



# **INTRODUCTION TO RISK MANAGEMENT: MDT'S PROCESS**

Lesly Tribelhorn, PE  
Highways Design Engineer



# SESSION GOALS

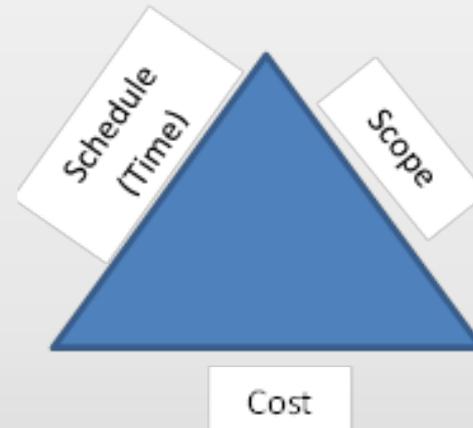
---

- ▶ Introduce you to MDT's Risk Management process
- ▶ Prepare you for Risk Analysis Workshop

# COST ESTIMATING BASICS

---

- ▶ Determine project needs/scope
- ▶ Identify project characteristics
  - ▶ Location
  - ▶ Type
  - ▶ Complexity
- ▶ Determine estimate basis





# COST ESTIMATING BASICS

---

- ▶ Prepare base estimate
  - ▶ Don't include risk
- ▶ Determine risk/contingency
- ▶ Review and approve estimate
- ▶ Communicate estimate
  - ▶ Scope
  - ▶ Assumptions
  - ▶ Basis



# RISK MANAGEMENT

---

- ▶ Estimating
  - ▶ Plan
  - ▶ Identify
  - ▶ Analyze
- ▶ Management
  - ▶ Respond
  - ▶ Monitor and control
  - ▶ Communicate
- ▶ Documentation
  - ▶ Risk Management Plan



# RISK-BASED ESTIMATING

---

- ▶ Determine project needs/scope
- ▶ Identify project characteristics
- ▶ Determine estimate basis
- ▶ Prepare base estimate
- ▶ Determine risk/contingency



# RISK IDENTIFICATION AND ANALYSIS

---

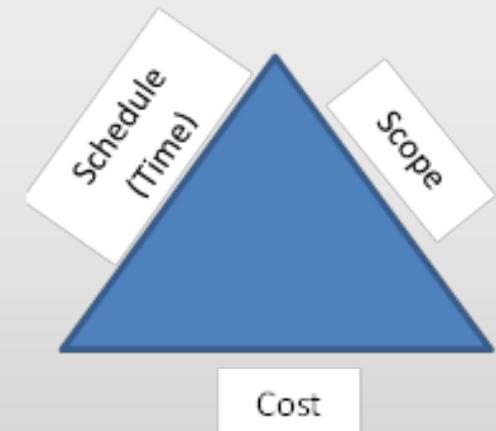
- ▶ Plan
- ▶ Identify
- ▶ Analyze



# PLAN

---

- ▶ Determine appropriate level of project risk management
- ▶ Include time in schedule for risk management
- ▶ Include costs in preliminary engineering estimate
- ▶ Include appropriate costs in construction estimate
- ▶ Remember triangle: Schedule (Time)/Scope/Cost
- ▶ Develop risk management mindset



# LEVEL OF PROJECT RISK MANAGEMENT

H. Wynnlee Crisp Matrix	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Deciding the Appropriate Level of Project Risk Management	Not important	Nice to achieve; but not critical	Consequences of failure are low to mod.	Consequences of failure significant	Critical; failure isn't an option
How important is it to	(circle your rating)				
Complete on budget	1	10	25	50	100
Complete on schedule	1	10	25	50	100
Fulfill all the requirements of the scope	1	10	25	50	100
Meet the quality expectation	1	10	25	50	100
Have a fully functional finished product	1	10	25	50	100
Have a satisfied Owner	1	10	25	50	100
Know if a "high" risk is unreasonably high	1	10	25	50	100
Understand the probability of completing on schedule	1	10	25	50	100
Understand the probability of completing on budget	1	10	25	50	100
Know which tasks impose the greatest risk on the overall project	1	10	25	50	100
Communicate the probability of success/failure to others	1	10	25	50	100
Demonstrate that a tight schedule is actually inadequate	1	10	25	50	100
Demonstrate that a tight budget is actually inadequate	1	10	25	50	100
Avoid damaging your reputation	1	10	25	50	100
Avoid damaging your organization's reputation	1	10	25	50	100
	TOTAL RATING				

© 2006 HW Crisp LLC. Unrestricted permission to reprint granted by H. Wynnlee Crisp, April 3, 2006, as long as this copyright notice and license is included. hwcrist@aol.com (425) 681-7887

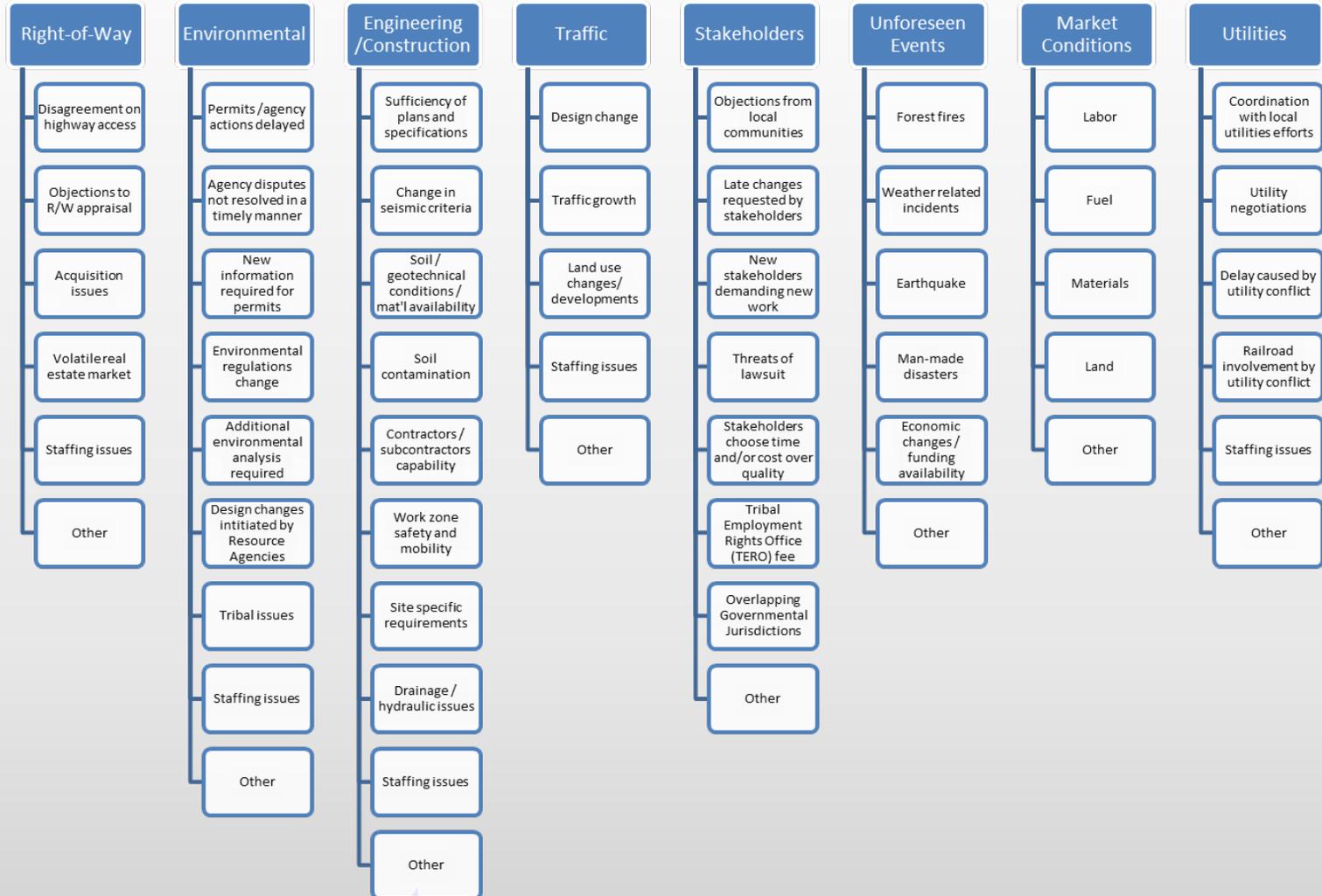


# IDENTIFY

---

- ▶ Focus on those risks that could significantly affect project objectives
- ▶ Opportunities and threats
- ▶ Brainstorm and condense
- ▶ Use risk element chart
- ▶ Get input from local experts

# RISK ELEMENT CHART





# ANALYZE INDIVIDUAL RISKS

---

- ▶ Qualitative or quantitative
- ▶ Probability of occurrence
- ▶ Cost impacts
- ▶ Schedule impacts
- ▶ Opportunities (decrease cost or time)
- ▶ Threats (increase cost or time)
- ▶ Overall significance



# RISK IMPACT MATRIX

<b>Probability of Occurrence</b>	<b>Very High</b>	Green	Yellow	Red	Red	Red
	<b>High</b>	Green	Yellow	Red	Red	Red
	<b>Medium</b>	Green	Green	Yellow	Red	Red
	<b>Low</b>	Green	Green	Yellow	Red	Red
	<b>Very Low</b>	Green	Green	Green	Yellow	Red
		<b>Very Low</b>	<b>Low</b>	<b>Medium</b>	<b>High</b>	<b>Very High</b>
		<b>Potential Impact</b>				



# RISK MANAGEMENT

---

- ▶ Respond
- ▶ Monitor and Control
- ▶ Communicate



# RESPOND

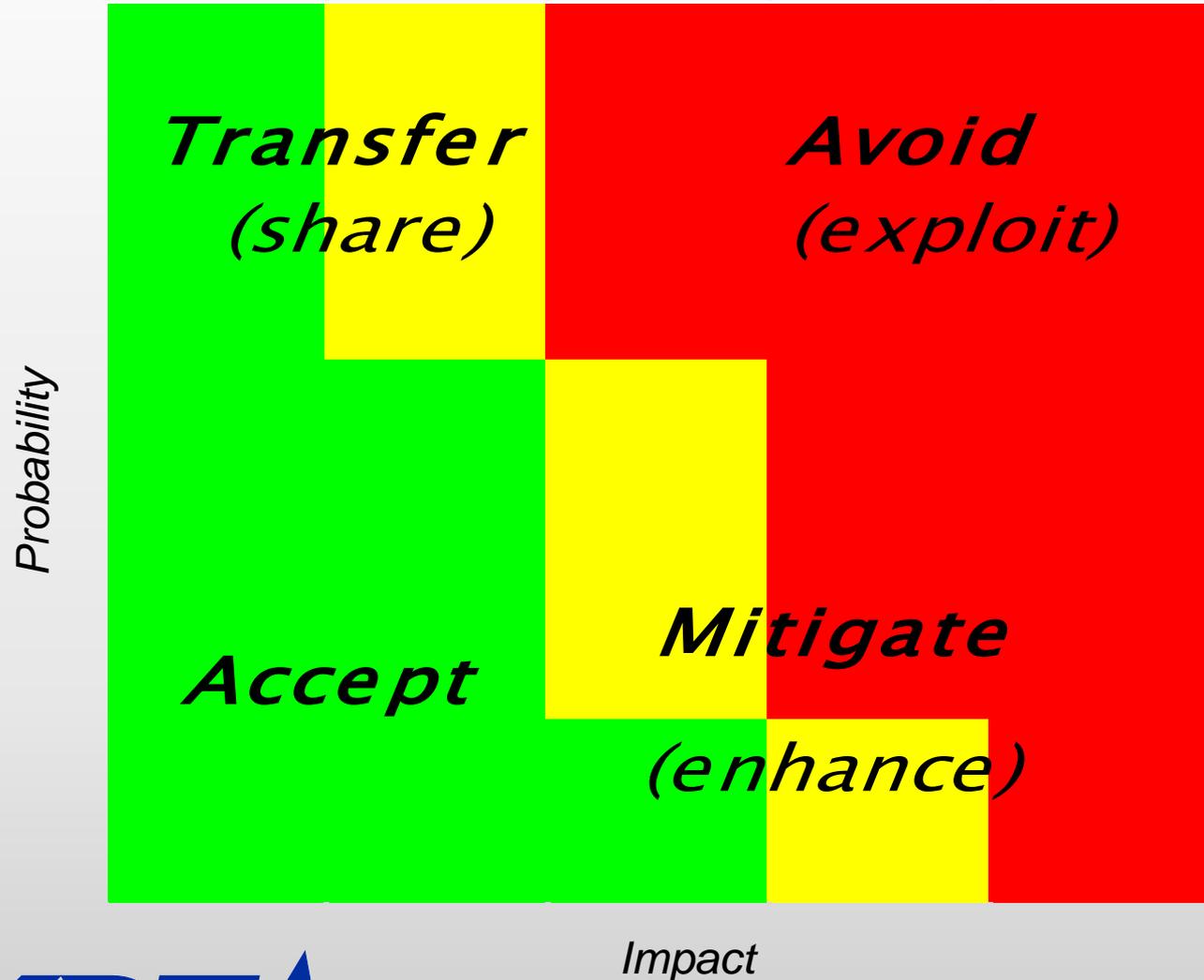
---

- ▶ Develop strategies
- ▶ Avoid or Exploit (adjust scope, schedule, or budget)
- ▶ Mitigate or Enhance (adjust PE and/or tasks)
- ▶ Accept (adjust contingency or costs/schedule)
- ▶ Assign tasks to responsible party with deadlines



# RISK RESPONSE

---





# MONITOR AND CONTROL

---

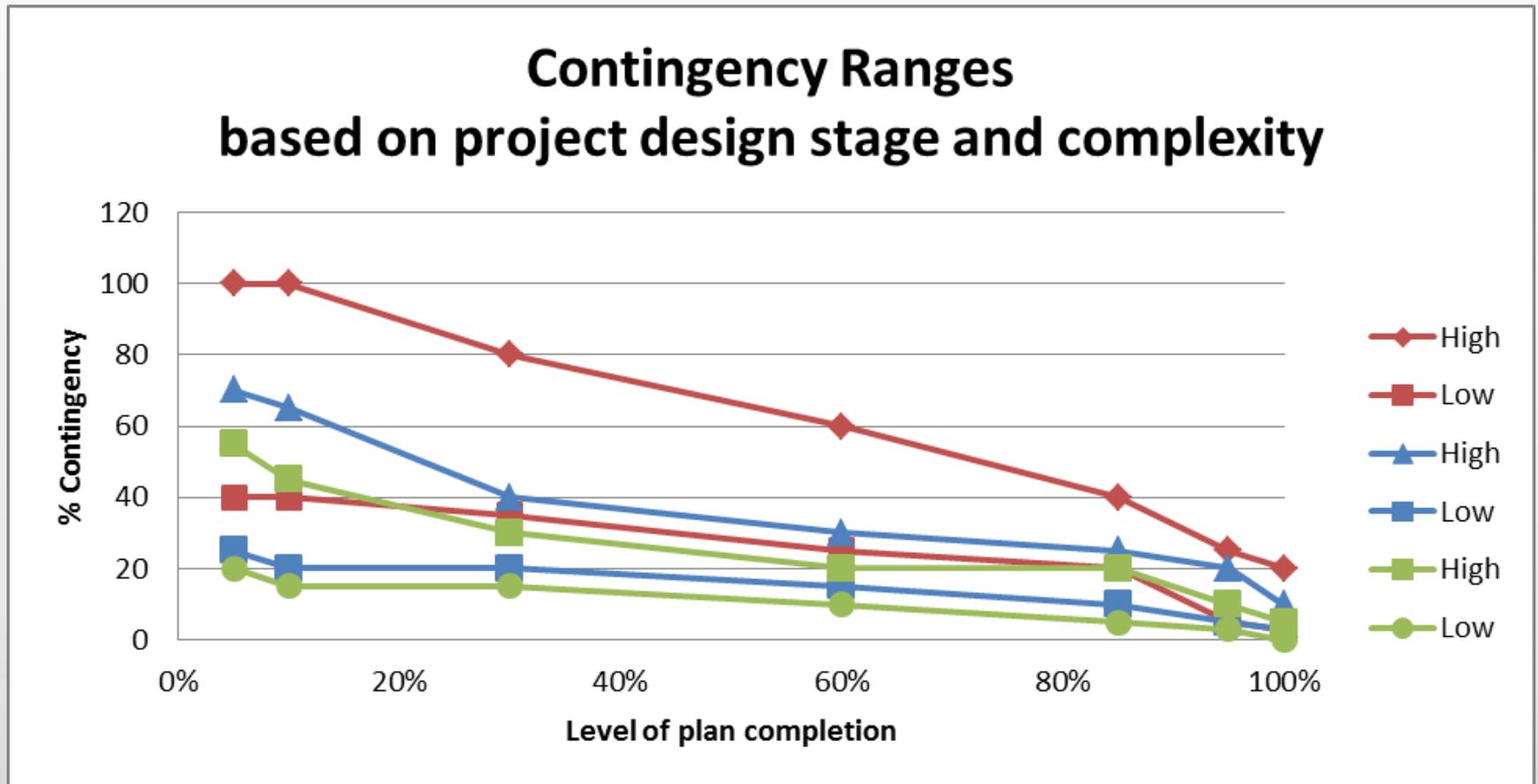
- ▶ Follow through on strategies
- ▶ Retire risks that have been taken care of
- ▶ Determine if additional risks have surfaced
- ▶ Revise risk management plan as needed

# COMMUNICATE

---

- ▶ Add risk impact to cost and schedule estimates
- ▶ Keep all stakeholders informed of status
- ▶ Reconvene risk management team as necessary
- ▶ Communicate positive and negative changes

# CONTINGENCY RANGES



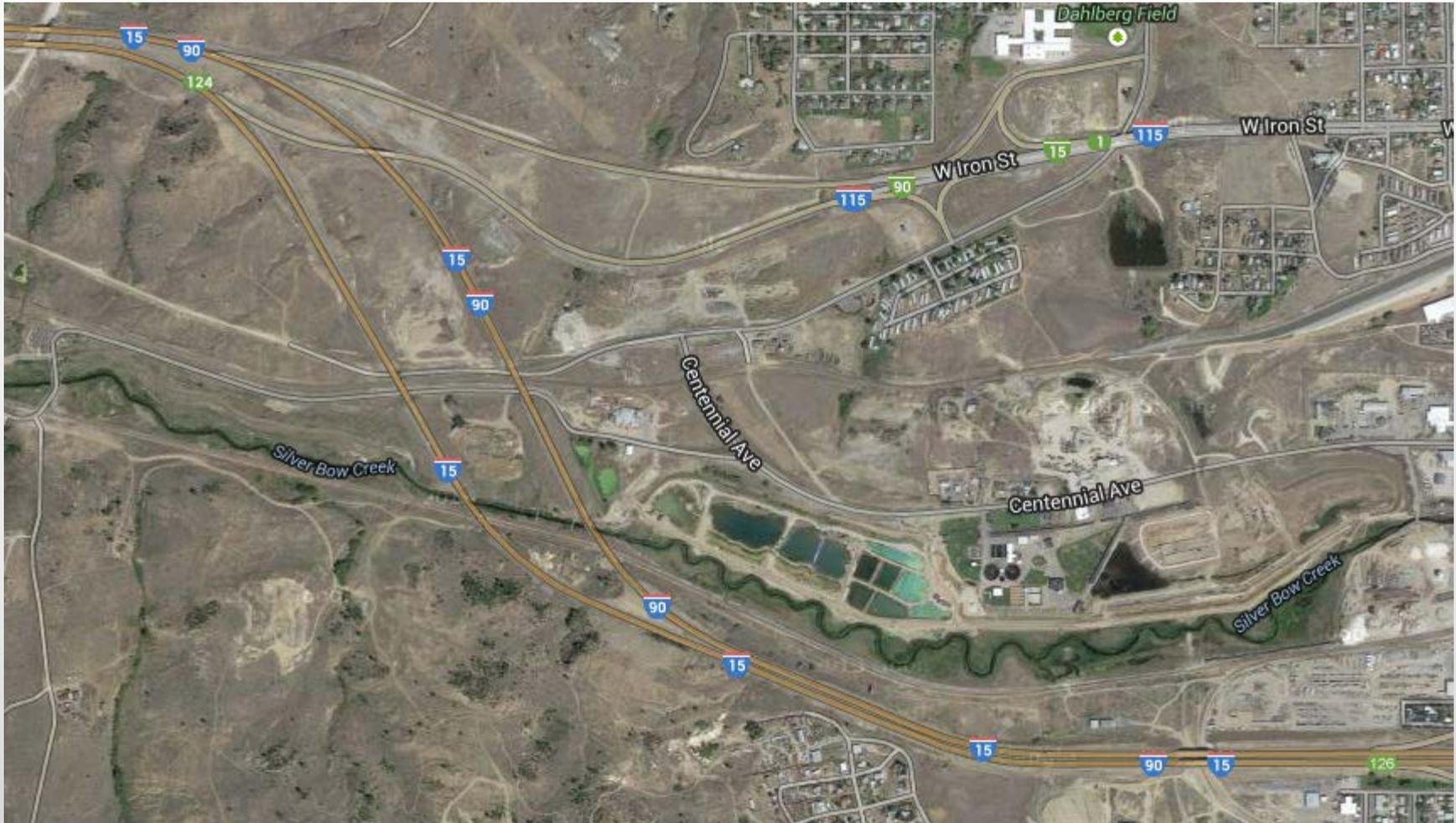


# DOCUMENTATION

---

- ▶ Risk Management Plan
- ▶ Project reports
  - ▶ Scope
  - ▶ Assumptions
  - ▶ Basis

# APPLICATION TO PROJECT





# RARUS/SILVERBOW CR. STRUCTURES

---

- ▶ Project scope
- ▶ Location
- ▶ Estimate basis
- ▶ Current, unadjusted CN estimate
- ▶ Current, unadjusted project schedule

# RISK MANAGEMENT PLAN

RISK MANAGEMENT SUMMARY RESULTS																RELATIVE RISK	Proactive Risk Management: Develop an action response strategy; assign risk owners to implement action; monitor and record effectiveness of the risk response action.			
Project No. and Name		STPP 99-1(2)915 NE of Montana Line - N.														# Risk Identified	RELATIVE RISK	Risk Breakdown Structure (functional assignment)		
Estimate Date	09/23/08	Target letting date	05/01/11	Planned and Actual			MIN	MAX	LIKELY	#DIV/0!	Right-of-Way			Planned Response Cost	Likely Cost Avoidance					
Project UPN	UPN	Estimated Constr. Duration	1.0Mo	Planned Cost to Respond					\$0.0		Environmental			\$0.0	\$0.0					
Last Review Date	11/05/13	Estimated PE Cost	\$1.0	Est. \$ of Cost Avoided (via risk management)			\$0.0	\$0.0	\$0.0		Engineering			\$0.0	\$0.0					
Project Manager	Joe Designer	Estimated R/W Cost	\$1.0	Actual Cost to Respond					\$0.0		Traffic			\$0.0	\$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	Estimated Monetary Impact of Significant Project Risks			\$0.0	Estimated Significant					
Risk Identification				Quantitative Analysis				Qualitative Display of Most Likely Impact				Response			Monitoring and					
Risk #	Status	Project Phase	Date Identified	Functional Assignment	Summary Description Threat and/or Opportunity	Description of Risk Event (Cause-Risk-Impact)	Risk Trigger	Type	Probability	Risk Impact (\$K or M) (Month)	Expected Impact (\$K) [Most likely X probability]	Probability	Impact	Risk Matrix	Priority	Strategy	Response Actions ACTION TO BE TAKEN including advantages and disadvantages include date	Risk Response Owner	Risk Review Dates	Date, Status, and (Do not delete prior records)
(1)	(2)	(3)	(3a)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(10a)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
25	EXAMPLE	Active	Feb-10	Design	Threat	Wetland mitigation may require additional R/W	If Wetland impact is larger than 1/2 acre and ratio exceeds 4:1.	Cost	70%	MIN \$1.0 MAX \$12.0 Most Likely \$7.0	\$4.8	High	Very High	Probability VH H M L VL	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	As of Nov. 15, 2005 agency has potential areas; additional wetland mitigation	
26								Schedule		MIN 0.0Mo MAX 4.0Mo Most Likely 3.0Mo	1.9Mo	High	Very Low	Relative risk 64 4						
27																				
28																				
29																				
30																				
31																				
32																				
33																				
34																				
35																				
36																				
37																				
38																				
39																				
40																				
41																				
42																				
43																				
44																				
45																				
46																				
47																				
48																				
49																				
50																				

# DETERMINE RISK/CONTINGENCY

---

- ▶ Evaluate overall impact of risks
  - ▶ Confirm complexity
  - ▶ Establish project completeness
  - ▶ Assign contingency
- OR
- ▶ Run Monte Carlo simulation



# PREPARATION FOR WORKSHOP

---

- ▶ Familiarize with Risk Management Guidelines
- ▶ Step through Risk Management Plan Worksheets
- ▶ Review/Revise Base Estimate
  - ▶ Remove risk factors
  - ▶ Document assumptions
  - ▶ Check basis of item prices
- ▶ Review/Revise Schedule
  - ▶ Which activities are standard values
  - ▶ Which activities include risk