with multiple special issues addressed; 4f/6f. TS&E species, SHPO, HAZMAT, Environmental Justice Land Use Actions are needed
Permitting	Programmatic permitting	Programmatic permitting; may require a simple variance of noise or other ordinance	Non-programmatic permitting; local noise ordinances and other variances	Non-programmatic permitting; special use areas and other non-routine variances or requirements
Right-of-Way (ROW)	No ROW or easements needed No access impacts	ROW easements or minor purchases (no relocations of people/businesses) No significant access impacts	ROW purchase of number of parcels, may involve relocations of people	Complex & complicated ROW involving many parcels with relocations of residents and businesses
Funding	Standard single program	No special funds/restrictions May have simple grant or project partner agency funds	Number of funds/restrictions Earmark and grant funds Funds from a number of other project partner agencies	Has complex funding; bonded funds with restrictions; bi-state funding; TIFFA loans; Federal earmarks; Funds from a number of other project partner agencies Full FHWA Oversight (outside of stewardship agreement) Includes funds from other federal agencies that have special requirements (FTA/FRA)