

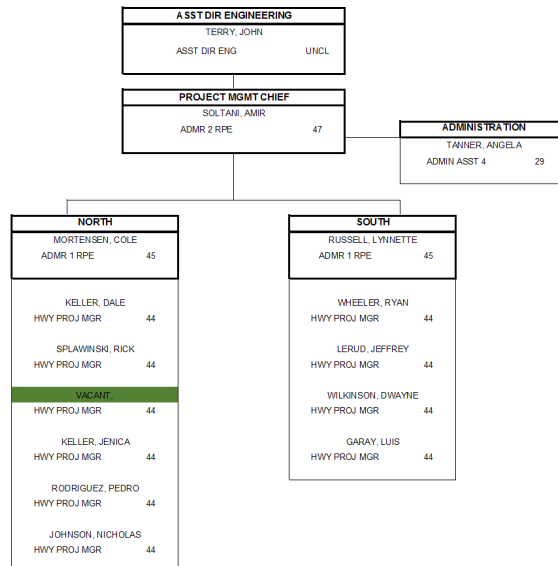


Cost and Schedule Risk Assessment



NDOT Project Management

- NDOT is a Centralized Agency
- Project Management Division (2007)
 - Major Projects - \$100M+
 - Innovative Delivery
 - Design-Build
 - CMAR
 - Coordination Intensive



NDOT Risk Management & Risk-Based Cost Estimating Guidelines

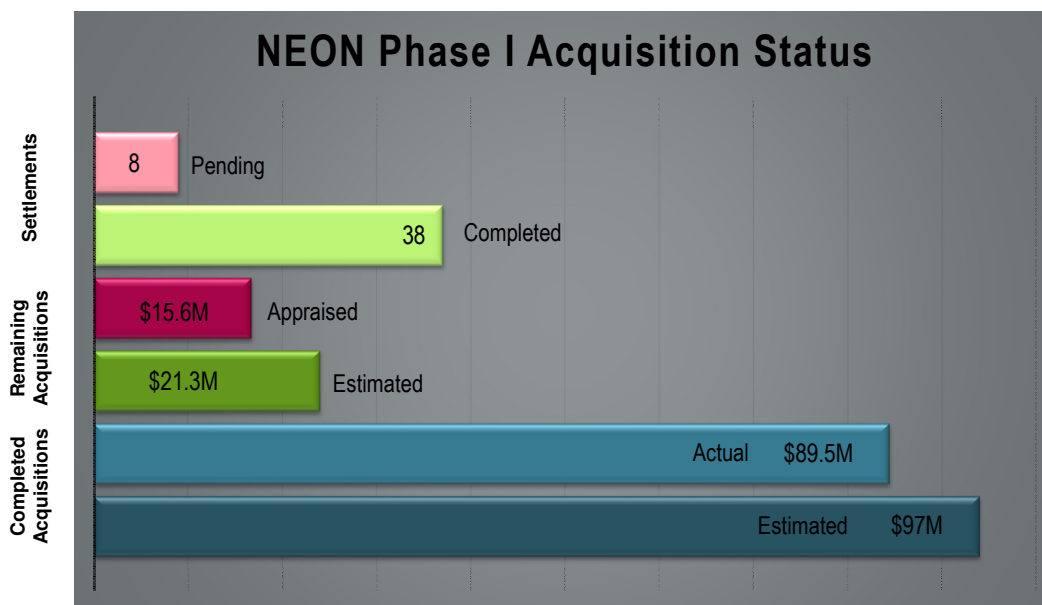
- Developed in 2012
- Goal is to provide guidance to Nevada DOT personnel and consultants in best practice methods of risk management and risk-based cost estimation.
- Guidelines address the first step in Nevada DOT project management's vision of achieving statewide uniformity and consistency of project cost estimates and department wide priority on estimating, managing and controlling costs.
- Training is provided to key personnel

NDOT Approach to Risk Management

- Major Projects >\$100M– Quantitative Assessment (Generally Consultant facilitated)
 - Also recommended for projects >\$25M
 - Goal: Meeting FHWA CRA requirements (currently exceeding)
- Projects >\$25M - Qualitative Assessment
 - Not widely used outside of the Project Management Division

But Wait! There's More!

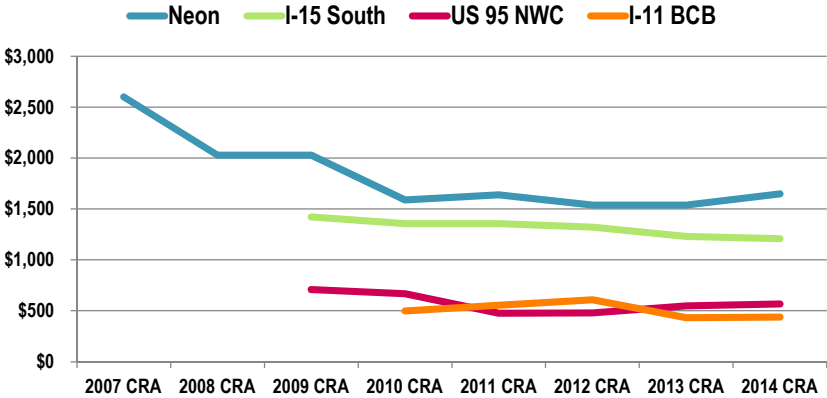
- Innovative Delivery Projects
 - Design-Build
 - Contractual Risks
 - ROW Risks
 - CMAR
 - Risk Reserves
- Independent Cost Estimates (ICE)



Cost / Risk Management (NEON)

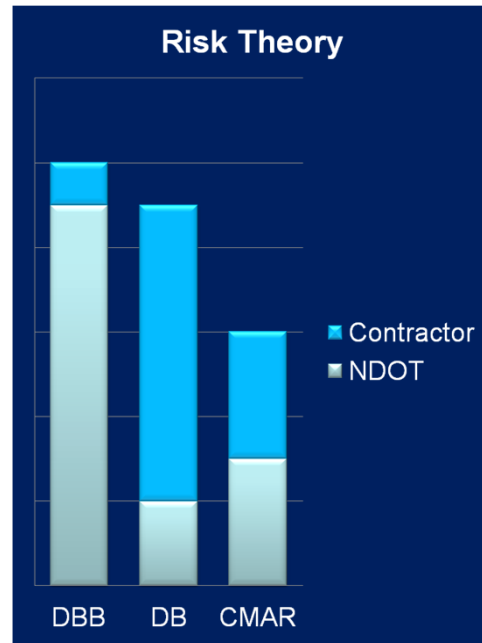
- Redesign of base concept - 2007
- NEON VA Study - October 2008
- CRA #1 - December 2008
- CRA #2 - October 2010
- Scoping Workshop - November 2010
- Phase 1 CRA - March 2011
- TAC Workshop - August 2011
- MLK+I VA Study - November 2011
- Every Day Counts - December 2011
- ABC Workshop - March 2012
- Every Day Counts - September 2012
- Risk Allocation Workshop - June 2013
- R/W CRA - September 2013
- 2013 ICE - October 2013
- R/W CRA – January 2014
- Future Phase CRA - February 2014
- Construction CRA - April 2014
- CRA update – February 2015

Major Projects Cost Trend

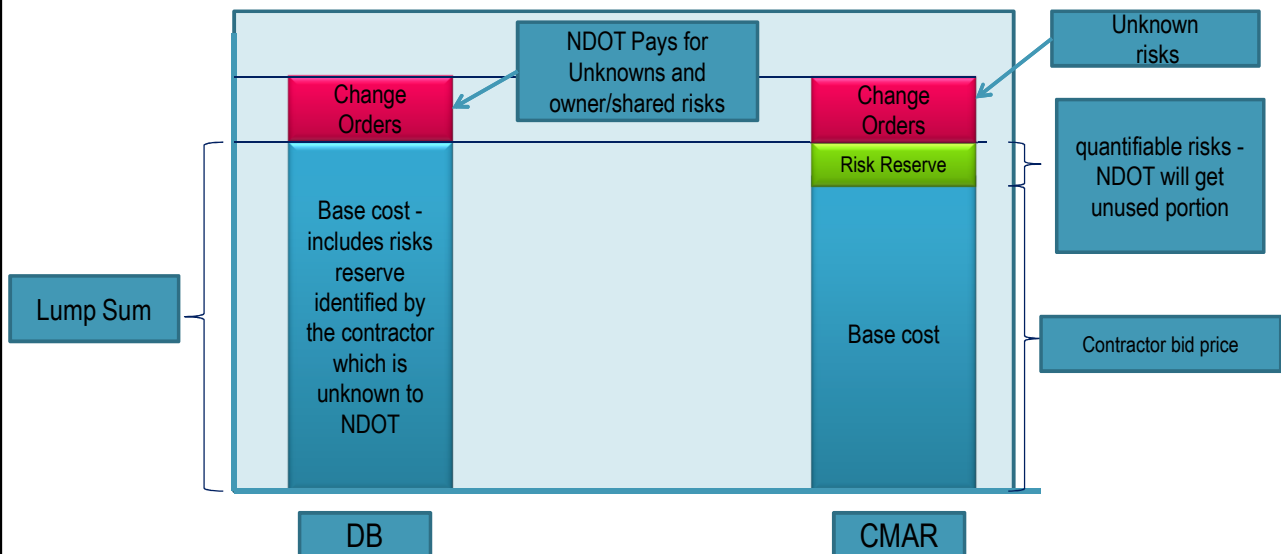


Risk Allocation

- Risk allocation is an essential element of innovative delivery projects (DB, CMAR and DBFOM)
- Innovative delivery provides flexibility in risk allocation – Keeping, sharing or transferring risks that traditionally are borne by NDOT



Risk Distribution – DB & CMAR



Workshops

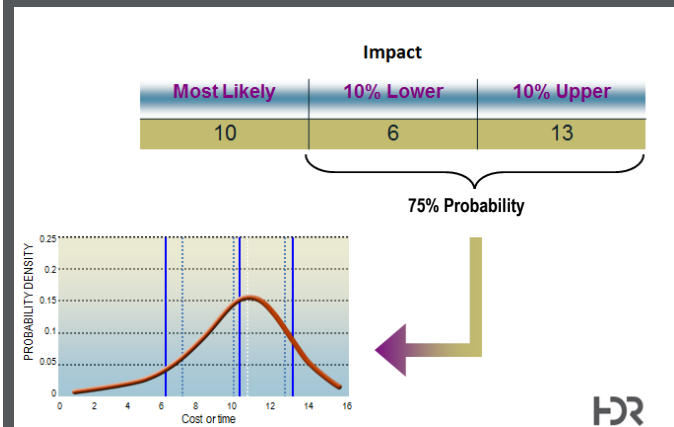
- **Consensus-Based Workshops led by an Independent Risk Lead**
- These Structured Workshops build Consensus among Various Stakeholders
- Engagement of Internal and External Subject-Matter Experts
- Sessions by Functional Assignment to:
 - Identify Risks
 - Quantify Risks
 - Discuss Risk Response and Mitigation Strategies



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Success - Identifying Event Risks that matter

- Focus on issues that matter
- Describe the event properly
- How likely is it to occur?
- What are the potential impacts (cost/schedule)?
- If the event occurs what are the impacts
 - on the low end?
 - on the upper end?
 - most likely?
- Is the event dependent on or correlated with other events



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Successes

- Workshop Agenda
- Need to have the right people at the table at the right time.
- Agendas are arranged by discipline

8:00 – 8:15	A good start... <ul style="list-style-type: none"> ▪ Welcome, Sign-in, Introductions ▪ Agenda review 	Risk Lead	
8:15 – 9:00	Right-of-Way/Utilities <ul style="list-style-type: none"> ○ Parkway – Unpaved Section ○ Parkway – Paved Section ○ US 50 Improvements 	Risk Lead	Relevant project team members
9:00 – Noon	Environmental/Design <ul style="list-style-type: none"> ○ Parkway – Unpaved Section ○ Parkway – Paved Section ○ US 50 Improvements 	Risk Lead	Relevant project team members
Noon - 1:00	Lunch	Everyone	
1:00 – 2:00	Structures <ul style="list-style-type: none"> ○ Parkway – Unpaved Section ○ Parkway – Paved Section ○ US 50 Improvements 	Risk Lead	Relevant project team members
2:00 – 3:00	Construction <ul style="list-style-type: none"> ○ Parkway – Unpaved Section ○ Parkway – Paved Section ○ US 50 Improvements 	Risk Lead	Relevant project team members
3:00 – 3:15	Break	Everyone	
3:15 – 4:15	Contracting & Procurement/ Management & Funding <ul style="list-style-type: none"> ○ Parkway – Unpaved Section ○ Parkway – Paved Section ○ US 50 Improvements 	Risk Lead	Relevant project team members
4:15 – 5:00	Wrap-up <ul style="list-style-type: none"> ▪ Additional information ▪ Clarifications ▪ Parking lot issues 	Risk Lead	13

Lessons Learned

- Historical Unit Bid Prices contain risks!
- Historical Unit Bid Prices often are unbalanced!



Success!

- **Reviewing & Validating the Project Base Costs are very Important – ICE!**
- Having an independent Cost Lead review/validate the engineers estimate is a must
- Walking through the base cost estimate with the entire project team during the workshop helps to identify items omitted or added that shouldn't be – sometimes saving millions of dollars

Date/Time	Topic	Leading	Participants
July 7, 2015			
1:00 – 1:15	A good start... <ul style="list-style-type: none"> ▪ Welcome, Sign-in, Introductions ▪ Agenda review 	Risk Lead	
1:15 – 1:30	What is Cost Risk Assessment?	Risk Lead	
1:30 – 2:30	Project Briefing <ul style="list-style-type: none"> ○ Project Overview ○ Geotechnical ○ ICE Findings 	Project Manager(s)	Project team members
2:30 – 2:45	Base Schedule and Flowchart Development <ul style="list-style-type: none"> ○ Review baseline schedule 	Schedule Lead	Project team members
2:45 – 3:00	Base Cost Validation & Concurrence <ul style="list-style-type: none"> ○ Review Base Cost Estimate ○ Costs spent to date ○ Pre-construction costs ○ Construction costs ○ Right of Way/Utilities 	Cost Lead	Project team members
3:00 – 3:15	Break	Everyone	
3:15 – 5:00	Geotechnical <ul style="list-style-type: none"> ○ Parkway – Unpaved Section ○ Parkway – Paved Section ○ US 50 Improvements 	Risk Lead	Relevant project team members
5:00	Adjourn for the day		

Lessons Learned

Risk Markups will affect your bottom line!

- Miscellaneous Item Allowances 10%
- Mobilization 8%
- Engineering 12%

Example is a risk that a 500' long bridge may need to be 2' wider

Unit cost is \$100/SF

(500 x 2 x \$100 = \$100,000)

The risk model will apply the markups



Miscellaneous Items - $\$100,000 \times 1.10 = \$110,000$

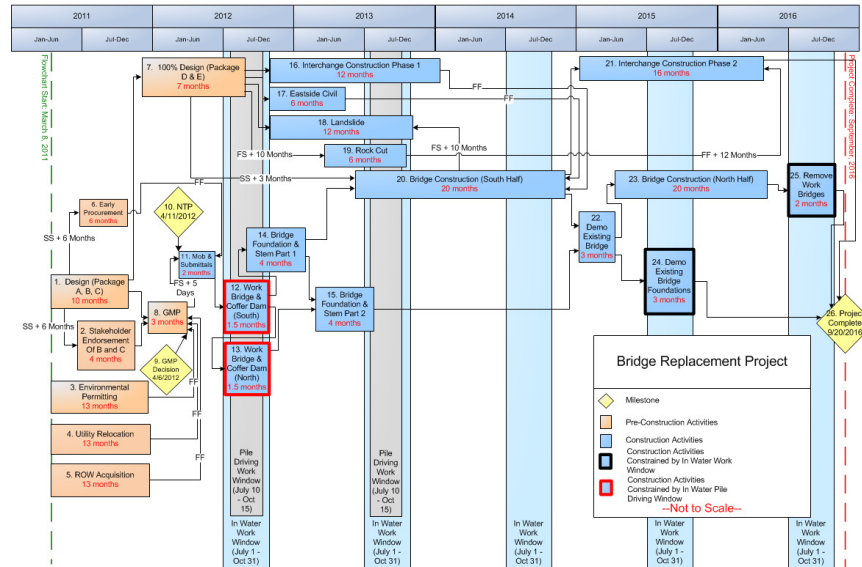
Mobilization - $\$110,000 \times 1.08 = \$118,800$

Engineering - $\$129,060 \times 1.12 = \$144,547$

What was thought to be a \$100K risk is really 133K

Lessons Learned

- The project flowchart (schedule) is the backbone of the risk model



Lessons Learned

- Develop Risk Management Plans to manage the risks not a contingency amount.

Risk Management Plan

US 95 Northwest Corridor



Last updated: December 12, 2011



Successes

- Risk Management is an integral part of Nevada DOT's CMAR Project Delivery process
- The CMAR, Designer, ICE and NDOT all participate to identify and respond to the project risks.
- A quantified risk reserve becomes part of the final GMP
- Risk reserve is managed jointly by CMAR and NDOT



Successes

- FHWA Financial Plans for Major Project
- Same firm that conducts the risk workshops develops the Financial Plans
- Good Relationship with FHWA
- FHWA signed off on using CRA process instead of CER process