Cost Risk Assessment

Building Success and Avoiding Surprises

Transportation Policy Committee

June 17, 2015

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Addressing Cost and Schedule Concerns

Usual Questions

- How much will it cost?
- How long will it take?
- Why does it cost that much?
- Why does it take that long?

Analysis Needs

- Risk Identification
- Qualitative and Quantitative Risk Analysis
- Value Engineering and Mitigation Strategies
- Risk Monitoring and Control

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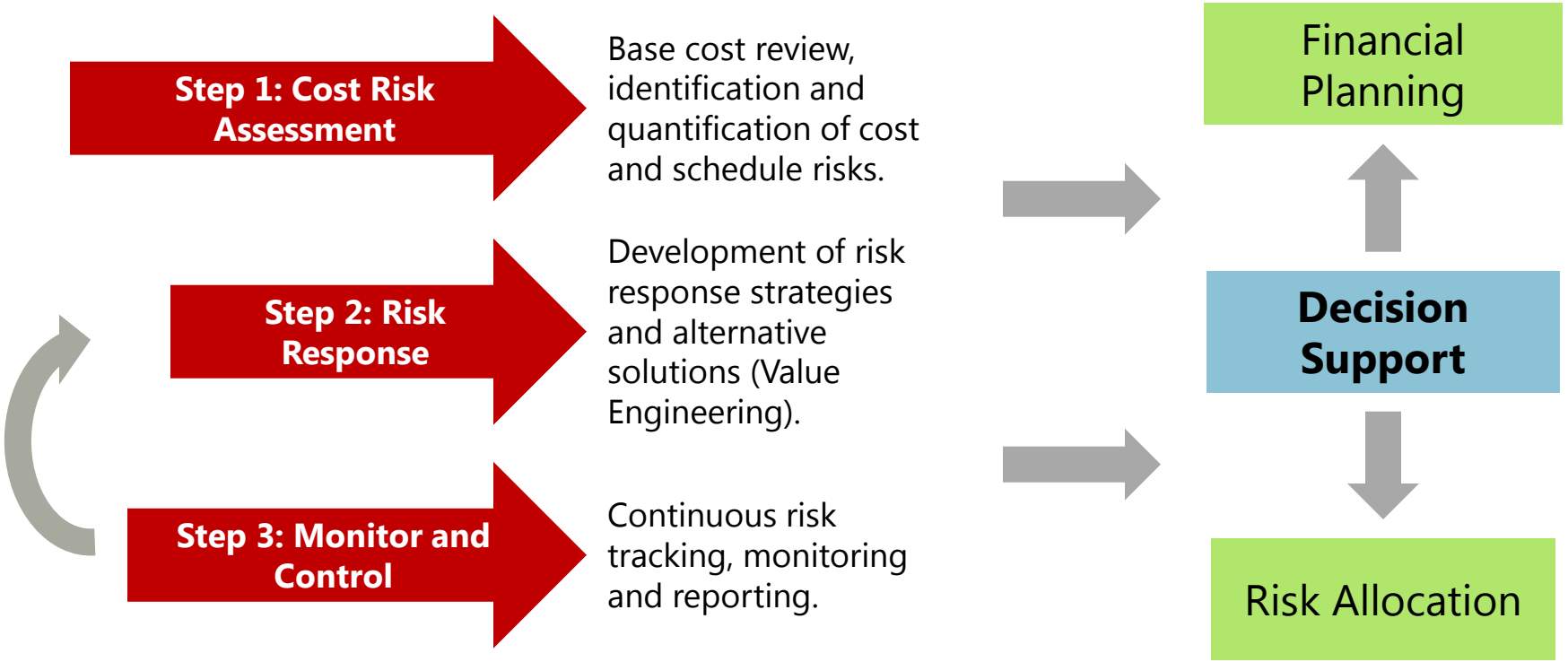
Risk Management Process



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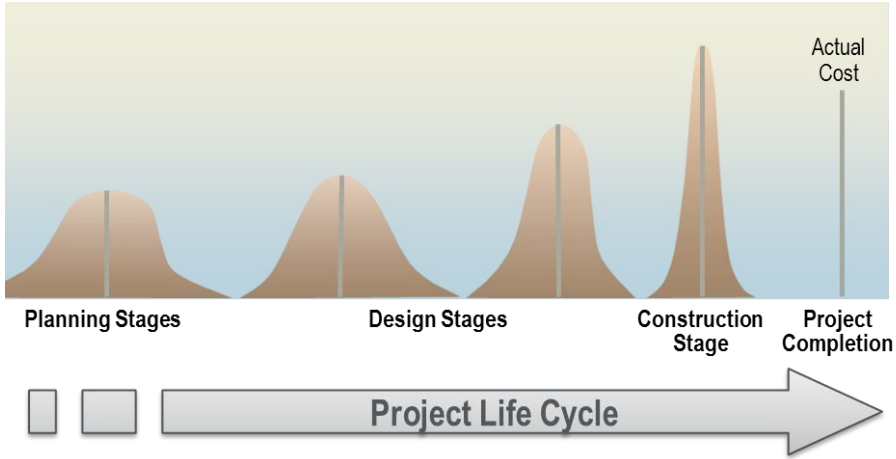
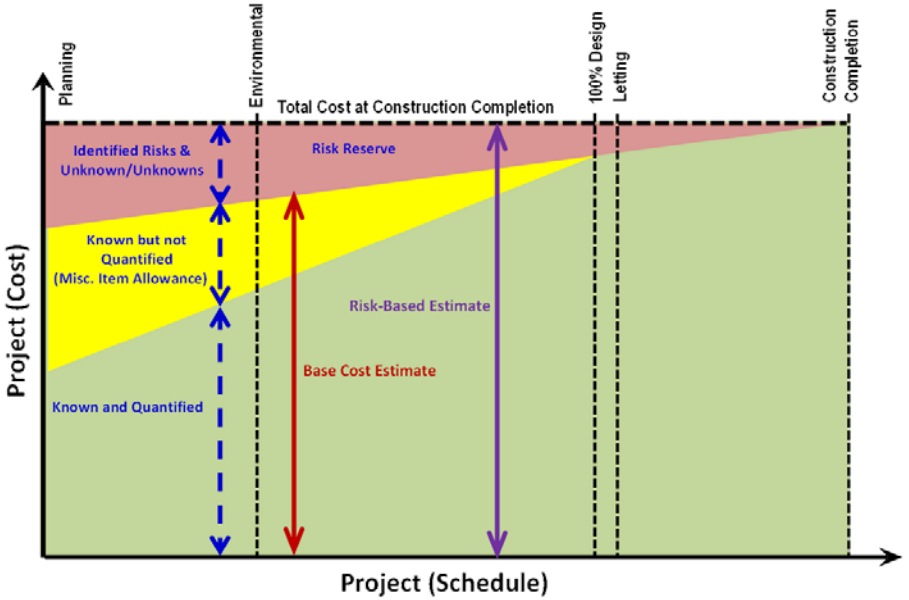
Overview of Project Cost





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Consensus-Based Workshops

- Structured workshops to 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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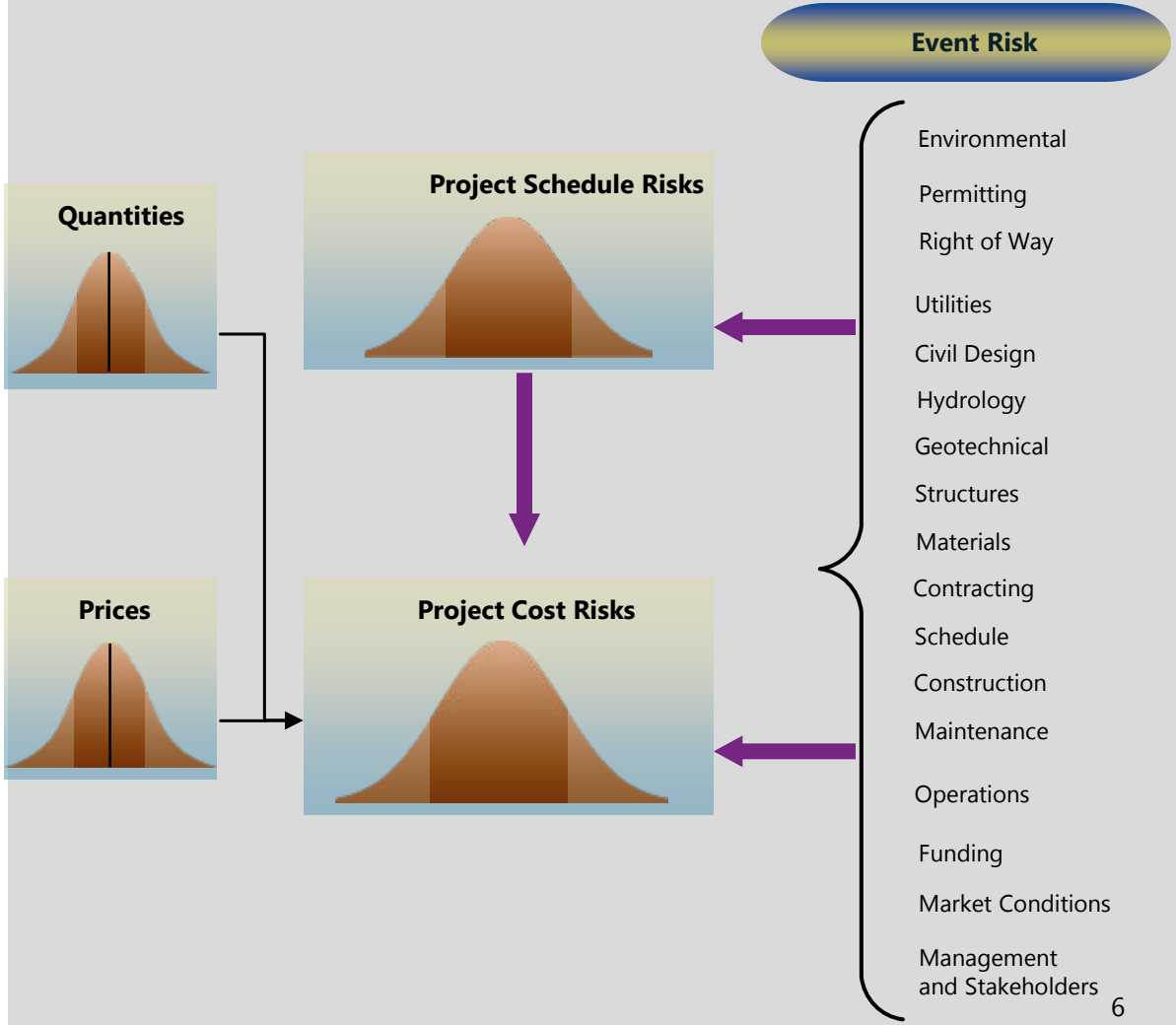
How the Modeling Works

- Monte Carlo Simulation
  - Base cost and uncertainties
  - Cost Event Risks
  - Schedule Event Risk

Making the "black box" transparent



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“Contractors don’t take risks, they price them!”

Source: http://mcgladrey.com/eClubNews/Change-orders-outsize-construction-contracts

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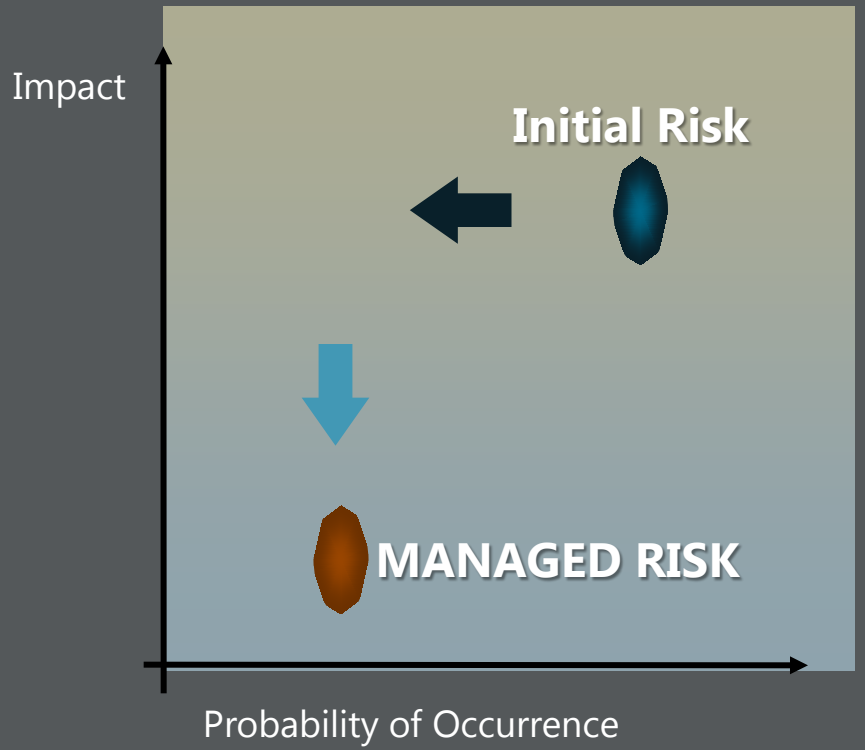
Risk Management

- Risk Assessment's aim is to assess potential impact of various scope, event, and budget risks on the project's cost and schedule.
- Risk Management's aim is to identify opportunities and mitigation strategies to reduce both the likelihood of an event occurrence and the potential effect if it occurs.



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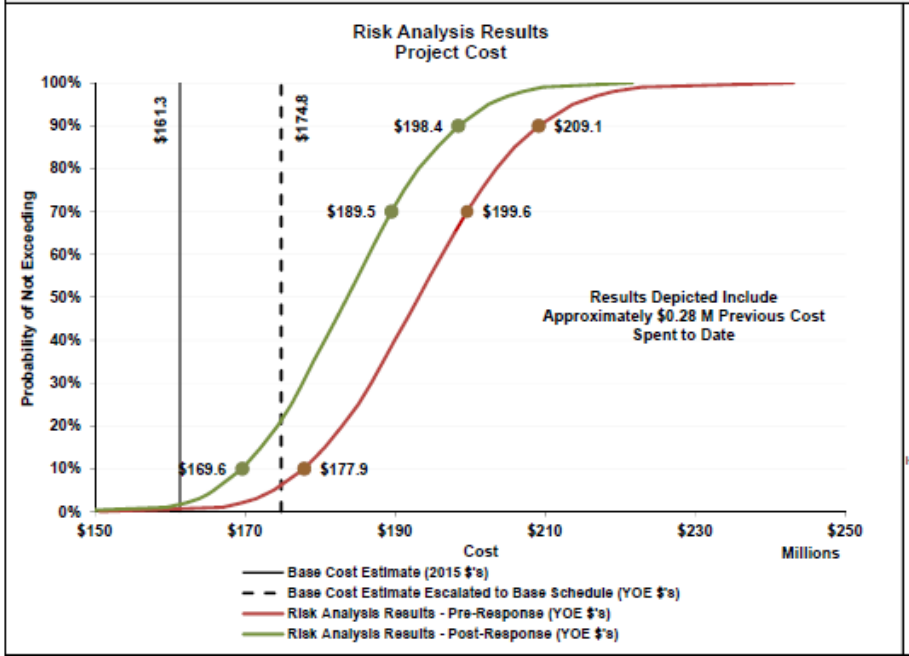
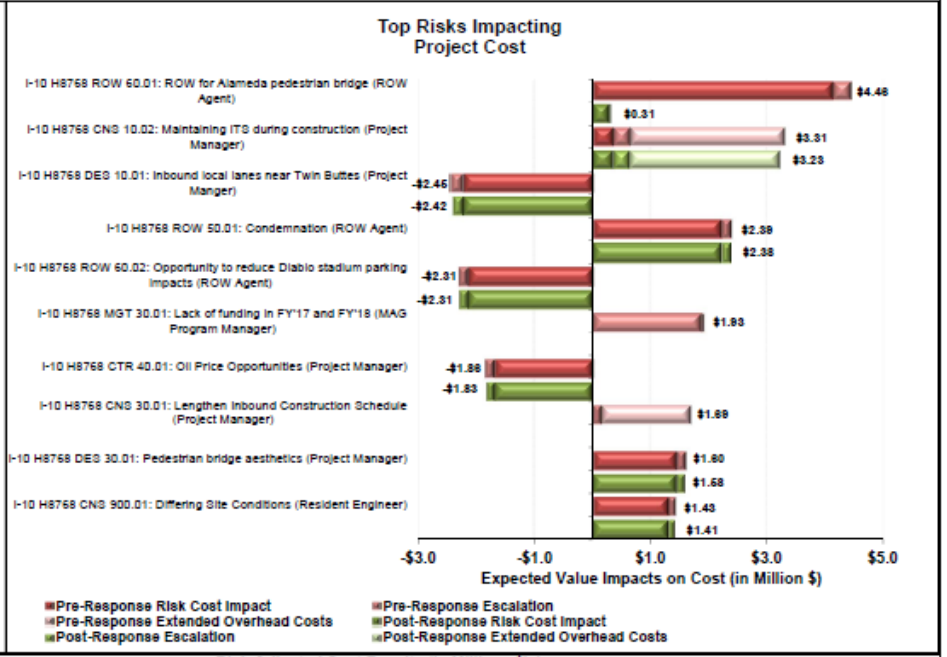
CRA Workshop Cost Summary Sheet	I-10, Maricopa (SR-143 – SR-202L, Santan) Near-Term Improvements TRACS# H8768 Last Updated January 2015	Level of Project Design: Low / Medium / High	CRA Workshop Cost Summary Sheet

Project Description

A modified collector-distributor roadway system will be developed to eliminate the existing weaving conditions between SR-143, Broadway Road and US 60 that is causing significant congestion on I-10 during the morning and evening peak travel periods. All existing system and service interchange freeway access will be retained with the Recommended Alternative. South of Baseline Road, I-10 will be widened to provide additional freeway capacity within that segment of the project.





Cost Results

The S-curves reveal that, prior to risk response, there was a **70 percent** chance of the total project costs being less than **$199.6 million** in year-of-expenditure (YOE).

With the risk response strategies included, project costs now have a **70 percent** chance of being less than **$189.5 million** YOE.

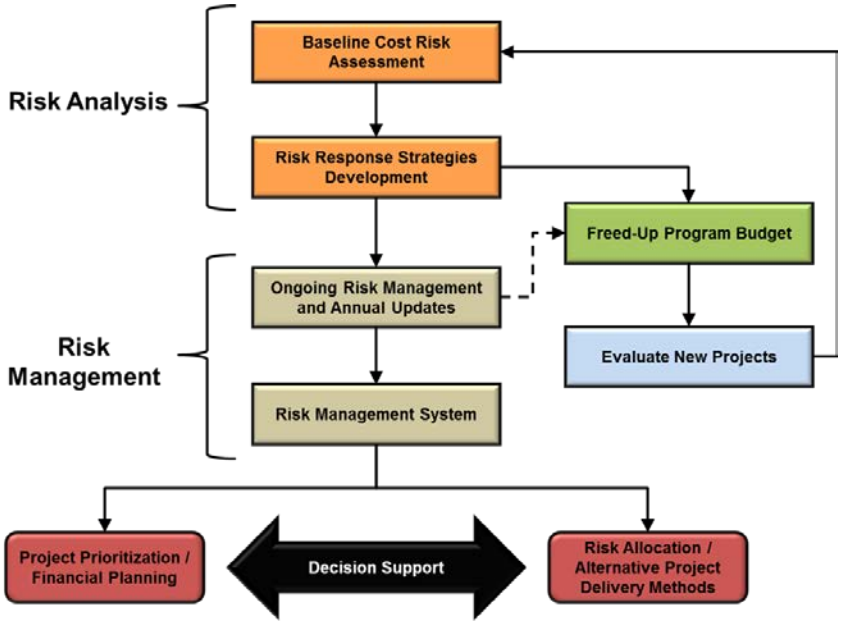
These results indicate that by implementing the risk response strategies developed at the CRA workshop, project costs are expected to be reduced by **$10.1 million**.

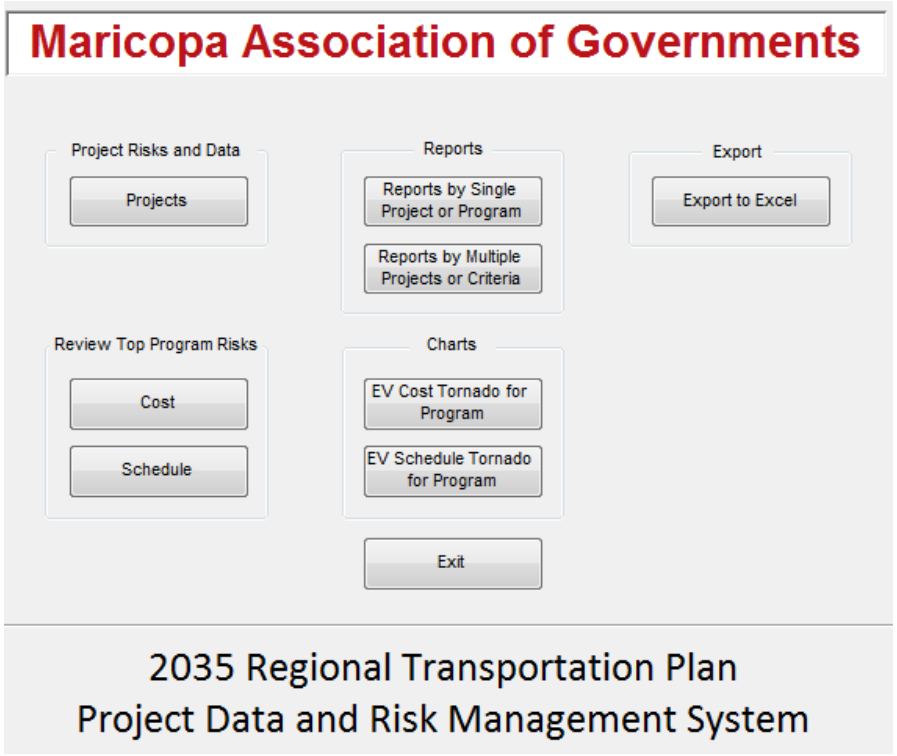
Risk-Adjusted Cost Results (in Millions $'s)

Category	Base Cost 2015 $'s	Base Cost YOE $'s	Cost Range YOE $'s: 10th Percentile	70th Percentile	90th Percentile
Pre-Response Results Total Project	$161.3	$174.8	$177.9	$199.6	$209.1
Post-Response Results Total Project			$169.6	$189.5	$198.4
Post-Response Preliminary Engineering	$13.9	$14.9	$14.5	$15.1	$15.3
Post-Response Right-of-Way	$12.0	$12.8	$10.4	$15.1	$17.2
Post-Response Construction	$135.4	$147.1	$141.8	$160.6	$168.9

Category	Base Cost 2015 $'s	Cost Range 2015 $'s: 10th Percentile	70th Percentile	90th Percentile
Post-Response Results Total Project	$161.3	$155.8	$173.8	$181.6

Risk Management System Tool





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First Six Projects under Design

Project	Pre-CRA	70% CRA	Delta	Greatest Risk Affecting Costs	Greatest Risk Affecting Schedule
I-10/Near-Term Improvement Strategy Operational Improvements	$183.4M	$173.5M	**$9.9M**	ROW for Alameda Bike-Ped Overcrossing ($4.4m)	Program Cash Flow to fund Project (6.6 months)
Loop 101/I-17 to SR-51 Add Lanes	$116.6M	$115.2M	**$1.5M**	Design Uncertainties ($3.4m)	Hotspot Analysis Mitigation (2.5 months)
Loop 101/SR-51 to Princess Dr Add Lanes	$58.4M	$61.1M	**-$2.7M**	Fill Borrow Costs ($3.1m)	Hotspot Analysis Mitigation (2.5 months)
Loop 303/SR-30 to I-10 New Freeway	$157.2M	$134.0M	**$23.2M**	Section 4(f) Analysis at Yuma Rd/Cotton Ln ($8.3m)	Section 4(f) Analysis at Yuma Rd/Cotton Lane (7.8 months)
I-17/Happy Valley and Pinnacle Peak traffic interchange improvements	$44.2M	$44.8M	**-$0.6M**	Differing Site Conditions ($1.3m)	Environmental Clearances (5.2 months)
I-10/Loop 303 Phase 2 Traffic Interchange	$91.8M	$90.2M	**$1.6M**	Differing Site Conditions ($1.5m)	Migratory Birds (1.5 months)
		SUMMARY:	**$32.8M**		