

# Value Engineering Overview



# **Objectives**

- Background
- What is VE
- Why, When, What, & How to VE
- Potential Roles
- Relation to Other PM Tools
- References

# **Background**

- 1947 VE Process Established
- 1954 Adopted by US Navy
- 1959 SAVE International
- 1970 Highway Act
- 1978 FDOT VE Program
- 1995 National Highway Systems Act
- 1997 Federal Regulation (23 CFR 627)
- 2005 SAFETEA-LU
- 2012 Updated Federal Regulation
- 2012 MAP-21
- 2014 Updated Federal Regulation











# **Background**





# **Background**

- FHWA Requirements 23CFR 627
  - NHS Federal-Aid projects
  - \$50 million projects
  - \$40 million bridge projects
  - Federal-Aid Major project on or off the NHS
  - Not Design Build
  - Any project FHWA determines appropriate

# What is Value Engineering?

### It is not cost reduction!!!

Value Engineering is the systematic application of function-oriented techniques by a multi-disciplined team to analyze and improve the value of a product, process or service.

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Value Engineering is the systematic application of function-oriented techniques by a multi-disciplined team to analyze and improve the value of a product, process or service.

### Why use VE?

- Shrinking Resources
  - Do More with Less
  - Put more product on the street
- Bold, Innovative & Inspirational

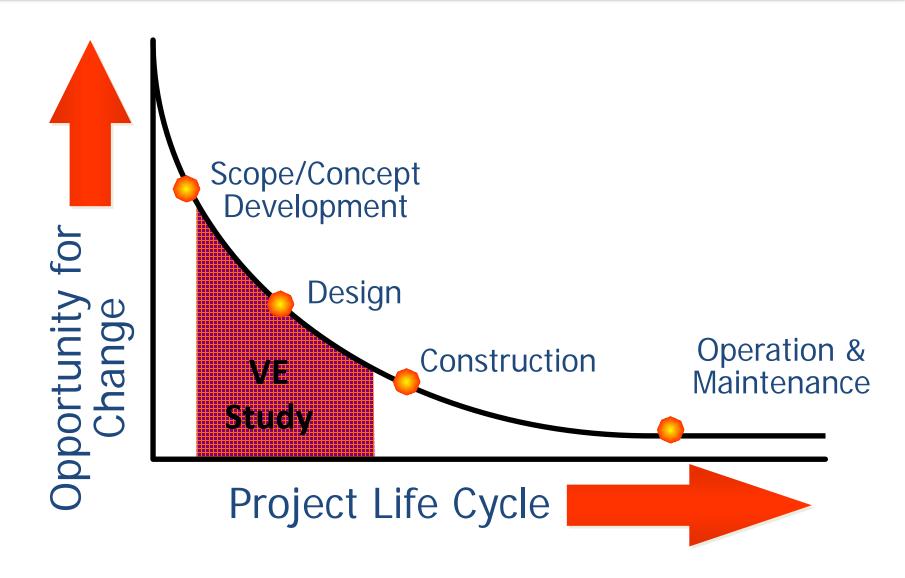


### Why use VE?

- Improve Project Schedule
- Improve Constructability
- Resolve Stakeholder Issues
- Reduce Operating Costs
- Reduce Overall Project Costs
- Mitigate Risks







### Planning

### **Typical Information Required:**



- Traffic Information
- Aerial Photo
- ROW Information
- Preferred Alternative

### Project Development & Environmental

### **Typical Information Required:**

- Construction Cost Estimates
- ROW Cost Estimates
- Business Damage
   Estimates
- Traffic Analysis

- Preliminary Plans
- Environmental Impact Analysis
- Summary of public Involvement

### Design

### **Typical Information Required:**

- Drainage Information
- Typical Sections
- Plan & Profile
- Intersection & Interchange Layouts

- Cross Sections
- Structure Info.
- Traffic Control Plans
- Preliminary Cost Estimate

- Design/Build Projects
  - 23 CFR 627.5 FHWA Encourages
  - 23 CFR 627.9 Conducted prior to release of RFP document



### **Typical Information Required:**

RFP Package

### **How is VE Done?**

#### **VE Job Plan**

**Pre-Study** 

- Project Selection
- > Team Selection

VE Team Study

- > Information Phase
- > Function Analysis
- > Creative
- > Evaluation
- Development
- > Presentation



**Post-Study** 

- > Implementation
- > Report Results

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## **Projects Selected for VE (What)**

- All projects over \$25 million
- Large Right-of-Way Purchases
- Major Bridges
- Complex Projects
- Large Corridor & Multi-modal Projects
- Project Manager Requests

# **Team Selection (Who)**

- Team Leader
  - Consultant
  - In-house
- Design
- Construction
- Maintenance
- Specialized Expertise



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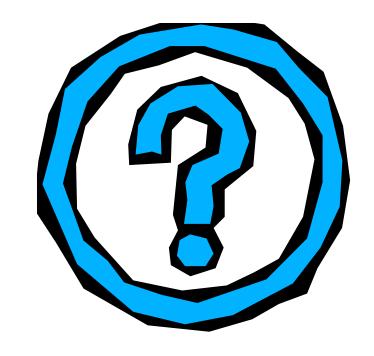
**Post-Study** 

- > Implementation
- > Report Results

### **5 QUESTIONS**

#### **ASK DURING THE VE STUDY:**

- 1. What is it?
- 2. What does it do?
- 3. What does it cost?
- 4. What else can do it?
- 5. What does that cost?



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**Post-Study** 

- > Implementation
- > Report Results

### **Information Phase**

- Review Project Information
  - Discuss Design/Estimate
  - Develop Questions for Design Team
    - Constraints ?
    - Major issues?
    - What keeps you up at night?
    - Significant Risks?
  - Identify any missing information
- Team Briefing



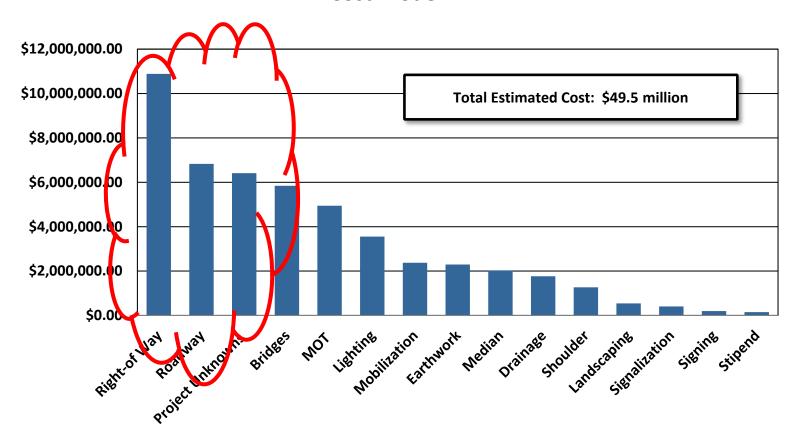
### **Information Phase**

- Site Visit
  - Meet at site and walk the site as a team
  - Record any observations
  - Take Pictures
- Post Site Visit
  - Collect group observations
  - Review Cost Model
  - Areas of Review

### **Cost Model Pareto**

### 20% of functions contain 80% of cost

#### **Cost Model**



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### What is Function?

- Intent or purpose that a product or service is expected to perform.
- Expressed in 2 words, active verb and measurable noun.

WHAT DOES IT DO?
WHAT DOES IT DO IT TO?



Calling 'timeout' in football results in various actions.







# ACTION VS. FUNCTION



Stop Clock Substitute Players Change Play

- 1. Conserve Time
- 2. Convey Strategy
- 3. Avoid Errors
- 4. Modify Strategy



Time out
How many reasons (Functions)
are behind any timeout call by
either player, coach or officials?

# ACTION VS. FUNCTION



Throw Flag

5. Challenge Decision

# **ACTION VS. FUNCTION**



Ice Kicker

6. Prevent Scoring



# ACTION VS. FUNCTION



Change Play

7. Establish Authority

# ACTION VS. FUNCTION



Coach Players

- 8. Improve Performance
- 9. Prevent Errors

# **ACTION VS. FUNCTION**



Review Play

10. Challenge Decision



# ACTION VS. FUNCTION

### **Measure Distance**





### 11. Determine Advancement

## **ACTION VS. FUNCTION**



Assist Player

12. Protect Player



# **ACTION VS. FUNCTION**

Resolve Disagreement



13. Finalize Judgment

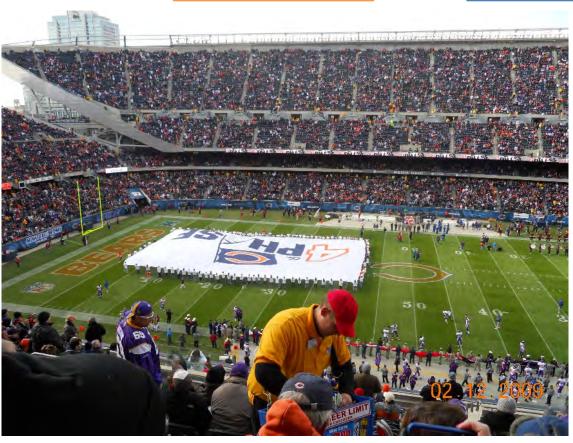
# ACTION VS. FUNCTION



Stop Fight

- 14. Minimize Disruptions
- 15. Prevent Injury

# ACTION VS. FUNCTION



Perform Show

16. Entertain People



# ACTION VS. FUNCTION

View Commercials



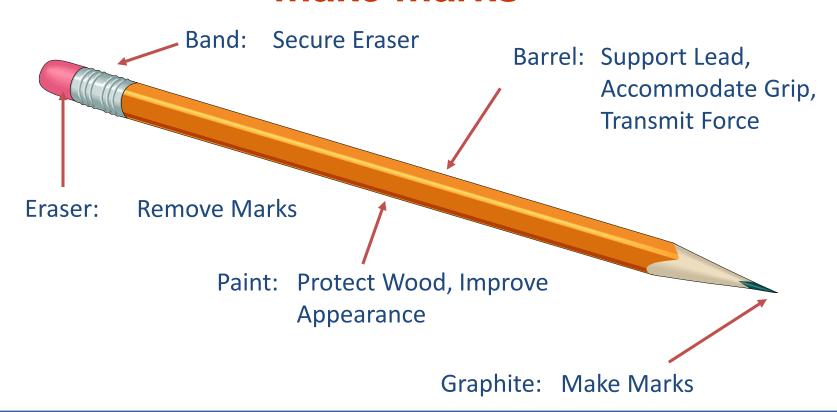
17. Promote Sponsors

#### **Random Function Generation**

ITEM	VERB	NOUN
Guardrail	Re-direct	Vehicle
Door	Control	Access
Electric Switch	Interrupt	Current
Screwdriver	Transmit	Torque
Column	Transfer	Load
Light	Illuminate	Area
Fence	Enclose	Area
Landscaping	Improve	Appearance

### What is the function of this pencil?

#### "make marks"



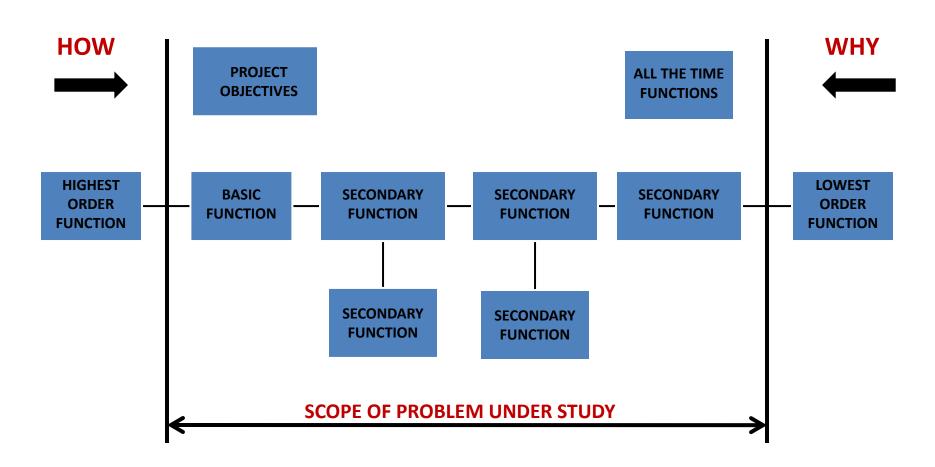
- Classifying Functions
  - Basic: Specific purpose for which something exists
    - 1. Primary purpose and intent
    - 2. If you can eliminate it is not basic
    - 3. Loss of Basic Function will cause loss in value
    - 4. Customer must be willing to pay for it
  - Secondary: Supports the basic function
    - 1. May or may not add value
    - 2. Contribute to cost and may not be essential to the performance of the basic function

### **Classifying Functions: Pencil**

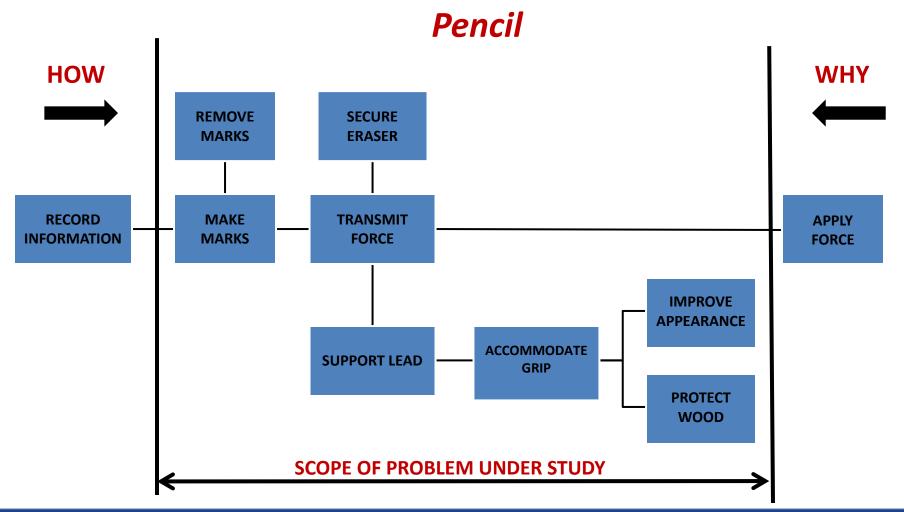
ITEM	VERB	NOUN	BASIC/SEC
Eraser	Remove	Marks	Secondary
Band	Secure	Eraser	Secondary
Barrel	Supports	Lead	Secondary
	Accommodates	Grip	Secondary
	Transmit	Force	Secondary
Paint	Protects	Wood	Secondary
	Improves	Appearance	Secondary
Graphite	Makes	Mark	Basic

- Classifying Functions
  - Higher Order: Specific need that causes the Basic function to exist. Describe the outcome or result of the Basic function
  - Lower Order: Describe required inputs for a project, product or process.

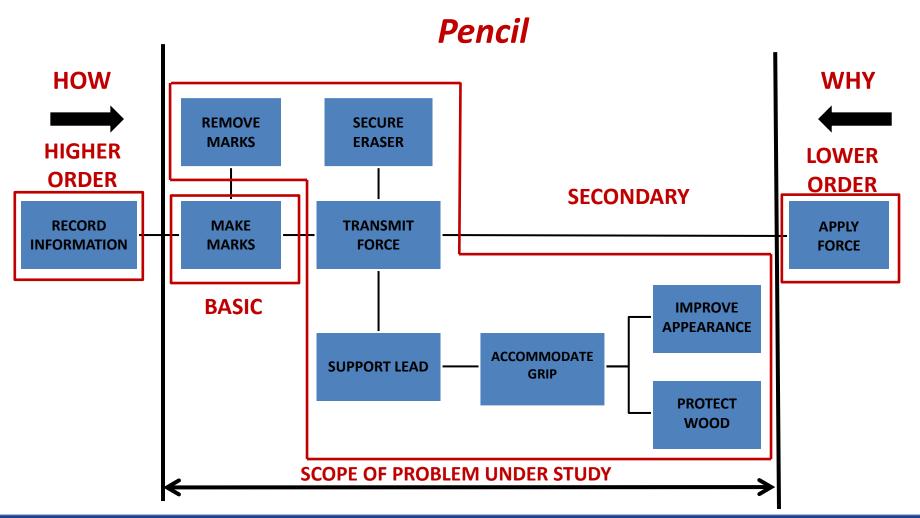
### **Function Analysis System Technique (FAST)**



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### **Function Analysis System Technique (FAST)**



### **How is VE Done?**

#### **VE Job Plan**

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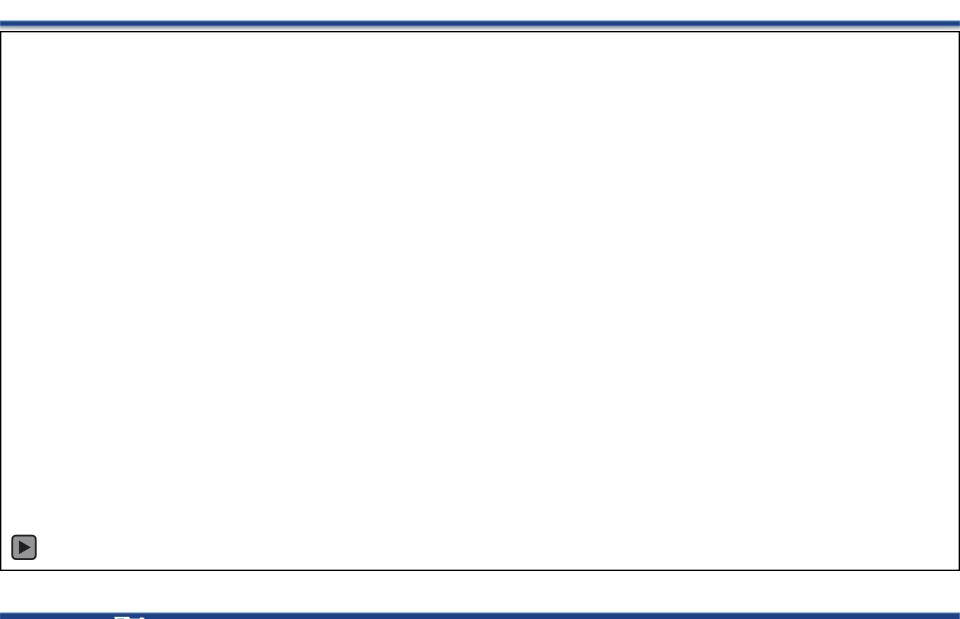
**Post-Study** 

- > Implementation
- > Report Results



# Exercise

Search	Figure Skating	Hole in one	RAILROAD
Search High and Low  And	5KAT1110	OHOLENE	Elevated Railroad
End over End End End	One at a time  1 at 3:46	3 ring circus 000 CIRCUS	No room at the inn HOROOM TEL MOROOMTEL
Ena	1 at 5.46	000 CIRCOS	INN
A breed apart	Greatest E E E E E E E	MARKET	Country
Breed Breed Breed	E	Corner the market	Cross Country
Lacrosse	Down to Earth	Triumph	Step above the rest Step
LA	A R T	Arch of Triumph	Step Step Step Step





### **Brainstorming**

- A technique to get bigger and better ideas
- Free flow of creative ideas not bound by barriers
- Challenges traditional thinking

### WHAT ELSE CAN DO IT?

- Ideas flow freely
- No debating or evaluating ideas
- Build on other ideas
- Think of new ways
- Be humorous and creative
- Everyone participates
- There are no bad ideas



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**Post-Study** 

- > Implementation
- > Report Results

- Eliminate ideas
- Combine ideas
- Evaluate remaining ideas
  - Weighted Matrix
  - Multi-Voting
  - Team Consensus



### What is an Evaluation Matrix?

Matrix used to evaluate ideas against the proposed design using the same criteria.

			Design Matri	K			
Project: Mega Mousetrap Car		Designs					
Weight	1 Trap	2 Trap	1 Trap & CD Wheel	Duel Drive	Special Axte		
1	5	4	4	3	2		
2	5	2	3	2	2		
1	5	5	5	4	3		
2	5	3	4	3	2		
2	2	5	2	2	4		
4	2	4	3	5	4		
	42	45	39	41	37		
	Weight  1 2 1 2 2 2	Weight 1 Trap  1 5 2 5 1 5 2 5 2 4 2	Weight         1 Trap         2 Trap           1         5         4           2         5         2           1         5         5           2         5         3           2         2         5           4         2         4	Weight         1 Trap         2 Trap         Wheel           1         5         4         4           2         5         2         3           1         5         5         5           2         5         3         4           2         2         5         2           4         2         4         3	Weight         1 Trap         2 Trap         Wheel         Duel Drive           1         5         4         4         3           2         5         2         3         2           1         5         5         4         3           2         5         2         3         2           1         5         5         4         3           2         5         3         4         3           2         2         5         2         2           4         2         4         3         5		

- Determine Evaluation Criteria
- Use paired comparison to weight criteria.
- Evaluate each alternative/idea based on criteria

### Typical Criteria:

- Costs
- Operations
- Constructability
- Maintenance
- Environmental
- Aesthetics

### **Paired Comparison**

	Costs (A)	Operations (B)	Constructability (C)	Maintenance (D)	Aesthetics (E)
Costs (A)		(B)	(C)	(A)	(A)
Operations (B)			(B)	(B)	(B)
Constructability (C)				(C)	(C)
Maintenance (D)					(D)
Aesthetics (E)					

### **Criteria Weightings**

Costs (A)	3 = (2)
Operations (B)	5 = (4)
Constructability (C)	4 = (3)
Maintenance (D)	2 = (1)
Aesthetics (E)	1 = (0)

### **Weighted Matrix**

RATINGS:  EXCELLENT – 4 GOOD - 3 FAIR – 2 POOR - 1	COSTS	OPERATIONS	CONSTRUCTABILITY	MAINTNANCE	AESTHETICS	TOTALS
ALTERNATIVES/ WEIGHTING	3	5	4	2	1	
AS PROPOSED	4 12	3 15	2 8	1 2	5 5	42
VE ALTERNATIVE 1	3 9	5 25	2 8	3 6	2 2	50

### **Multi-Voting**

### What is it?

 A decision-making tool that enables a team to reduce a long list of ideas to a manageable number of ideas.



	Round 1	Round 2	Round 3	Round 4
	4 Votes per person	3 Votes per person	2 Votes per person	1 Votes per person
Idea 1	0			
Idea 2	3	4	4	1
Idea 3	1	0		
Idea 4	2	2	0	
Idea 5	0			
Idea 6	2	0		
Idea 7	1	0		
Idea 8	0			
Idea 9	4	4	4	3
Idea 10	0			
Idea 11	2	3	2	1
Idea 12	1	0		
Idea 13	0			
Idea 14	1	2	0	
Idea 15	1	0		
Idea 16	0			
Idea 17	0			
Idea 18	1	0		
Idea 19	0			
Idea 20	1	0		
Total	20	15	10	5

#### **Team Consensus**

### What is it?

- As a group decide:
  - 1. Which ideas to move forward for development
  - 2. Which ideas to combine
  - 3. Which ideas to eliminate



"Then we are agreed nine to one that we will say our previous vote was unanimous!"

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**Post-Study** 

- > Implementation
- > Report Results

### Write-up Ideas

- Descriptions
- Sketches
- Calculations
- Advantages & Disadvantages
- Cost Analysis (Life Cycle Costs)



### Write-up Ideas

Descriptions

Clear Descriptions of both the proposed design and the VE alternative

### Write-up Ideas

- Descriptions
- Sketches

Sketches to help visualize the VE alternative that is being presented

### Write-up Ideas

- Descriptions
- Sketches
- Calculations

Calculations that help support the VE Alternative

### Write-up Ideas

Advantages and Disadvantages of the VE Alternative

- Advantages & Disadvantages
- Cost Analysis (Life Cycle Costs)

#### Write-up Ideas

Life Cycle Cost Analysis

- Advantages & Disadvantages
- Cost Analysis (Life Cycle Costs)

### Life Cycle Cost Analysis

сопѕиченой то аетегиние и а спанде has occurred to the project's scope or design where a VE analysis would be required to be conducted (as specified in § 625.5(b)).

(b) STAs shall ensure the required VE analysis has been performed on each applicable project including those administered by subrecipients, and shall ensure approved recommendations are

directly involved in the planning or design of the project, with at least one individual who has training and experience with leading VE analyses;

(2) Develops and implements the VE

Job Plan;

(3) Produces a formal written report outlining, at a minimum:

(i) Project information;

(ii) Identification of the VE analysis

#### (iv) Documentation of the stages of the VE Job Plan which would include documentation of the life-cycle costs that were analyzed;

anaryses are conducted on applicable projects; monitoring, assessing, and reporting on the VE analyses conducted and VE program; participating in periodic VE program and project reviews; submitting the required annual VE report to the FHWA; and supporting the other elements of the VE program.

#### § 627.9 Conducting a VE analysis.

(a) A VE analysis should be conducted as early as practicable in the planning or development of a project,

conducted:

(vi) Documentation of the proposed recommendations and approvals received at the time the report is finalized; and

(vii) The formal written report shall be retained for at least 3 years after the

completion of the project.

(f) For bridge projects, in addition to the requirements in subsection (e), the VE analyses shall:

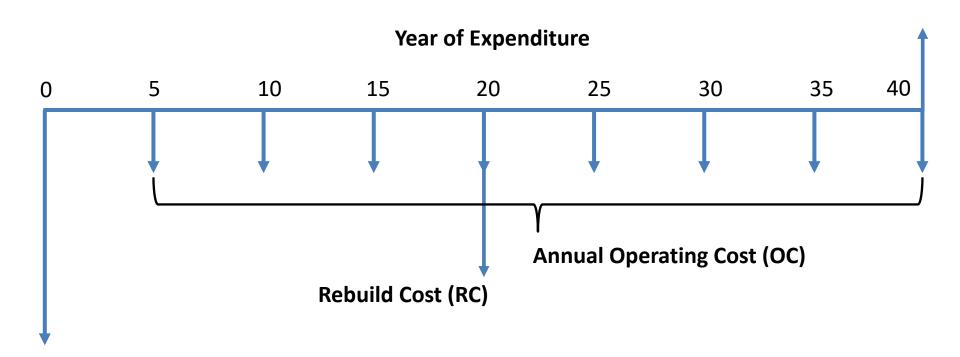
(1) Include bridge substructure and superstructure requirements that

### What is Life Cycle Cost Analysis?

A tool to determine the most cost-effective option among different competing alternatives to purchase, own, operate, maintain and finally dispose of an object when each is equally appropriate to be implemented. All the costs are typically discounted to Net Present Value (NPV).

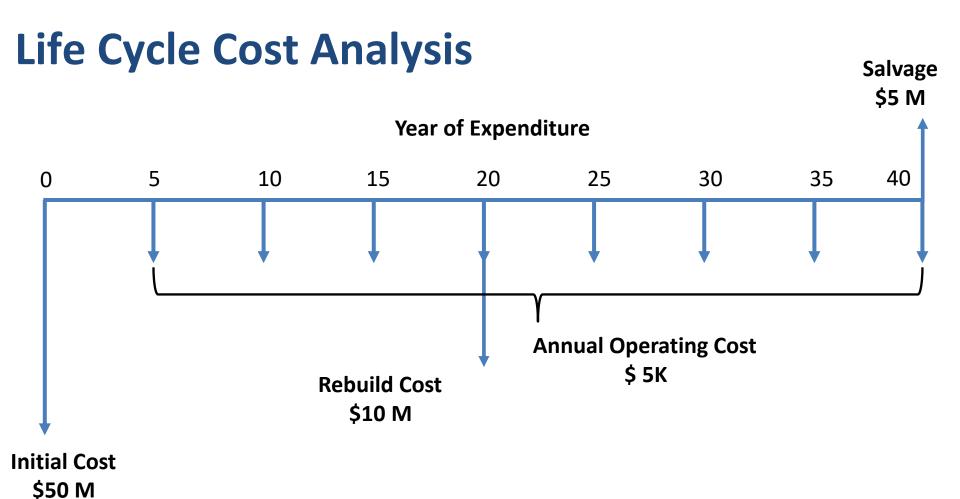
### **Life Cycle Cost Analysis**

Salvage (S)



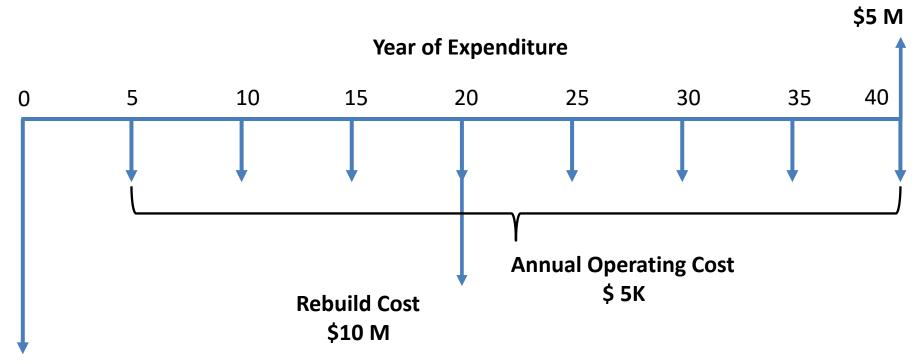
PW=IC + OC\*(P/A,i,n) + RC\*(P/F,i,n) - S\*(P/F,i,n)

Initial Cost(IC)



PW = \$50M + \$5K(P/A,3%,40) + \$10M(P/F,3%,20) - \$5M(P/F,3%,40)





Initial Cost \$50 M

PW=\$50M+\$5K(22.95)+\$10M(0.55)-\$5M(0.30) PW=\$50M+\$114.75K+\$5.5M-\$1.5M PW=\$54.11M

Salvage

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**Post-Study** 

- > Implementation
- > Report Results

#### **Presentation Phase**

- Present results to management
- Either last day of study or scheduled separately by District VE coordinator.
- Multiple presenters
- Dress rehearsal



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**Post-Study** 

- > Implementation
- > Report Results

- Results are reported at the Monthly Performance Meeting
- Results are reported on an Annual Basis to FHWA
- Annual Report is developed with Statewide and District Results





#### FY 2018 VALUE ENGINEERING/COST SAVINGS INITIATIVE THROUGH APR 2018

#### **VE Definition:**

Value Engineering (VE) is a systematic process used by a multidisciplinary team to improve the value of a project through the identification and analysis of functions. The concepts the VE team identify as solutions may be substituted for features currently depicted, while still meeting the standard the project was designed to meet.

<u>Cost Avoidance</u> is reduced project costs through implementation of alternate means or methods meeting the design or construction functionality of a project.

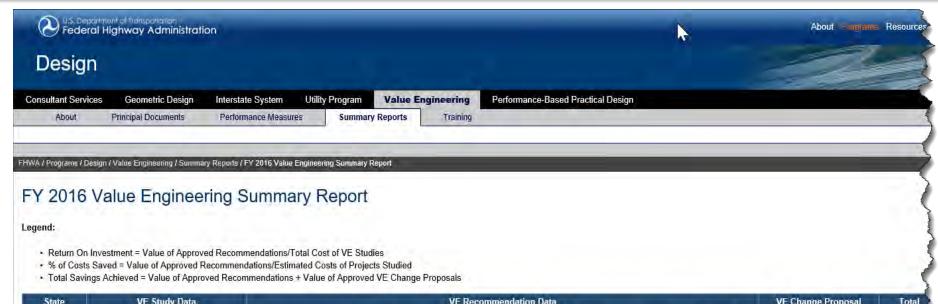
Value Added are recommendations that add cost to the project, but increase the functional value of the project.

PROJECT COST A	D1	DZ	D3	D4	D5	106	07	TE	co	sw		
2018-2020 LETTINGS  *** FY'S MONTHLY LETTING AVERAGE PER DISTRICT CUMULATED TO  DATE**				454.01	187.58	458.30	353.00	122.65	277.43	744.29	(4)	2,271.02
	1	0	1	4	1	2	2	0	1	12		
ANNUAL APPROVED COST AVOIDANCE/SAVINGS ADOPTED RECOMMENDATIONS	ŚM	\$18.61	\$42.51	522.10	\$19.53	5190,32	\$57.13	\$14.18	\$0.00	\$0.00	\$364.38	
	46	\$12.90	\$17.57	50.11	\$4.54	\$52.89	\$25.44	\$12.19	\$0.00	\$0.00	\$125.64	
ANNUAL APPROVED VALUE ADDED ADOPTED RECOMMENDATIONS	\$M	\$0.39	\$26.93	\$0.00	518.49	\$10.96	525.81	\$0.84	\$0.00	\$0.00	\$83,42	
	5	\$0.39	\$1.63	\$0.00	\$10.23	\$4.38	\$15.91	\$0.00	\$0.00	\$0.00	\$32.54	
ANNUAL ADOPTION RATE (TARGET 40% - 60%)	# RECOMMENDED		10	28	6	19	67	18	11	0	1	160
	# APPROVED % APPROVED		7	10	1	13	31	13	6	0	1	82
***************************************			70%	36%	17%	68%	46%	72%	55%	0%	100%	51%
PERCENT PROJECT SAVED	% PROJECT SAVED	(VE SAVINGS) DIVIDED BY (COST OF PROJECTS VE'D)	23.36%	2.59%	0.0296	1.78%	4.51%	9,59%	5.37%	0.00%	0.00%	4.02
PERCENT PROJECT SAVED	% PROGRAM SAVED	(VE SAVINGS ) DIVIDED BY	4.62%	3.87%	0.01%	0,99%	14.98%	20.74%	4.39%	0.00%	0.00%	5.53%

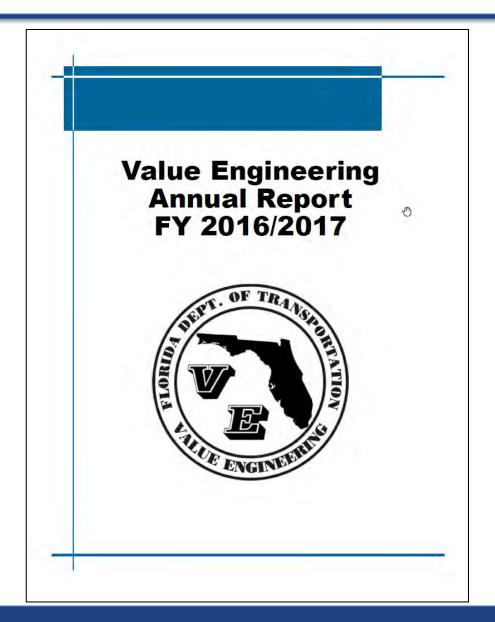








State	VE Study Data				VE Recommendation Data									VE Change Proposal	
	Number of VE Studies			Cost to Conduct VE	Estimated Costs of Projects	Number of Proposed VE	Value of Proposed VE	Number of Approved VE	Value of Approved VE	Recommen- dation	Return On Investment	% of Project	Number of Approved	Value of Approved VE	Total Savi Achieved
	In- House	Consultant	Total	Studies	Studied	Recommen- dations	Recommen- dations	Recommen- dations	Recommen- dations	Acceptance Rate	investillent	Costs Saved	VE Change Proposals	Change Proposals	Acmeyed
Alabama	0	0	0	\$3	\$-	0	\$-	0	\$-	0%	0	0.0%	2	\$15,064	\$15,0
Alaska	0	1	1	\$79,444	\$41,678,172	22	\$3,966,000	6	\$3,522,000	27%	44	8.5%	3	\$522,763	\$4,044,7
Arizona	0	5	5	\$138,000	\$461,610,000	29	\$60,270,000	10	\$(11,870,000)	34%	-86	-2.6%	1	\$79,876	-\$11,790,1
Arkansas	3	0	3	\$40,600	\$307,800,000	15	\$5,773,000	2	\$377,000	13%	9	0.1%	4	\$2,179,098	\$2,556,0
California	0	19	19	\$925,500	\$1,421,900,000	121	\$328,609,000	58	\$132,587,000	48%	143	9.3%	18	\$1,397,500	\$133,984
Central Federal Lands	0	0	0	\$-	\$-	0	\$-	0	\$-	0%	0	0.0%	1	\$24,096	\$24.0
Colorado	0	0	0	\$-	\$-	0	\$-	0	\$-	0%	0	0.0%	7	\$280,000	\$280,0
Connecticut	5	4	9	\$400,000	\$514,040,000	32	\$65,586,013	16	\$(16,948,051)	50%	-42	-3.3%	0	\$-	-\$16,948
Delaware	1	0	1	\$45,000	\$190,000,000	74	\$55,000,000	25	\$55,000,000	34%	1,222	28.9%	3	\$72,276	\$55,072,2
Florida	6	22	28	\$1,300,000	\$4,900,000,000	166	\$440,600,000	84	\$165,000,000	51%	127	3.4%	29	\$9,760,000	\$174,760



## **FDOT VE Program Results**

- FY 2007/2008 FY 2016/2017
  - Conducted 265 studies
  - Approved 913 recommendations
  - \$2.77 billion Cost Avoidance/Savings
  - 51% Adoption Rate
  - 7.3% Project Saved
  - 246 Approved CSI's (VECP's)
  - \$58.8 million Savings



#### **Team Member Role**

- ✓ Review pre-study information
- ✓ Fully participate during study
- ✓ Review & comment study report



## **Project Manager Role**

#### **Pre – Study Activities:**

- ✓ Provide input during Project Selection Phase.
- ✓ Provide input during Team Selection Phase.
- Provide all available information on the project prior to study.

## **Project Manager Role**

#### **Study Activities:**

- ✓ Brief the team on first day of the study.
- ✓ Be available during the week to answer questions.
- ✓ Attend team presentation of recommendations.

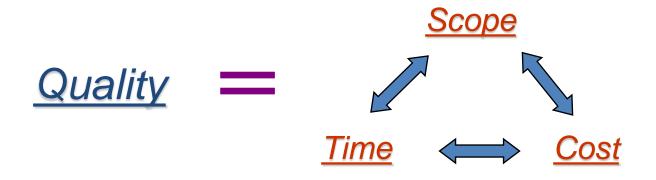
## **Project Manager Role**

#### **Post – Study Activities:**

- ✓ Participate in the resolution of recommendations.
- ✓ Inform everyone involved in the project, *in writing*, of all accepted recommendations.

## **VE & Project Management**

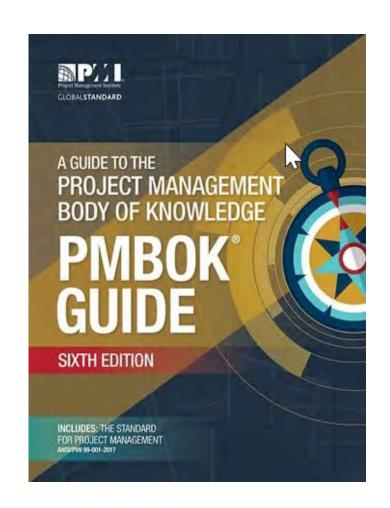
#### **Triple Constraint**



Project Quality is affected by balancing Scope, Time, & Cost

# **Project Management Body of Knowledge**

- Five Project Management Process Groups
- Ten Knowledge Areas



# **10 Knowledge Areas**

- 1. Integration
- 2. Scope
- 3. Time
- 4. Cost
- 5. Quality

- 6. Human Resources
- 7. Communications
- 8. Risk
- 9. Procurement
- 10.Stakeholder Management

# 10 Knowledge Areas

- 1. Integration
- 2. Scope
- 3. <u>Time</u>
- 4. Cost
- 5. Quality

- 6. Human Resources
- 7. Communications
- 8. <u>Risk</u>
- 9. Procurement
- 10.<u>Stakeholder</u> <u>Management</u>

Areas that VE can help improve

## **10 Knowledge Areas**

# How can VE help?

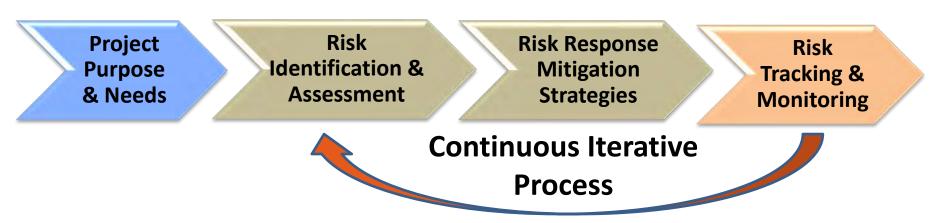
- Improve Project Schedule *Time*
- Improve Constructability Quality
- Resolve Stakeholder Issues Scope
- Reduce Operating Costs Cost
- Reduce Overall Project Costs Cost
- Mitigate Risks Risk



# **Risk Management Overview**

#### **Risk Management Overview**

Risk Management is the systematic process of identifying, assessing, and responding to risks in order to manage or reduce potential adverse effects on the achievement of project goals.



#### What is Risk?

Project Management Institute (PMI) Says:

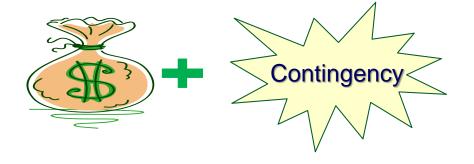
"An uncertain event or condition that, if it occurs, has a positive or negative effect on the project's objectives."



#### **Cost Estimating Strategies**

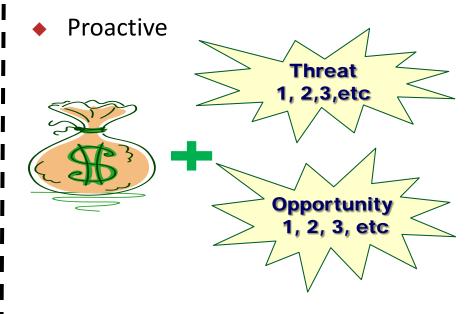
#### **Traditional Estimating**

- Contingency is intended to include all risk known/unknown
- Little control of cost and schedule
- Reactive



#### **Risk-Based Estimating**

- Risk are clearly identified and quantified in estimate
- Reasonable control of cost and schedule



# Why Risk Analysis?

- Improved cost estimates and schedules
  - Validate cost & schedule
  - Risk-based project contingency
- Implement Risk Assessment/Mitigation activities
- Meet FHWA financial plan requirement

Maximizes the Likelihood of Meeting Budget & Project Delivery Goals

### **Project Selection Guidelines – Risk Analysis**

- Complex project or total project cost greater than \$500 Million – Consultant-led Independent Risk Analysis Workshop
- Total project cost between \$100 \$500 million Risk Analysis Workshop using commercial risk modeling program
- Projects not requiring a formal workshop Risk Analysis Modeling Tool by HDR
- Qualitative Risk Analysis Risk Based Graded Approach Worksheet



### **Risk Analysis Workshops**

- 2 to 3 day structured event
- Identify and quantify threats and opportunities
- Identify risk management strategies
- Collaborative team approach!



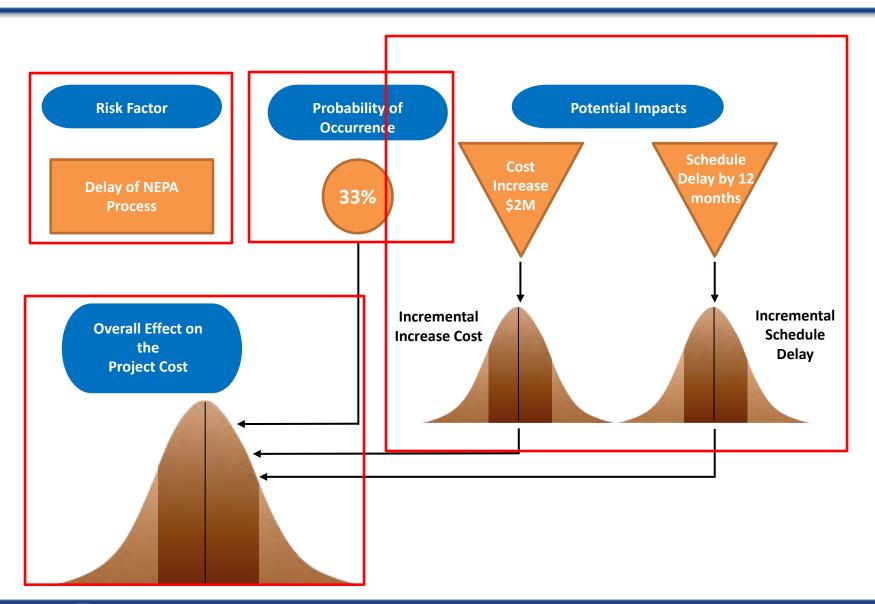
#### Who participates in a Risk Workshop

- Project Manager and Design Team
- External Subject Matter Experts
- Internal and External



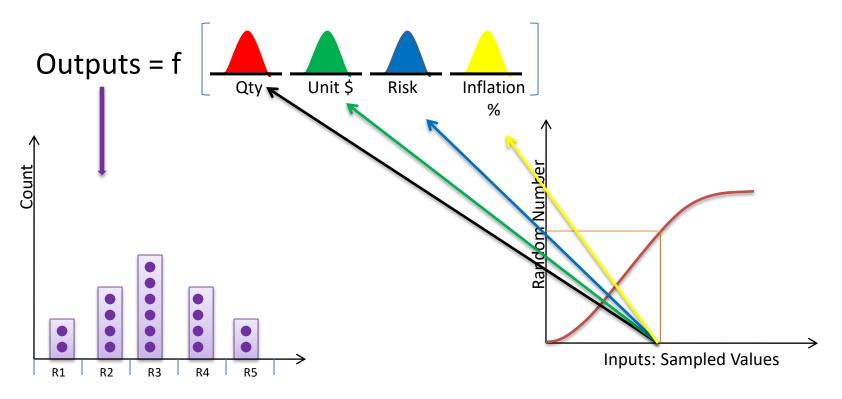
- Disciplines
  - Construction
  - Bridge & Structures
  - Environmental
  - Right of Way
  - Geotechnical
  - Construction
  - Utilities
  - Local agencies
  - Others depending on project scope

# **Quantifying Risks**



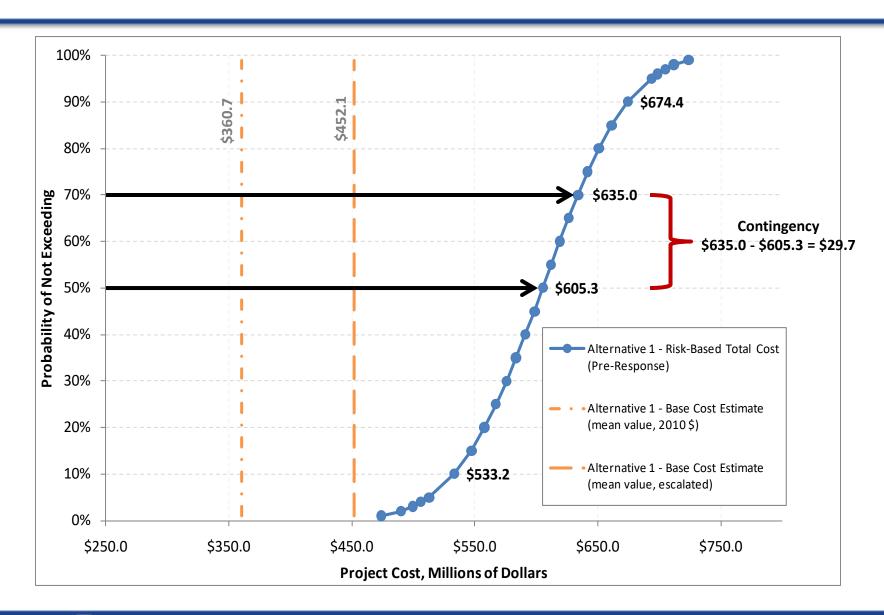
# **Risk Modeling - Monte-Carlo Simulation**

y = f(x) or "y" is a function of "x"

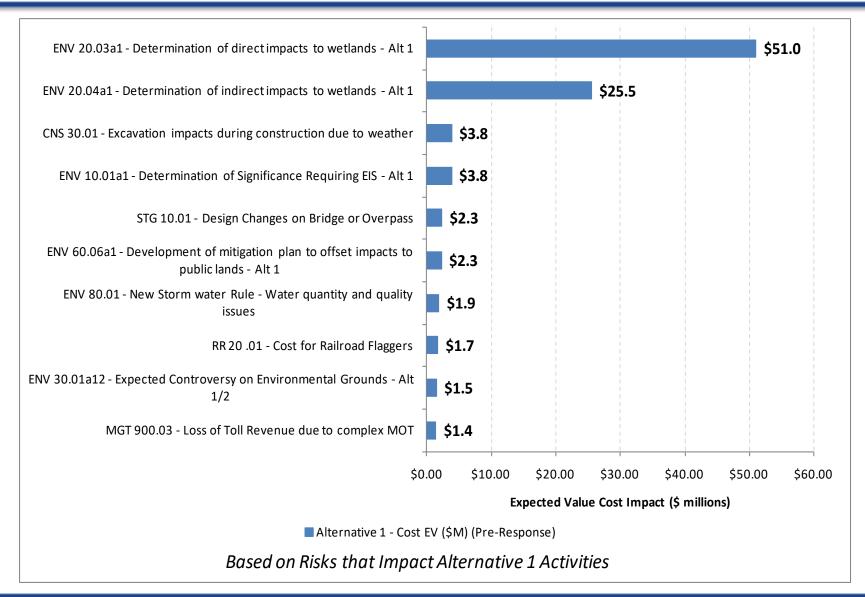


**Outputs: Binned Results** 

#### **Risk Assessment Results**



#### **Risk Assessment Results**



# **Risk Workshop Deliverables**

- Final report detailing the results of the workshop
- Final Risk Register for Project Manager to use managing the identified risks



# **Cost Risk Analysis & Value Engineering**

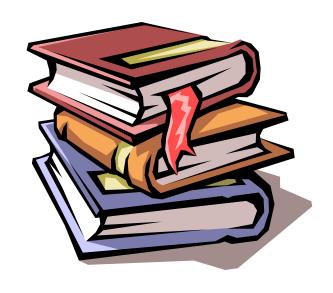
- CRA Process & VE Process are complimentary
  - Use the VE process to develop risk response strategies
  - Use the CRA process on the VE recommendations to evaluate the risks and their impact on the cost & schedule



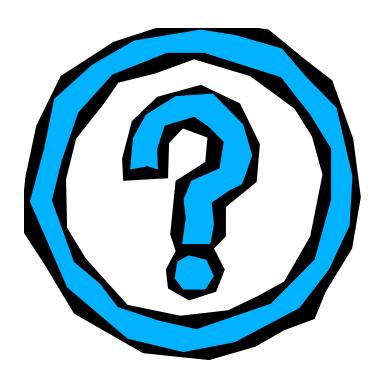
#### References

- FDOT Value Engineering web site
- FDOT Value Engineering Procedure 625-030-002
- FHWA Value Engineering web site
- SAVE International web site





# Questions



# Thank you

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