Value Engineering

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Objectives

- Background
- What is VE
- Why, When, What, & Who to VE
- Review VE Job Plan (How)
- Team Member & PM Roles
- VE applied to a process
- VE Relationships
- 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

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.

What is Value Engineering?

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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

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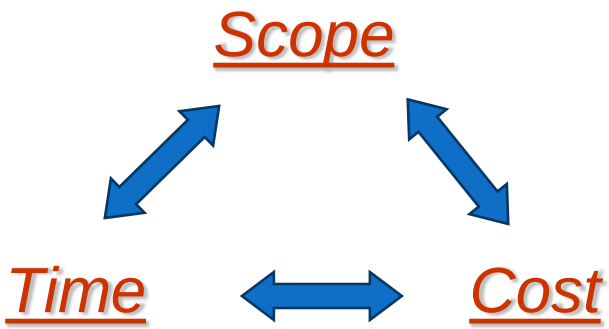
VE & Project Management

Triple Constraint

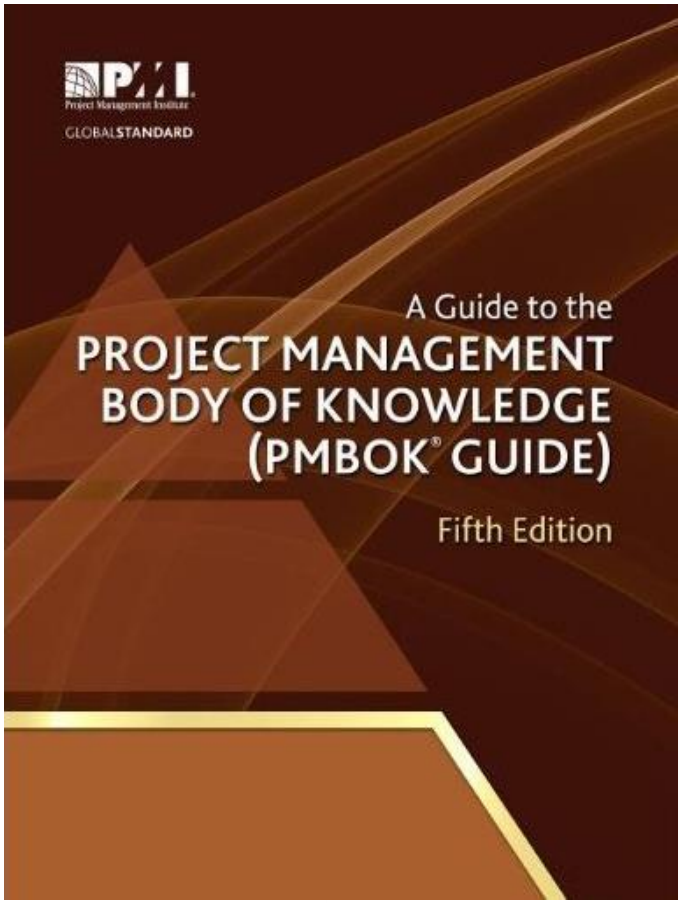
Quality =



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

Project Management Body Of Knowledge (PMBOK)

- 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

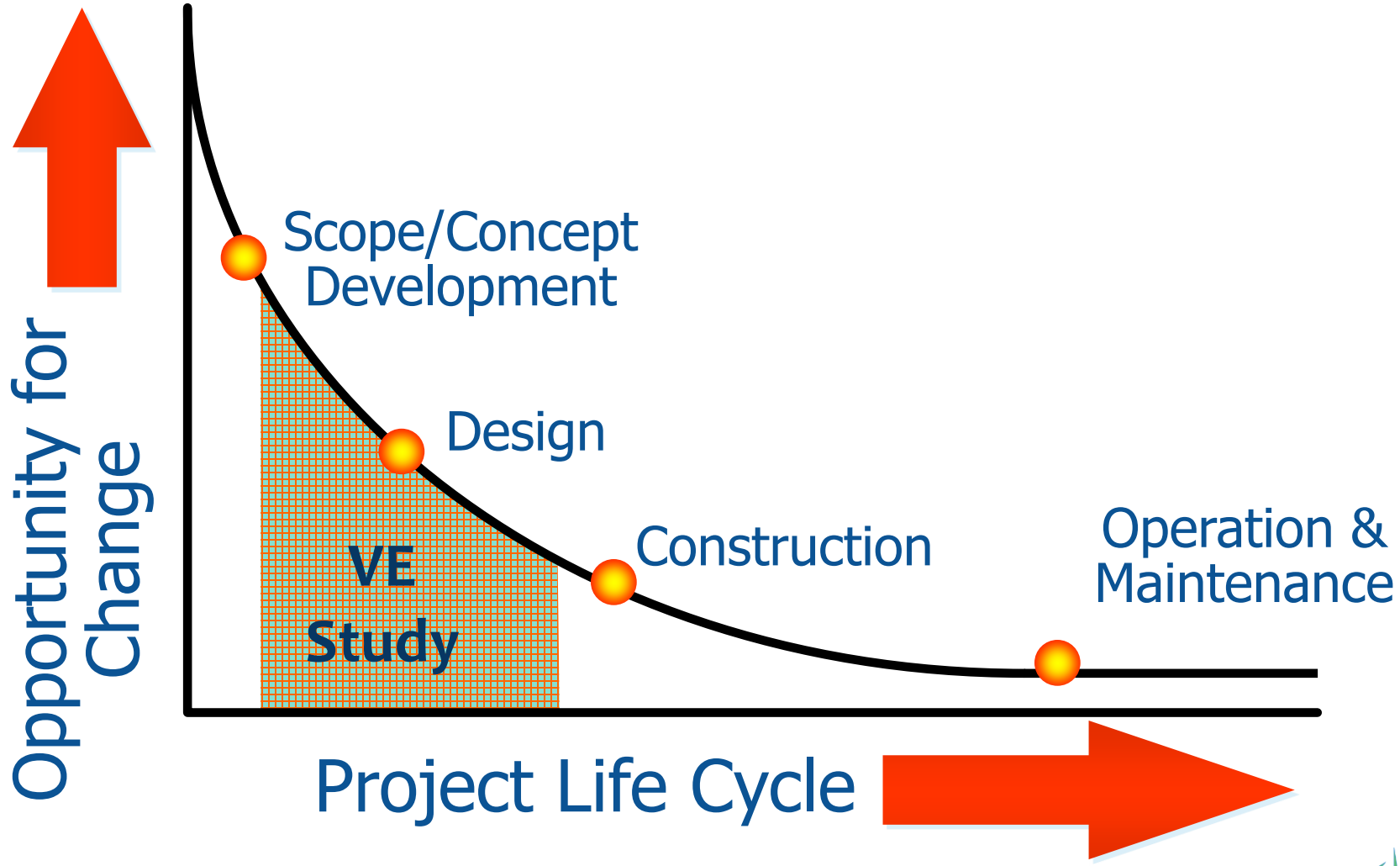
1. Integration
2. ***Scope***
3. ***Time***
4. ***Cost***
5. ***Quality***
6. Human Resources
7. Communications
8. ***Risk***
9. Procurement
10. ***Stakeholder Management***

Areas that VE can help improve

How Can VE Help 10 Knowledge Areas

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

When to apply VE



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

Projects Selected for VE (What)

- $25 million or more
- 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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5 QUESTIONS

ASKED 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?

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
  - Site Visit

Cost Model - Pareto

20% of functions contain 80% of cost

Function Analysis Phase

What is Function?

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

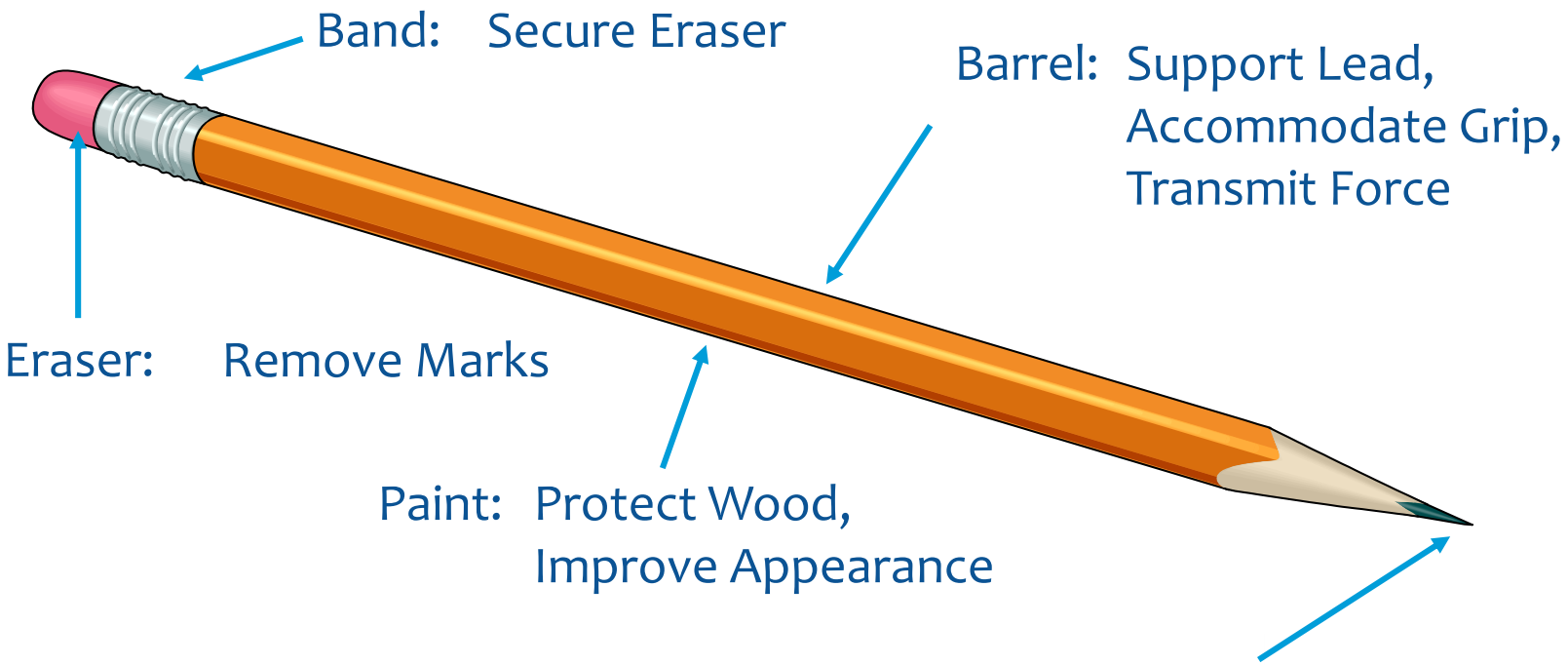
WHAT DOES IT DO?

WHAT DOES IT DO IT TO?

Function Analysis Phase

What is the function of this pencil?

“make marks”



Creative Phase

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?

Evaluation Phase

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

Development Phase

Write-up Ideas

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

Presentation Phase

- Present results to management
- Either last day of study or scheduled separately by District VE coordinator
- Document results in report

How Is VE Done?

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Post-Study

- Implementation
- Report Results

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

Report Results

FY 2016 VALUE ENGINEERING/COST SAVINGS INITIATIVE *THROUGH MAY 2016*

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.

Cost Avoidance 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 AVOIDANCE IN DESIGN (VE)			D1	D2	D3	D4	D5	D6	D7	TE	SW
2015-2017 LETTINGS **3 FY'S MONTHLY LETTING AVERAGE PER DISTRICT ACCUMULATED TO DATE**			212.95	380.66	336.96	192.26	309.4	291.54	212.49	217.95	2097.94
# VE STUDIES			1	3	1	5	1	5	2	0	18
ANNUAL APPROVED COST AVOIDANCE/SAVINGS ADOPTED RECOMMENDATIONS	$M RECOMMENDED		$12.66	$61.13	$13.90	$6.23	$22.98	$134.33	$55.02	$0.00	$306.22
	*$M APPROVED		$11.35	$10.61	$13.84	$2.04	$8.30	$17.32	$53.03	$0.00	$116.49
ANNUAL APPROVED VALUE ADDED ADOPTED RECOMMENDATIONS	$M RECOMMENDED		$0.51	$14.21	$0.03	$0.00	$4.43	$5.02	$1.72	$0.00	$25.93
	$M APPROVED		$0.51	$0.40	$0.00	$0.00	$0.25	$0.57	$1.72	$0.00	$3.46
ANNUAL ADOPTION RATE (TARGET 40% - 60%)	# RECOMMENDED		19	23	5	7	11	17	18	0	100
	# APPROVED		16	7	3	1	4	4	16	0	51
	% APPROVED		84%	30%	60%	14%	36%	24%	89%	0%	51%
PERCENT PROJECT SAVED	% PROJECT SAVED	(VE SAVINGS) DIVIDED BY (COST OF PROJECTS VE'D)	6.90%	8.79%	22.31%	2.78%	3.28%	2.07%	20.01%	0.00%	6.55%
	% PROGRAM SAVED	(VE SAVINGS) DIVIDED BY **ABOVE**	5.33%	2.79%	4.11%	1.06%	2.68%	5.94%	24.96%	0.00	5.55%

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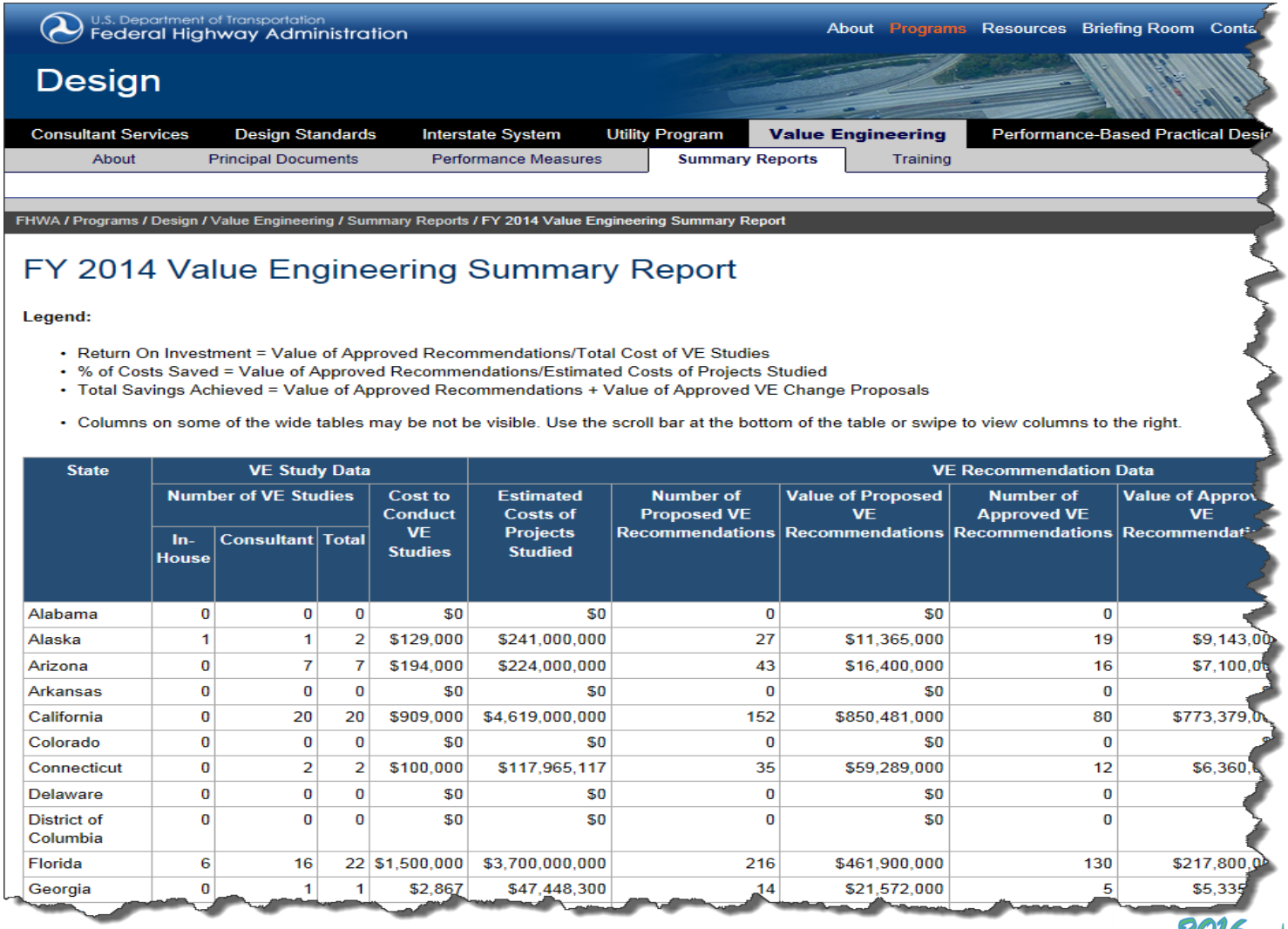
Report Results



U.S. Department of Transportation
Federal Highway Administration

About Programs Resources Briefing Room Conta

Design

Consultant Services | Design Standards | Interstate System | Utility Program | Value Engineering | Performance-Based Practical Desi

About | Principal Documents | Performance Measures | Summary Reports | Training

FHWA / Programs / Design / Value Engineering / Summary Reports / FY 2014 Value Engineering Summary Report

FY 2014 Value Engineering Summary Report

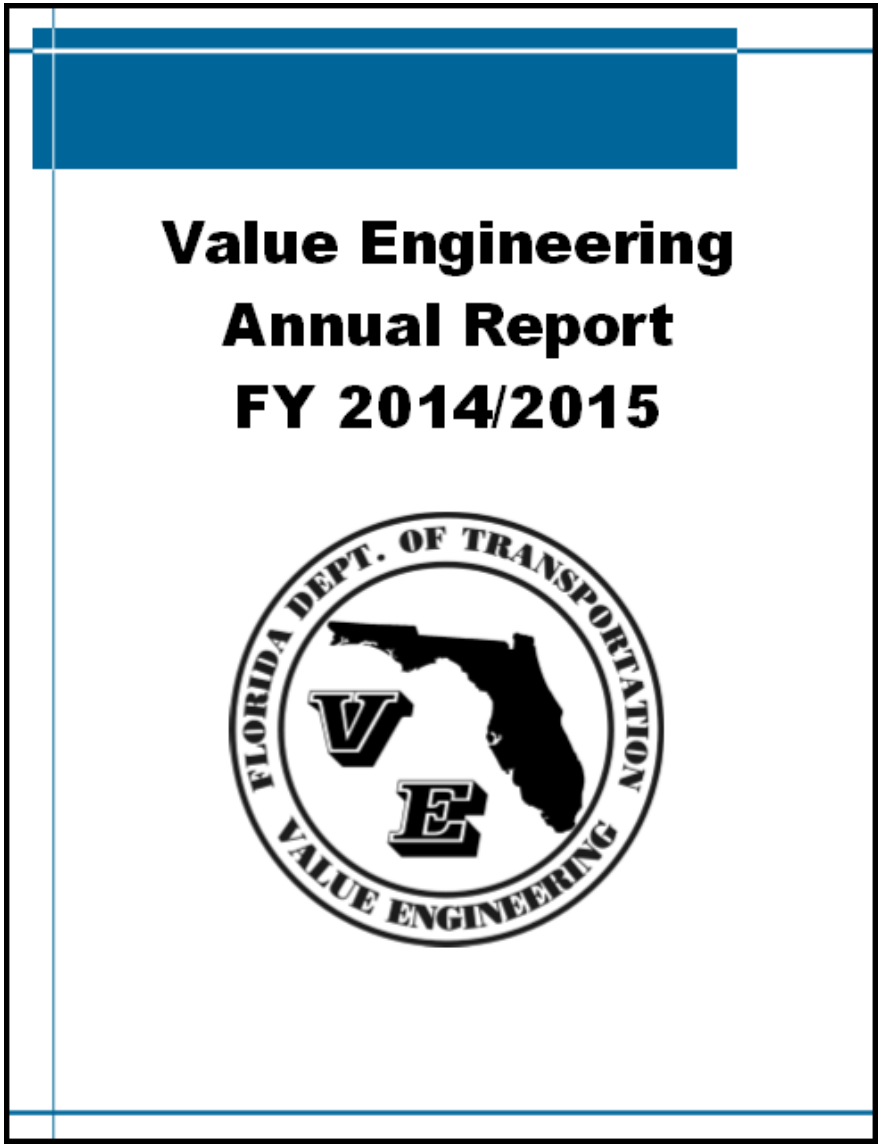
Legend:

- Return On Investment = Value of Approved Recommendations/Total Cost of VE Studies
- % of Costs Saved = Value of Approved Recommendations/Estimated Costs of Projects Studied
- Total Savings Achieved = Value of Approved Recommendations + Value of Approved VE Change Proposals

- Columns on some of the wide tables may be not be visible. Use the scroll bar at the bottom of the table or swipe to view columns to the right.

State	VE Study Data				VE Recommendation Data				
	Number of VE Studies			Cost to Conduct VE Studies	Estimated Costs of Projects Studied	Number of Proposed VE Recommendations	Value of Proposed VE Recommendations	Number of Approved VE Recommendations	Value of Approv VE Recommendat
	In-House	Consultant	Total						
Alabama	0	0	0	$0	$0	0	$0	0	
Alaska	1	1	2	$129,000	$241,000,000	27	$11,365,000	19	$9,143,00
Arizona	0	7	7	$194,000	$224,000,000	43	$16,400,000	16	$7,100,0
Arkansas	0	0	0	$0	$0	0	$0	0	
California	0	20	20	$909,000	$4,619,000,000	152	$850,481,000	80	$773,379,0
Colorado	0	0	0	$0	$0	0	$0	0	
Connecticut	0	2	2	$100,000	$117,965,117	35	$59,289,000	12	$6,360,
Delaware	0	0	0	$0	$0	0	$0	0	
District of Columbia	0	0	0	$0	$0	0	$0	0	
Florida	6	16	22	$1,500,000	$3,700,000,000	216	$461,900,000	130	$217,800,0
Georgia	0	1	1	$2,867	$47,448,300	14	$21,572,000	5	$5,335

Report Results



Report Results

- FY 2005/2006 – FY 2014/2015
  - Conducted 297 studies
  - Approved 885 recommendations
  - $2.8 billion Cost Avoidance/Savings
  - 50% Adoption Rate
  - 7.8% Project Saved
  - 217 Approved CSI's (VECP's)
  - $48.2 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.

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

FDOT Value Engineering Program…more than meets the eye!

Using Value Engineering to Improve A Process

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Tim Brock
District Four Utility / Value Engineer

We have used the Value Engineering Program to improve several processes:

- Pond Siting Process (2004)
- Lane Elimination Process (2009)
- PD&E Process (2013)
- Right of Way Process (2014)
- Transportation Systems Management and Operations / Transit (TSM&O / Transit) (2016)
- Consultant Invoice Transmittal System Process (CITS) (2016)

Typical Agenda For The First 2 Days

Tuesday April 26, 2016	
Location: FDOT District Four Second Floor Conference Room	
Time	**Topic**
9:30 a.m.	**Workshop Kick-off: Process Overview and Workshop Expectations** • Welcome, sign-in • Management direction • Agenda review • Current Process overview and Procedure
10:45 a.m.	**Break**
11:00 a.m.	**CITS Process — Group Function** • Create a Function Analysis System Technique Diagram of our current Consultant Invoice Tracking System • Open discussion of current process and how individual functional units interact • Identify constraints, policy, challenges, etc. • Review questionnaire issues, any additional issues? • Brainstorming of ideas on how to overcome the issues
12:00 p.m.	**Lunch**
1:30 p.m.	**CITS Process — Procurement Office** • Discussion of current process and interactions • Review questionnaire issues, any additional issues? • Brainstorming of ideas on how to overcome the issues
3:00 p.m.	**Break**
3:15 p.m.	**CITS Process — (Design & Construction)** • Discussion of current process and interactions • Review questionnaire issues, any additional issues? • Brainstorming of ideas on how to overcome the issues
5:00 p.m.	**Adjourn for the day**

Wednesday April 27, 2016	
Location: FDOT District Four Second Floor Conference Room	
Time	**Topic**
8:30 a.m.	**CITS Process — Financial Services /Program Management** • Discussion of current process and interactions • Review questionnaire issues, any additional issues? • Brainstorming of ideas on how to overcome the issues
10:00 a.m.	**Break**
10:30 a.m.	**CITS Process — Other Offices /Parking Lot items** • Discussion of current process and interactions • Review questionnaire issues, any additional issues? • Brainstorming of ideas on how to overcome the issues
12:00 p.m.	**Lunch**
1:30 p.m.	**CITS Process — Group** • Overview of combined discussions of current process and interactions • Begin Brainstorming as a Group
3:00 p.m.	**Break**
3:15 p.m.	**CITS Process — Group** • Continue Brainstorming as a Group • Discuss homework assignments
5:00 p.m.	**Adjourn for the day**

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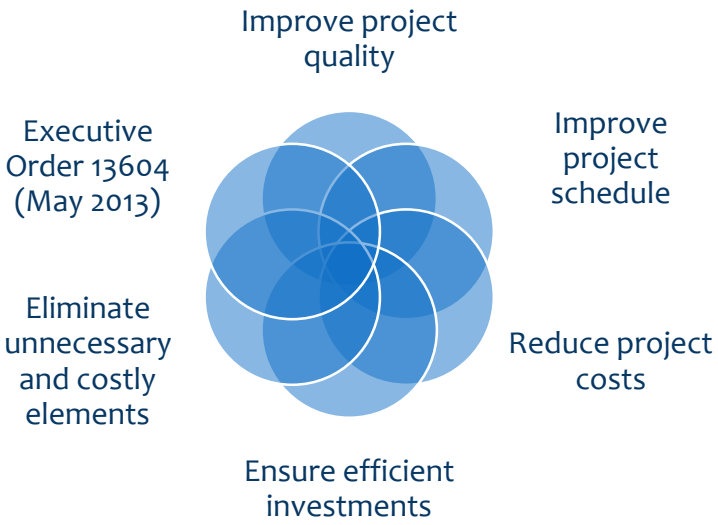
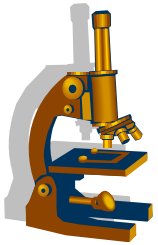
Why are we doing it?



What is the Value Engineering Job Plan?

Through a phased application of the VE job plan

Investigation



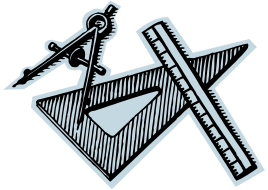
Function Analysis

Presentation

Independent Speculation

Evaluation

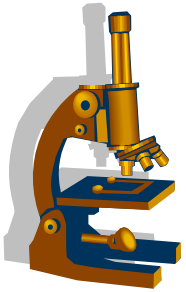
Development



Typical Process Part I

VE Study Phases and Outcome

Investigation



Identified Issues and Concerns

PD&E – 149 issues

ROW – 52 issues

TSM&O – 167 issues

CITS - 45 issues

Function Analysis → Function Activity Diagram

Independent Speculation

Initial Idea List

PD&E – 575 ideas

ROW – 123 ideas

TSM&O – 42 ideas

CITS – 43 ideas

Typical Process Review Part II

VE Study Phases and Outcome

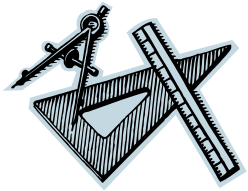
Speculation

Summarized/Consolidated Idea List

Evaluation

Solutions

Development



Recommendations:

- PD&E - 15
- ROW – 18
- TSM&O – 12
- CITS - 13

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Value Engineering a Process

Workshop Part I

Information & Analysis
Two Day Session

- ✓ Ask about Functions
  - What
  - How
  - Why
  - When
  - Where
  - Who
- Function Analysis
- ??? Issues Identified
- ??? Ideas Gathered

Workshop Part II

Speculate, Evaluate, Develop & Recommend
Three Day Session

- Brainstorm
  - Overcome Issues & Concerns
  - Enhance Opportunities
  - How to Do It Differently
- Evaluate Ideas
  - Does it work?
  - Does it save time?
  - Does it meet/exceed performance?
- Prioritize Ideas
- Develop ?? Recommendations

Part III
Presentation of Recommendations
To be Determined – District Auditorium

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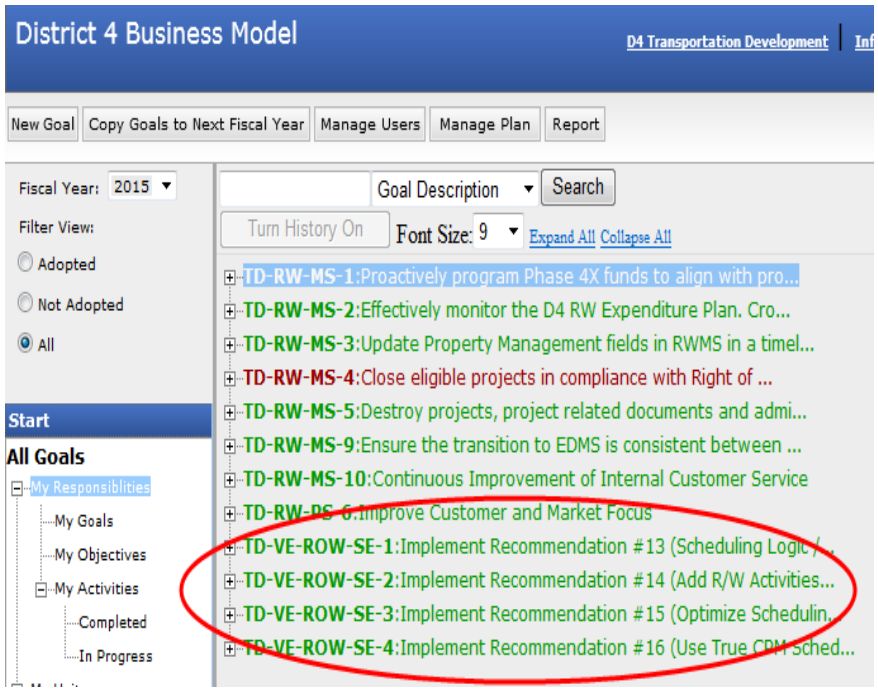
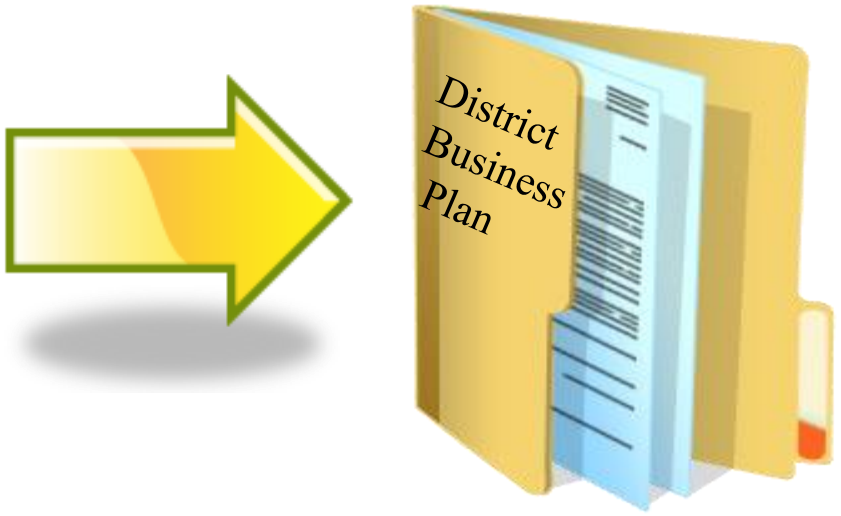
Next Steps

- Implementation of the recommendations is tracked through a business plan developed for this purpose.
  - Any successes will be shared with Central Office for possible statewide implementation.



VE RECOMMENDATION NO. X:	IDEA NOS.
Issues	
Idea	
Advantages	**Disadvantages**
•	•
Discussion	
Goal (s)	
Objective(s)	
1	
2	
Obstacles	
•	
Benefits	
•	
Resources	



Reference

- FDOT Value Engineering Procedure - 625-030-002

- FDOT VE Web Site

http://www.dot.state.fl.us/officeofdesign/ProjectReview/ValueEng/

- FHWA VE Web Site

http://www.fhwa.dot.gov/ve/

- SAVE International Web Site

http://www.value-eng.org/

Value Engineering: Relationships

Frank Chupka, PE

District Seven Court/GEC/CSRA/E&O/Value Engineer

Value Engineering: Relationships

R-E-S-P-E-C-T

PD&E TEAM

DESIGN TEAM

VE TEAM

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What in the world were they thinking?

What was their thought process?

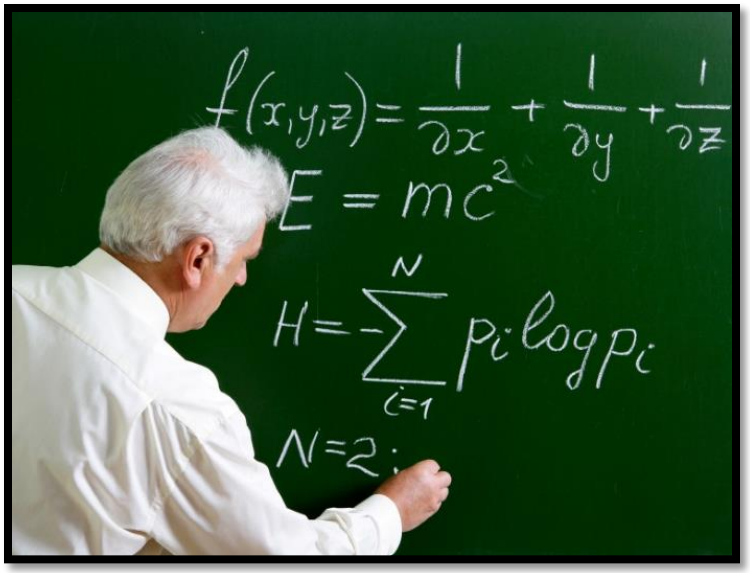
Answers to the quiz: Writing VE recommendations for success

Example:
Delete sidewalk and construct shared use path instead

DELETE SIDEWALK

and construct shared use path instead

Construct a shared use path instead of a sidewalk



Example: Evaluate storm water criteria for possible pond savings

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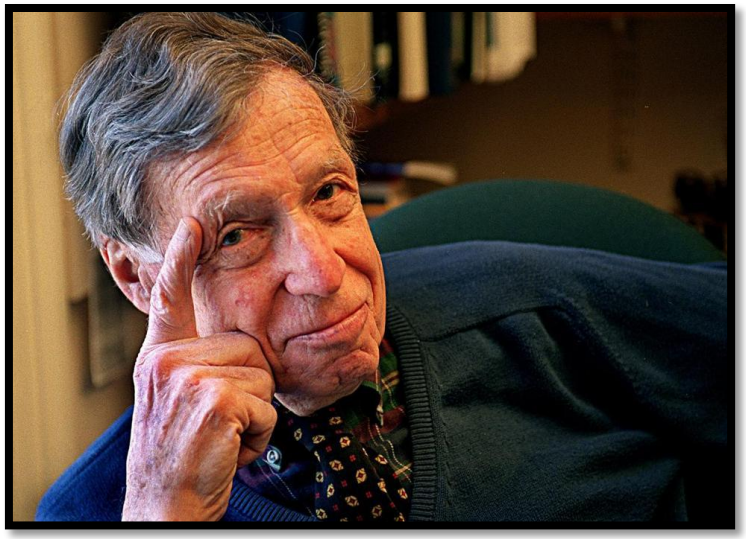

Reduce pond right of way by sizing for treatment volume only in the tidal area.

Offer alternate versions of your recommendations

Example:

Recommendation 1A: Widen the bridge instead of replacing

Recommendation 1B: Construct a box culvert instead of replacing existing bridge

Example:

Recommendation 1C: Construct a spectacular cable stayed bridge over Jones Creek

Questions

Thank You