RISK ANALYSIS & VE FOR CMAR PROJECTS

ADOT AND FHWA PILOT PROJECTS

Presented by:
Renee L. Hoekstra, CVS
RH & Associations, Inc.
"Partnering, Public Outreach and Value Engineering Specialists"
(800) 480-1401

RH & Associates, Inc.

- Understanding CMAR
- CMAR Project Differences
- CMAR and CMGC
- The Risk and Value Engineering Approach for CMAR – Loop 303 and Cordes Junction TI
- The Benefits of CMAR

PRESENTATION OBJECTIVES

RH & Associates, Inc.

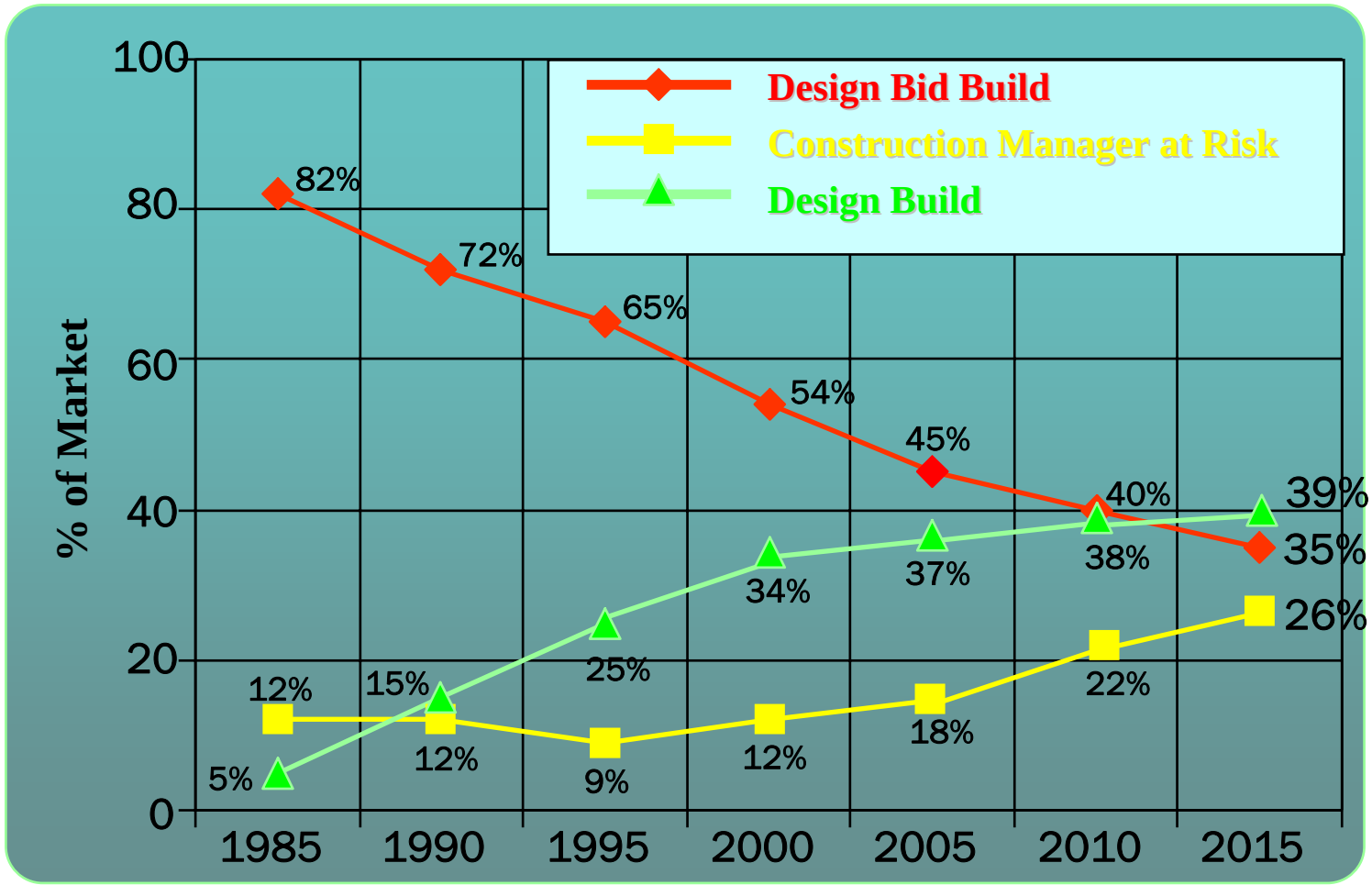
Trends in the Public Sector Market:

- Design Build (DB)
- Job Order Contracting (JOC)
- Construction Manager at Risk (CMAR)
- Construction Manager/General Contractor (CMGC)
- General Contractor/Construction Manager (GCCM)

ALTERNATIVE PROJECT DELIVERY METHODS

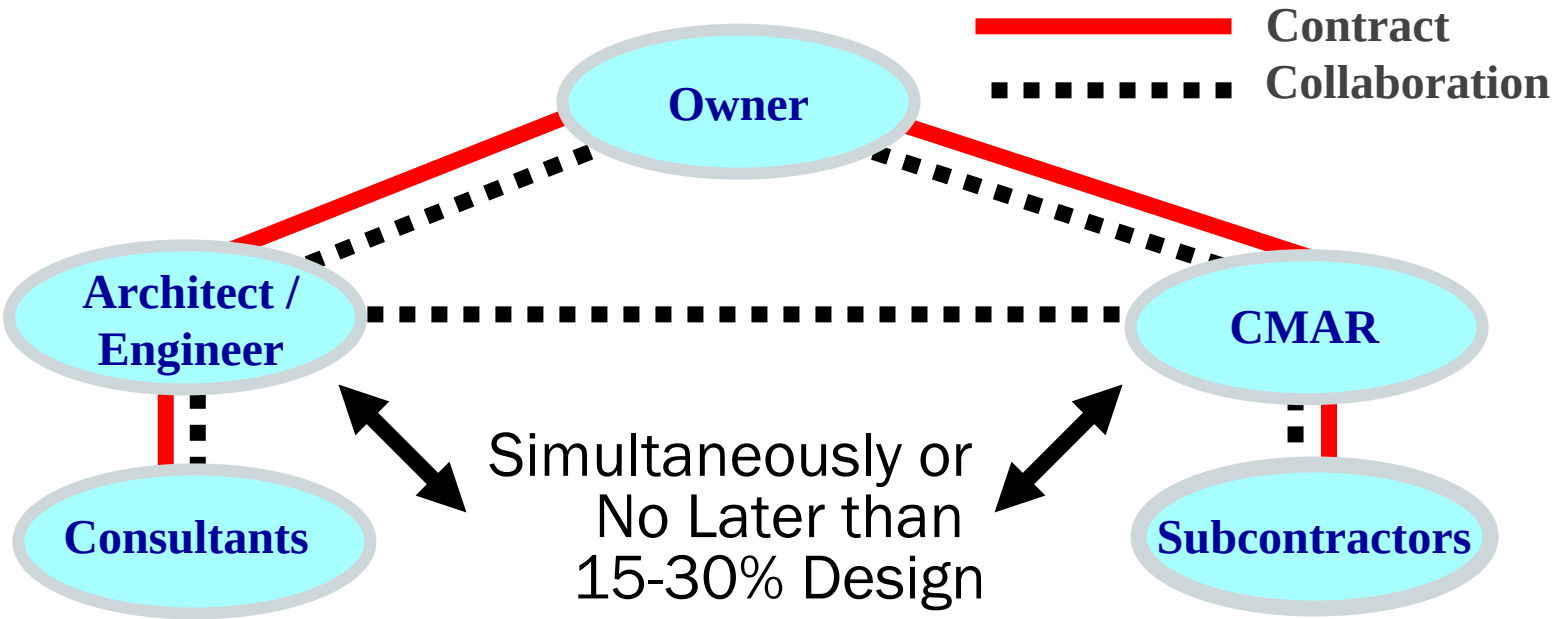
RH & Associates, Inc.

PROJECT DELIVERY SYSTEMS*



Public Works Projects

** Engineering News Record*
Modified by ASU



- Architect/Engineer (Qualifications Based Selection)
  - Design services with active CMAR participation
  - Some construction administration

CONSTRUCTION MANAGER AT RISK

RH & Associates, Inc.

- Construction Manager at Risk
  - Preconstruction services – QBS + Negotiated Contract
  - Management of Bid Process and Trade Subcontractors
  - “Open Book” philosophy
  - Management of Budget and Schedule
  - Construction Bid is defined as a Guaranteed Maximum Price (GMP is Negotiated, assuming agreement is made)
  - Selecting a Contractor with the Actual Experience Required

UNDERSTANDING CMAR

RH & Associates, Inc.

Construction is becoming highly specialized

- Use of sophisticated technology in construction is rapidly increasing - BIM
- Environmentally responsible construction
- Need for flexible-use
- Innovative solutions are needed when:
- Complex options must be considered
- Technology changes very quickly
- Flexibility in approach and decision-making is required

Qualifications Based Selection is no longer a luxury, but a necessity.

QUALIFICATIONS BASED SELECTION FOR CMAR PROJECTS

RH & Associates, Inc.

CMAR

- Qualification Based Selection
- AZ – No price competition during proposal stage
- Contractor assumes risk
- Guaranteed Maximum Price

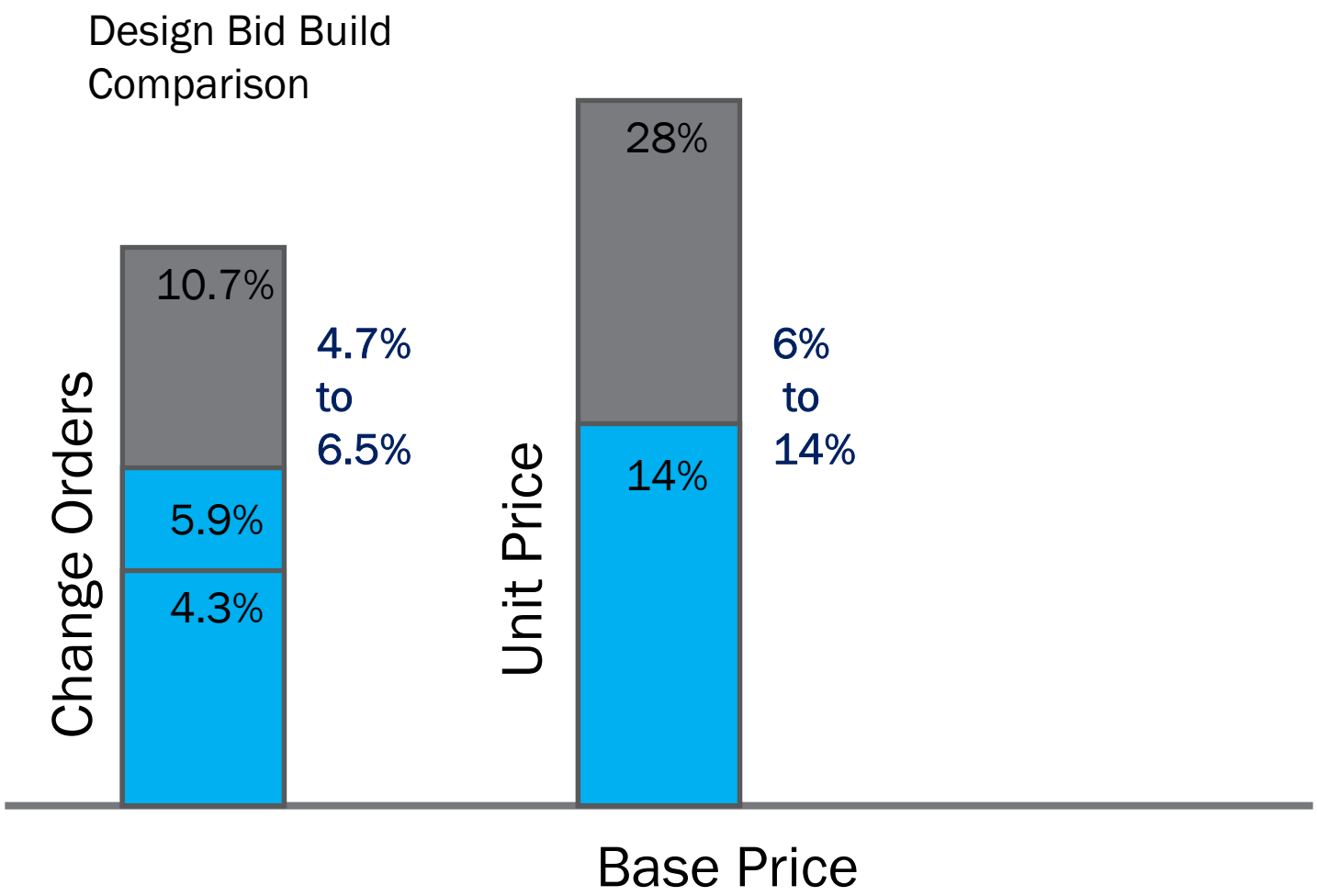
CMGC

- Qualification Based Selection
- Pricing is required during selection (Overhead/General Conditions), Possible unit pricing
- Owner chooses where to place the risk
- Target Maximum Price

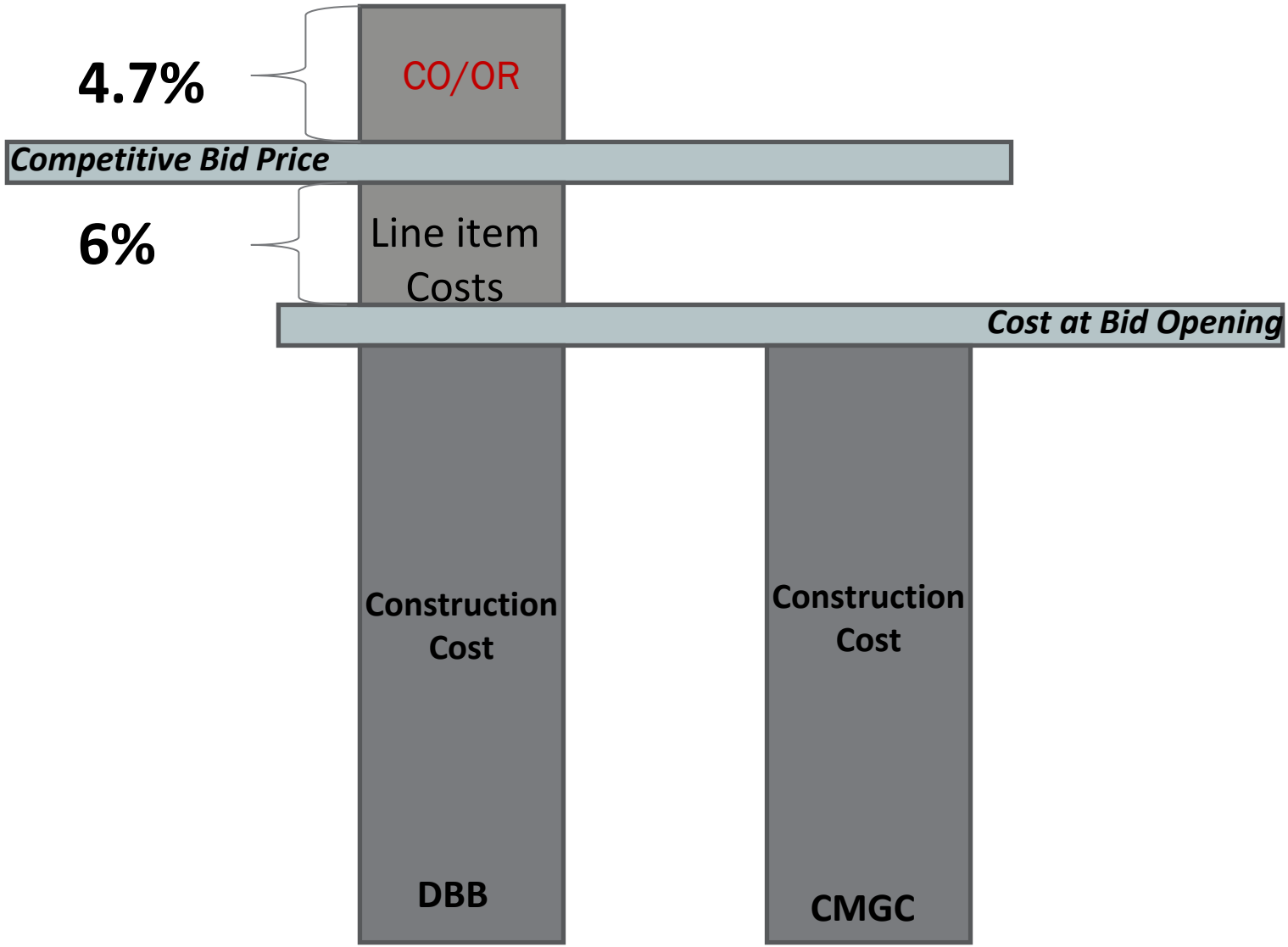
DIFFERENCES IN CMAR/CMGC

RH & Associates, Inc.

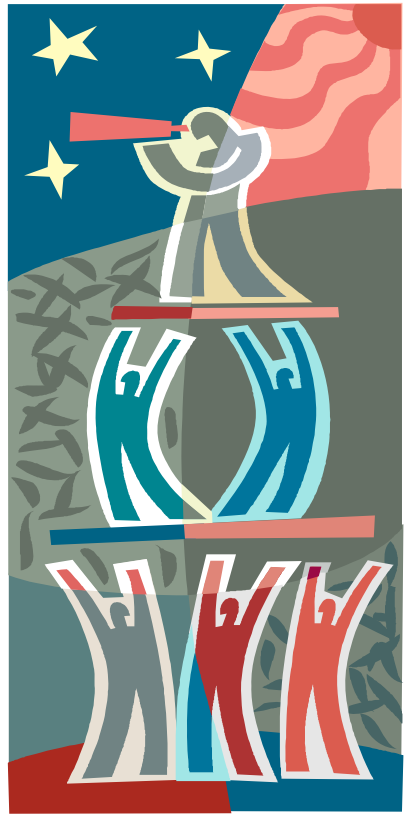
UDOT COST COMPARISONS



UDOT DIRECT COST COMPARISONS



- **Use the Existing Team Members**
  - **Design Team**
    - Project Manager
    - Key Design Team Members
  - **CMAR Team**
    - Pre-Construction Services Manager
    - Construction Project Manager
    - Cost Estimator
    - Superintendent (as possible)



CMAR REQUIRES A DIFFERENT VE APPROACH

RH & Associates, Inc.

- **Use the Existing Team Members**
  - **Owner (ADOT)**
    - Project Manager
    - Key Disciplines
    - Resident Engineer
  - **Other Members (Loop 303)**
    - FHWA
    - Stakeholder Agencies
      - City of Surprise

CMAR REQUIRES A DIFFERENT VE APPROACH

RH & Associates, Inc.

3-Day Workshop Approach

- Still Follows the SAVE International 6-Step Job Plan* with a Risk Analysis
  - Information Phase*
  - Risk Analysis
  - Function Phase*
  - Creative Phase*
  - Evaluation Phase*
  - Development Phase*
  - Innovation & Opportunities
  - Presentation Phase* - Not Completed

RISK AND VALUE ENGINEERING WORKSHOP

RH & Associates, Inc.

- Reduced amount of time needed to bring the team up to speed
- No site visit is needed
- Develop study goals and objectives
- Determine project constraints
- Develop performance measures and rate and rank them to define project success (to be used throughout the entire project, even during construction)

INFORMATION PHASE

RH & Associates, Inc.

PERFORMANCE CRITERIA MATRIX

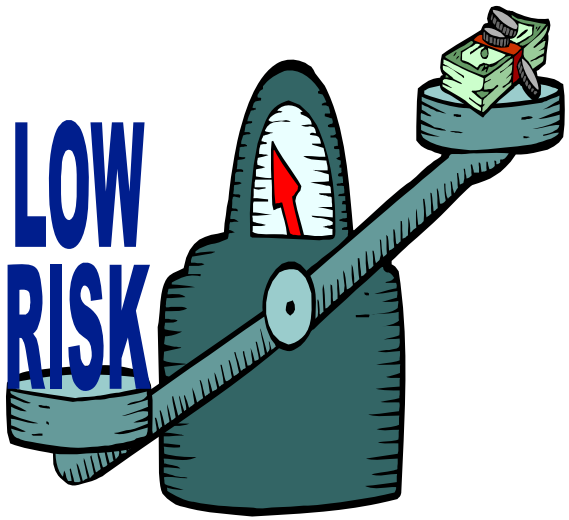
Loop 303 CMAR

RH & Associates, Inc.

													TOTAL	%
Maintenance of Traffic	A	a	a	a/d	a								3.5	35%
Schedule	B	c	b	b									2.0	20%
Constructability	C	c	e										2.0	20%
Public perception	D	e											0.5	5%
Maintainability	E												2.0	20%
	F													0%
	G													0%
	H													0%
	I													0%
	J													0%
	K													0%
													10.0	100%

a	More Important
a/b	Equal Importance

RH & Associates, Inc.



- Brainstorm All Potential Risks Associated with the Project
- Determine the Impacts of the Risk
  - Probability of the Risk
  - Severity of the Risk
  - Cost Impacts
  - Schedule Impacts
  - Determine Disposition of Risk
    - Eliminate, Mitigate or Accept

RISK ANALYSIS

RH & Associates, Inc.

Risk Matrix

Probability of Occurrence	Highly Likely	Likely	Possible	Unlikely	Very unlikely	MATRIX KEY
	> 70%	51 - 70%	21 - 50%	5 - 20%	< 5%	
Severity of Impact	Catastrophic	Substantial	Moderate	Marginal	Negligible	
	100	50	20	5	1	
Risk Rating	Extremely High		High	Moderate	Low	
	Red (50- 500)		Orange (15 - 49)	Yellow (3 - 14)	Green (0 - 2.9)	

Identify the Risk		Assign the Risk	Classify the Risk			Quantify	Quantify	Risk Response	
Risk ID	Description of Risk	Who does the risk affect?	Probability of Impact %	Severity of Impact (numeric)	Risk Rating	$$ Impact	Schedule Impact	Avoid? Mitigate? Accept?	Plan of action and risk champion/owner.
Identify the Risk									
1.1	Irrigation design by MWD on the south end of the project (Greenway south)	Design and construction	60%	50	100.0	$ 200,000	120 days	Avoid	
1.2	Right of way acquisition - total	Construction	20%	50	25.0	-	90 days	Avoid	
1.3	Well removal and abandonment at Greenway	Construction	50%	20	20.0	-	90 days	Mitigate	
1.4	Utility relocations	Some design, mostly construction	30%	50	50.0	-	6 month	Mitigate	
1.5	Roadway drainage during construction	Construction and travelling public	70%	50	100.0	500,000	120 days	Mitigate	
1.6	Drainage outfall on south end of the project	Design, construction & property owners	70%	50	100.0	Design Construction	n/a	Mitigate	
1.7	Schedule commitment made to SLR by ADOT	ADOT	5%	50	25.0	20,000,000		Avoid	
1.8	GMP schedule April 15, 2011	Entire Project	5%	100	50.0			Avoid	

RH & Associates, Inc.

- Brainstorm the Functions of the project
  - Sample Functions Loop 303

Increase Capacity
Accommodate Drainage
Accommodate Traffic
Mitigate Sound
Mitigate Dust
Improve Aesthetics

FUNCTION ANALYSIS PHASE

RH & Associates, Inc.

- The CMAR brings their ideas from their proposal to the study
- Additional ideas are brainstormed using the Functions as the topics
  - How else might we accomplish the function?
  - Loop 303 had 85 ideas, including proposal ideas from CMAR
  - Cordes Junction 78 ideas, including proposal ideas from CMAR
- Brainstorm ideas to mitigate the identified Risks

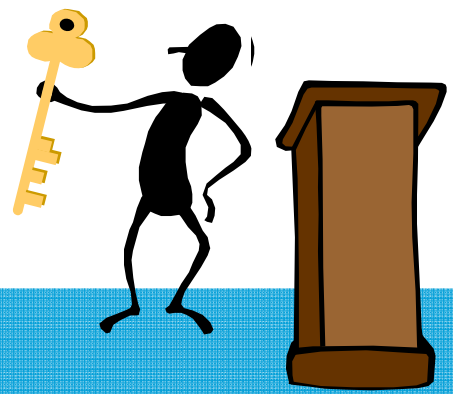
CREATIVITY PHASE

RH & Associates, Inc.

1ST EVALUATION:
SYNTHESIZING IDEAS

The First cut will be an identifier for ideas that will be considered fatal flaws or out of scope

Team members will briefly discuss the pluses, potential and concerns of the idea. Don't get bogged down in the fine details, this should be a high level review.

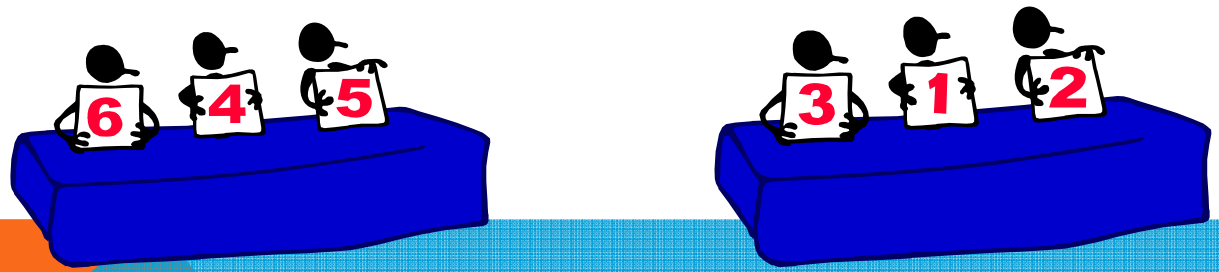


EVALUATION PHASE

RH & Associates, Inc.

2nd Evaluation:
Gut Feel Index (GFI)

Once the idea is understood, each team member is asked to draw on their knowledge and experience to simultaneously vote on the merits of the idea. The votes are then totaled.



EVALUATION PHASE

RH & Associates, Inc.

- For CMAR projects, this is a facilitated Team Event
- Discuss the merits of the idea
  - Identify the existing approach
  - Identify the new approach
  - Identify advantages and disadvantages
  - Evaluate the idea against the performance measures
  - Determine costs associated with the new idea
    - Cost estimator from CMAR provides more accurate/realistic costs

DEVELOPMENT PHASE

RH & Associates, Inc.

VALUE ENGINEERING ALTERNATIVE	RH & Associates, Inc.	
	IDEA NUMBER	PAGE NO. 1 of

TITLE:

ORIGINAL CONCEPT:

ALTERNATIVE CONCEPT:

ADVANTAGES:

-

DISADVANTAGES:

-

DISCUSSION / JUSTIFICATION:

IMPLEMENTATION CONSIDERATIONS:

Performance Criteria						Cost Impacts
Performance Measure						

DISPOSITION: (Accept Conditional Accept Reject)

Rating Scale: Value Add +2 +1 0 -1 -2 Value Decrease

RH & Associates, Inc.

- A decision is made immediately
  - Accept the idea and incorporate into design
  - Reject the idea
  - Conditionally accept the idea, identify additional information needed and schedule impacts
    - Determine how to incorporate into the design

DEVELOPMENT/DISPOSITION

RH & Associates, Inc.

THE VE OBJECTIVE

$$\textbf{Value} = \frac{\text{Performance}}{\text{Cost}}$$

Not Just a Cost Cutting Tool!

RH & Associates, Inc.

A successful study is dependent upon the entire CMAR team

THIS REALLY IS A TEAM APPROACH

RH & Associates, Inc.

- Team approach from the start
- Increased owner control
- Value engineering (innovation)
- Controlled purchasing
- "Open book" financial approach
- Fewer Claims/Litigation
- Improved collaboration
- Common goals and objectives

- Increased value for each dollar spent
- Shorter project schedules
- Improved construction quality
- Construction planning
- Phased construction option
- Fewer warranty problems
- Improved service response to owner
- Shorter RFP

OVERALL BENEFITS OF CMAR

RH & Associates, Inc.

QUESTIONS

RH & Associates, Inc.

CONTACT INFORMATION

Renee L. Hoekstra, CVS - Renee is a Certified Value Specialist and has been working in the public sector providing professional facilitation services for the past 19 years. She has been providing scoping, risk analysis, value engineering and partnering services for Alternative Delivery Projects for the past 5 years. She has also been helping organizations to improve their current processes to ensure that these new delivery methods can be successful.

Renee is the president of RH & Associates, Inc. located in Glendale, Arizona. For additional information she can be reached at the following :

RH & Associates, Inc.
6677 W. Thunderbird Road, Suite K183
Glendale, AZ 85306
(623) 266-3943 (800) 480-1401
Email: rhpartnering@earthlink.net

RH & Associates, Inc.