zero deaths | zero serious injuries
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Montana Department of Transportation

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Memorandum

To: Distribution

From: Dwane Kailey, P.E., Chief Engineer
Highways and Engineering Division signed by DEK 12/6/2016

Date: December 5, 2016

Subject: Project Risk Management

Introduction

Every project has risks, regardless of project size or complexity. Risks have negative or positive effects on at least one project objective (cost, time, scope, and quality). Unfortunately, known risks are often not communicated to all the impacted entities. Project Risk Management minimizes surprises that impede successful project delivery through effective communication and documentation of risk throughout the delivery process.

Project delivery success can be increased by establishing and maintaining a risk management plan over the project lifecycle. This plan will serve to document identified risks and provide an analysis of the risk impact. The plan also serves as an active risk management tool that defines and tracks risk mitigation strategies and actions.

It is the goal of MDT to intentionally manage risk on all design projects. Project Risk Management can be scaled to fit each project. Guidance and tools are provided on the Cost Estimation webpage.

Project risk management is the active management of the significant project risks identified through the risk analysis to minimize the impacts of threats and maximize the chances for opportunities. Risk management is a scalable activity and should be commensurate with the size and complexity of the project under consideration. Simpler projects will have less chances of risk and can be managed by the Project Design Manager. Larger, more complex projects will require involvement from functional managers, Construction personnel, and possibly outside experts.

This memo is intended to provide guidance to manage the risk on preconstruction projects within the construction program in a two-phase approach.

1. Nomination phase. **Program Managers** are expected to perform a high-level risk evaluation as part of the project nomination, formally documenting known risks as early as possible. These identified risks (even if potential) will be included in nomination estimates, will be documented, and will be provided to the project design manager.
2. OT and project development phase. **Project Design Managers** will continue risk management throughout project development. In addition to considering the risks identified by the Program Manager, the **Project Design Manager** will perform a more detailed risk evaluation. This risk evaluation will be formally documented and carried through project development. **Project Design Team Members** will be expected to provide input in identifying and analyzing risk elements, particularly in their field of expertise. **All Team Members** are expected to intentionally consider risks identified during the planning stages and nomination as well as those identified throughout the design process.

Policy

Apply the appropriate level of Risk Management process to all federal aid projects for which the Department has project delivery responsibility.

Use the level of project risk to determine the minimum risk management process as shown in the following table:

Project Level of Risk See table in Appendix A	**Minimum Process** Project managers may use a higher level process as needed
Low Risk Pavement Preservation or minor projects	Risk identification using the Project Risk Documentation worksheet and document in milestone reports
Medium Risk Rehab or Reconstruct	Qualitative risk analysis using the RMP worksheet
High Risk Complex projects	Risk analysis workshop using the RMP worksheet

Program Managers are expected to include potential risk in nomination estimates, document the risks, and provide the information to the Project Design Manager. Project Design Managers will continue risk management by identifying additional risks and officially documenting those risks with a potential to significantly affect project objectives. For high risk complex projects, risk teams will participate in workshops to identify, analyze, and determine response strategies for potential risks. Active management of the potential risk to project objectives will include monitoring and controlling, reviewing previously identified risks, and adding or retiring risks.

Active risk management is expected for all medium and high risk projects. Active risk management is also required for all projects on the National Highway system and for projects that have restricted funding (i.e. STPU, NHPB, STPS, etc.). The risk management process can be scaled up or down to match the level of risk unique to each project. The flow chart in Appendix B shows how risk fits into project development.

Guidance

Planners and Program Managers will perform a high-level evaluation of potential risk areas using the Project Level of Risk Table (Appendix A and RMP) and resources in the Project Risk Management Guidelines. Document the risk events and estimate the potential impacts to project objectives. Adjust the nomination estimate for all phases appropriately. Provide this information to the Project Design Manager once the project is programmed. Clearly communicate and document the project objectives, including the scope, schedule, and budget expectations.

Project Design Managers will determine the Project Level of Risk using risk evaluation performed by the Program Manager and the table in the RMP workbook. The table is organized to match the Preliminary Field Review Report format and provides examples of project characteristics categorized by risk level. Use the table to guide team discussion during the PFR. Most projects will include characteristics in all risk levels. The project team must use judgement and experience to determine the appropriate level of risk. The Project Design Manager holds ultimate authority in this decision. Document the risk level in the Project and Risk Management section of milestone reports.

Identify and record risk events with the potential to significantly impact project objectives in the Risk Management Plan (RMP) workbook. The level of effort and tool used for identification depend on the level of risk. For Low Risk projects, use the Project Risk Documentation worksheet in the RMP workbook (Appendix C). For Medium and High Risk projects, use the Risk Management Plan worksheet. See Appendix D for a RMP worksheet example. Note that all the risk evaluation tools are contained within the RMP workbook. Individual worksheets are identified on the tabs at the bottom of the workbook view.

Adjust the project cost estimates and schedule to reflect the awareness of and potential for risk events. Determine the appropriate contingency factors based on overall project risk, project complexity, and design stage. Contingency can be applied to project schedules or specific tasks with direction from the program manager or project sponsor. Guidance on contingency ranges is provided on worksheets within the RMP workbook.

Communicate issues and concerns to all the impacted entities, including:

Functional managers	District Administrator
Design team members	Internal stakeholders
Program manager or project sponsor	External stakeholders

Fiscal & Planning staff (STIP/TIP, funding program manager etc.)

Document significant risks and status of risk management strategies in milestone reports. Explicitly include risk impacts in the revised cost estimates for each phase (PE, CN, CE, RW, IC) and in the projected schedule.

Refer to the Risk Management Guidelines to identify, analyze, and manage risks for better project and cost control. Manage the identified risks as necessary to meet all project objectives. Low Risk projects may not require much effort beyond ensuring that the responsible area completes the tasks needed to mitigate the potential risk events. Medium and High Risk projects will require active management throughout the project development process to ensure that mitigation strategies are completed on time, the measures taken are effective, and that new risks are identified and evaluated. The RMP should be reviewed and updated regularly throughout design.

Definitions

Project objectives: the scope, schedule, budget, and quality.
Project Sponsor: District Administrator, Chief Engineer, or Rail, Transit & Planning Administrator.
Program Manager: Preconstruction Engineer, District Preconstruction, Bridge Engineer, or Traffic and Safety Engineer for most projects. CMAQ, Urban and Secondary projects fall under the management of the Rail, Transit & Planning Administrator.
Risk: an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective.

- Opportunity: a risk with a positive impact.
- Threat: a risk with a negative impact.

RMP: Risk Management Plan.
RMP Workbook: Risk Management Plan template containing the RMP worksheet, Project Risk Documentation worksheet, and other tools to assist with risk management
RMP Worksheet: a worksheet within the RMP workbook for identifying, analyzing, and managing risk for medium to high risk projects

e-copies: MDT District Administrators
MDT District Preconstruction Engineers
MDT Engineering Bureau Chiefs
Lynn Zanto – Rail, Transit & Planning Administrator

APPENDIX A – PROJECT LEVEL OF RISK

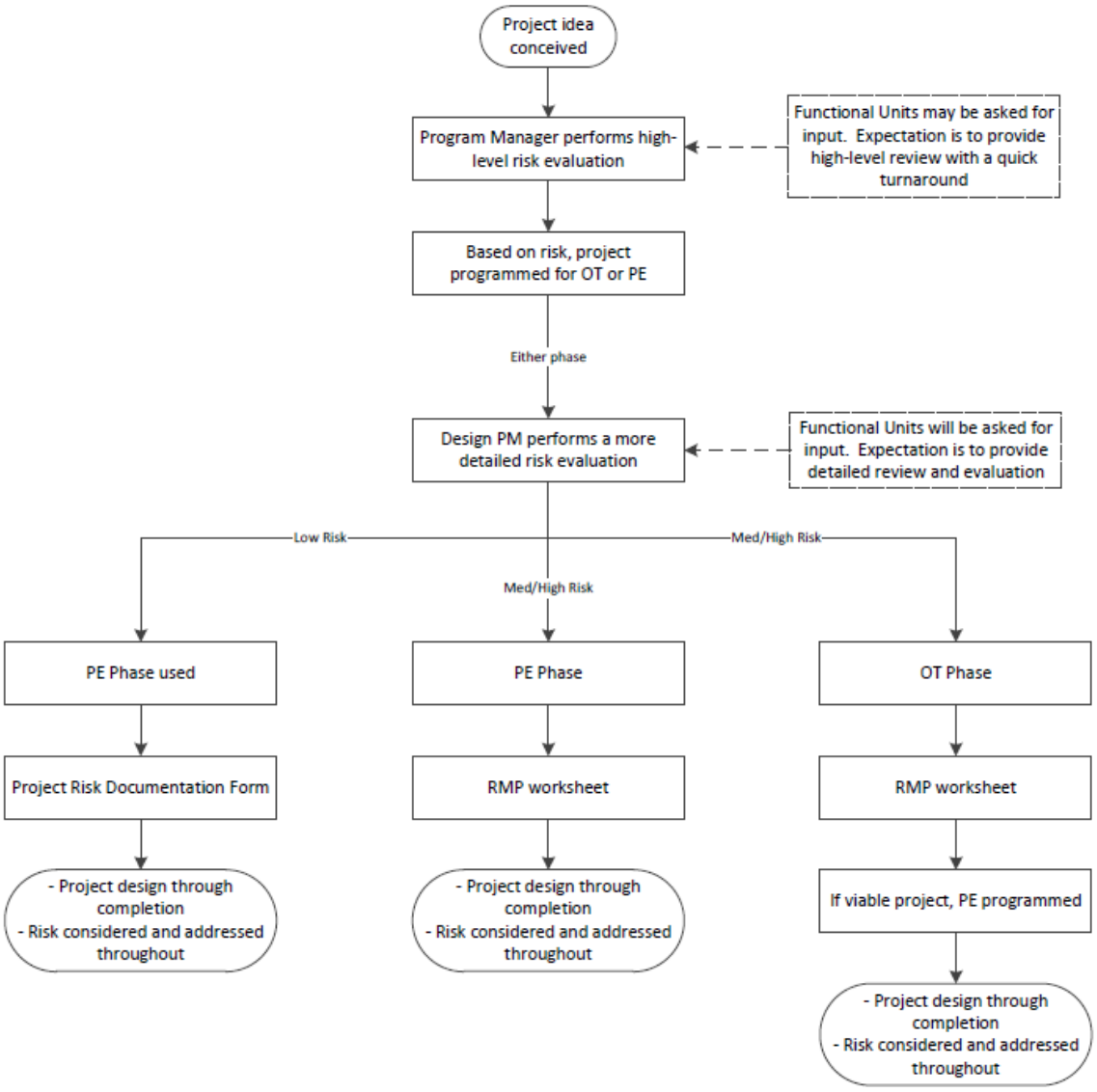
	LOW RISK	MEDIUM RISK	HIGH RISK
Proposed Scope of Work	Preservation Overlay, minor widening, mill/fill Traffic signal rehabilitation Minor spot safety improvement RR at grade crossings	Rehabilitation or reconstruction work with no added capacity Minor roadway relocations Slides, subsidence New facilities Intersection safety improvement ADA work New traffic signal installation Experimental feature included that may cause design changes or project delay	New highways; major relocations New interchanges Capacity adding/major widening Major reconstruction New facilities
Project Location and Local Coordination	Rural Project included in local plan or Transportation Improvement Program (TIP)	Urban or rural Reservation City, County, or Tribal agreements needed TIP or local plan coordination needed to ensure consistency	Urban or rural Controversial or complex City, County, or Tribal agreements needed TIP or local plan coordination anticipated
Funding Considerations	No unusual funding constraints or special funding attachments	UPP STPB STPU STPS – Pavement preservation only TA CMAQ NHFP ER Special funding (includes local matching and multiple sources)	NHPB STPU STPS – Reconstruction TA – Complex projects CMAQ – Reconstruction NHFP Special funding (earmarks, program caps, discretionary)
Work Zone Safety and Mobility	Level 3 Short construction duration Minimal traffic disruptions	Level 1 or 2 Moderate construction duration Moderate traffic disruptions	Level 1 (Significant) Complex sequencing Significant traffic disruptions Long-term detours
Topography	Flat terrain: Generally flat, fairly flat	Rolling terrain: Flat and rolling or gently rolling	Mountainous terrain: Gorges, steep terrain, confined area

Geotechnical Considerations	Little or no involvement	Geotechnical involvement: Roadway projects will require digouts or alignment changes Abutment work No major geotechnical work, generally standard bridge foundations (driven piles)	Heavy geotechnical involvement with possible: Retaining structures, complex bridge foundations, rock slopes, landslides, high seismic areas
Hydraulic Involvement	Little or no involvement	Location Hydraulics Study Report required Curb & Gutter with sump work Culvert extensions or straightforward replacements Bridge surface runoff Bridge replacement – not complex Floodplain permits may be required Some irrigation involvement	Major culvert replacements Bridge replacement – complex modelling Extensive reports anticipated Floodplain permits require additional mapping (CLOMR/LOMR) Significant irrigation design and coordination
Bridge Work	No major bridge work Minor rail upgrades or surfacing treatments	Bridge replacement or major rehabilitation Major deck rehabilitation Seismic retrofitting Generally standard foundation work	Complex bridge construction: Unusual or non-conventional design Complex superstructure Complex foundation work
Traffic Considerations	Standard striping and signing	Traffic or safety analysis needed Signal replacements/upgrades New lighting Electrical work Geometric design	New flashing signs or traffic signals Overhead signs Substantial intersection re-design, e.g. roundabout
Right-of-Way Involvement	Little or none Construction permits only Notifications only Maintain existing access control Sidewalk and Approach Construction Agreement applies	Right-of-Way (R/W) plans needed R/W acquisition expected No claims or condemnation expected Simple or no relocations or displacements Access Control changes	Extensive R/W acquisition plans necessary Potential for condemnations Relocations or displacements Reservation/Tribal involvement New Access Control
Utilities Involvement	Little or none Minor adjustments No relocations	Some utility relocations, most prior to construction No major utility relocations	Major utility relocations Multiple utility coordination
Railroad Involvement	Low likelihood of requiring agreement >50ft from Railroad (RR)	Occasional flagger involvement Project areas within 50ft of RR Minor R/W or RR agreements possible	RR flaggers at all times Major RR agreement R/W acquisition and/or utility involvement

			with RR Structure over RR facilities
Survey	Very little or none required	Design survey, control/or cadastral survey	Complex design survey requirements
Public Involvement	Level A No public controversy	Level B Involvement of public, public officials, stakeholders and local agencies is moderate due to noncontroversial project type General communication about project progress is required	Level C Controversial (lack of consensus) and high profile projects Local agency heavily involved Major coordination among numerous stakeholders is required Tribal involvement
Environmental Considerations	Listed Categorical Exclusion covered under Programmatic Agreement with FHWA. (i.e., FHWA concurrence not required) • Minimal oversight or regulation from external agencies • Minor environmental impacts • Minor wildlife accommodations (e.g. fencing, pathway under bridge)	Non-listed Categorical Exclusion, Listed Categorical Exclusion not covered under the Programmatic Agreement with FHWA, or Build/No-build Environmental Assessment • Cultural Resources (historical, archaeological) involvement • Section 106 determination of adverse effect • De Minimis or Programmatic 4(f) Evaluation • Acquisition of land under the protection of LWCF (Section 6(f)) • Section 404 Nationwide permit required • May impact a designated or proposed Wild and Scenic River • Traffic noise analysis required • Threatened and Endangered Species USFWS informal consultation • Bald and Golden Eagle Act conservation measures needed • Does not conform to State Implementation Plan for air quality • Compensatory wetland/stream mitigation required	Environmental Assessment with complex, multiple alternative analyses or Environment Impact Study • Full 4(f) Evaluation • Individual Section 404 Permit • Other agencies (such as FHWA, COE, EPA, USFWS, Fish, Wildlife & Parks, DEQ, DNRC) are heavily involved • Traffic noise mitigation required • Threatened and Endangered Species USFWS formal consultation • Montana Sage Grouse Oversight Team approval or mitigation required • Remediation of hazardous materials required • Compensatory wetland or stream mitigation required but not available • Substantial Tribal involvement

		• SPA 124 notification • Likely presence of hazardous materials • Coordination with other State Agency commissions (e.g. river closures) • Migratory Bird Treaty Act conservation measures needed • Montana Sage Grouse consultation letter needed • Moderate Tribal involvement (e.g. ALCO permit) • Wildlife accommodation structures	
Project Delivery	No anticipated concerns meeting ready date	Ready date is very close to planned finish date; project delivery could be delayed Accelerated schedule	Politically important; construction date promises or expectations; schedule delays are a concern

APPENDIX B - RISK AND PROJECT FLOW



APPENDIX C - PROJECT RISK DOCUMENTATION (for Low Risk Projects)

Risk Review Participants:	
Risk Review Date(s):	

Project Area	Potential High Risk Element from Risk Level Table	Threat or Opportunity	Risk Management Strategy	Active or Resolved
Project Area	**Potential Medium Risk Element from Risk Level Table**	**Threat or Opportunity**	**Risk Management Strategy**	**Active or Resolved**

Instructions

Use this table to manage risks identified for low risk projects.
If a significant number of high or medium risks are identified, elevate the project risk level and complete a more robust risk analysis process using the RMP.

1. Review potential risks to the project using the Project Level of Risk Table. Highlight the high and medium risk items.
2. Copy High Risk element and Medium Risk element row entries into this form. Identify as opportunities or as threats. Add rows to this form as needed.
3. Determine and document risk management strategies for each potential risk element to protect or enhance the project objectives.
4. Document the status of the risk (active or resolved).
5. Review and update this risk document regularly to ensure that project objectives are met or exceeded.
6. Cells will expand when typing; use ALT+Enter to add a line.
7. Form is set to print all columns one page wide.

APPENDIX D – RISK MANAGEMENT PLAN WORKSHEET

Project No. and Name	STPP 99-1(29)5 NE of Montana Line - N.			RISK MANAGEMENT SUMMARY RESULTS				# Risks Identified	RELATIVE RISK
Estimate Date	09/23/08	Target letting date	05/01/11	Planned and Actual	MIN	MAX	LIKELY		#DIV/0!
Project UPN	UPN	Estimated Constr. Duration	1.0Mo	Planned Cost to Respond			$0.0		
Last Review Date	04/29/16	Estimated PE Cost	$1.0	Est. $ of Cost Avoided (via risk management)	$0.0	$0.0	$0.0		
Project Manager	Joe Designer	Estimated R/W Cost	$1.0	Actual Cost to Respond			$0.0		
NOTE: All costs in $	M	Estimated CN Cost	$1.0	Est. Actual $ Cost Avoided (via risk mgmt)	$0.0	$0.0	$0.0		

Proactive Risk Management: Develop an action response strategy; assign risk owners to implement action; monitor and record effectiveness of the risk response action.

Risk Breakdown Structure (functional assignment)	Planned Response Cost	Likely Cost Avoidance	Risk Breakdown Structure (functional assignment)	Planned Response Cost	Likely Cost Avoidance
Right-of-Way	$0.0	$0.0	Stakeholders	$0.0	$0.0
Environmental	$0.0	$0.0	Unforeseen Events	$0.0	$0.0
Engineering	$0.0	$0.0	Market Conditions	$0.0	$0.0
Traffic	$0.0	$0.0	Utilities	$0.0	$0.0
Estimated Monetary Impact of Signficant Project Risks	**$0.0**		**Estimated Time Impact of Signficant Project Risks**	**0.0Mo**	

Response Cost & Cost Avoi (based on most likely valu

Risk Identification								Quantitative Analysis					Qualitative Display of Most Likely Impact			Response			Monitoring and Control			Critical Issue		Estimated Response $ Entered	Calculated Est. Cost Avoidance	Actual Response $ Entered
Risk #	Status	RBS Group	RBS Date Member	Project Phase [Date Identified	Functional Assignment	Summary Description Threat and/or Opportunity	Description of Risk Event (Cause-Risk-Impact) Clearly state the cause, the risk, and the impact.	Risk Trigger	Type	Probability	Risk Impact ($K or M) (Month)		Expected Impact ($K) [most likely X probability]	Probability	Impact	Risk Matrix	Strategy Priority	Response Actions ACTION TO BE TAKEN including advantages and disadvantages include date	Risk Response Owner	Risk Review Dates	Date, Status, and Review Comments (Do not delete prior comments, therefore providing a history)	Near or Long Term?		Planned Cost to Respond [$K or M] (enter single number estimate)	Est.Cost Avoided [$K/M] (Expected Value of Risk) - (Est. Cost to Respond)	Actual Cost to Respond [$K or M]
(1)	(2)	(3)	(3a)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(11a)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)		(22)	(23)	(24)
EXAMPLE	Active	ROW	03	Feb-10 Design	Design	Threat Wetland mitigation may require additional R/W Threat	Because the mitigation ratio has not been finalized and there could be additional impacts to wetlands, the amount of R/W needed for the mitigation area may significantly increase, resulting in additional R/W costs and potential acquisition delays.	If Wetland impact is larger than 1/2 acre and ratio exceeds 4:1.	Cost	70%	MIN	$1.0	$4.8	High	Very High	Probability VH H M L VL; Relative risk 64; Mo $; VL L M H VH; Impact 4	Avoid	Finalize design to identify all wetlands that are impacted. Early coordination with the outside agencies to determine mitigation ratio.	Design Leader/Enviro. mgr	2007-Jan-2 2006-Dec-2	As of Nov. 15, 2005 there are only two potential areas where there could be additional wetland impacts. As of Dec. 2, 2005 agency has initially determined that mitigation ration would be 4:1.	NEAR	EXAMPLE		$0.7 $8.4 $4.9	
											MAX	$12.0														
											Most Likely	$7.0														
									Schedule		MIN	0.0Mo	1.9Mo													
											MAX	4.0Mo														
											Most Likely	3.0Mo														
1	Active				Design	Threat			Cost		MIN		$0.0	NO RISK	NO RISK	Probability VH H M L VL; Relative risk 0; VL L M H VH; Impact 0						NEAR		$0.0 $0.0 $0.0	$0.0 $0.0	
											MAX															
											Most Likely															
									Schedule		MIN		0.0Mo													
											MAX															
						Threat					Most Likely															
2	Active				Design	Threat			Cost		MIN		$0.0	NO RISK	NO RISK	Probability VH H M L VL; Relative risk 0; VL L M H VH; Impact 0						NEAR		$0.0 $0.0 $0.0	$0.0 $0.0	
											MAX															
											Most Likely															
									Schedule		MIN		0.0Mo													
											MAX															
						Threat					Most Likely															
3	Active				Design	Threat			Cost		MIN		$0.0	NO RISK	NO RISK	Probability VH H M L VL; Relative risk 0; VL L M H VH; Impact 0						NEAR		$0.0 $0.0 $0.0	$0.0 $0.0	
											MAX															
											Most Likely															
									Schedule		MIN		0.0Mo													
											MAX															
						Threat					Most Likely															