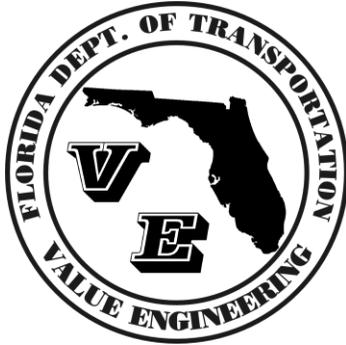


Value Engineering



Kurt Lieblong, PE, CVS
Specifications & Estimates Office



Objectives

- Background
- What is VE
- Why, What, Who, & When to VE
- Review VE Job Plan (How)
- Team Member & PM Roles
- 2011 AASHTO VE Winner
- 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



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?

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.



Why use VE?

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

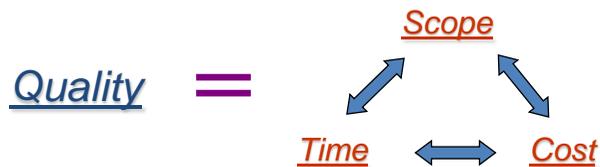


Why use VE?

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



Triple Constraint

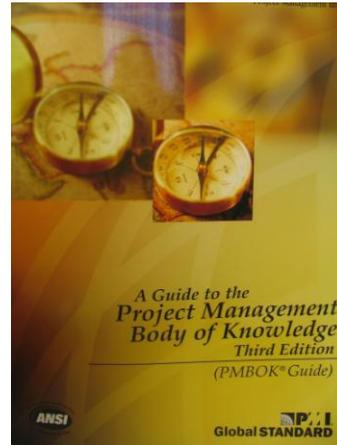


Project Quality is affected by balancing Scope, Time, & Cost



Project Management Body Of Knowledge (PMBOK)

- Five Project Management Process Groups
- Nine Knowledge Areas



9 Knowledge Areas

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



9 Knowledge Areas

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

Areas that VE can help improve

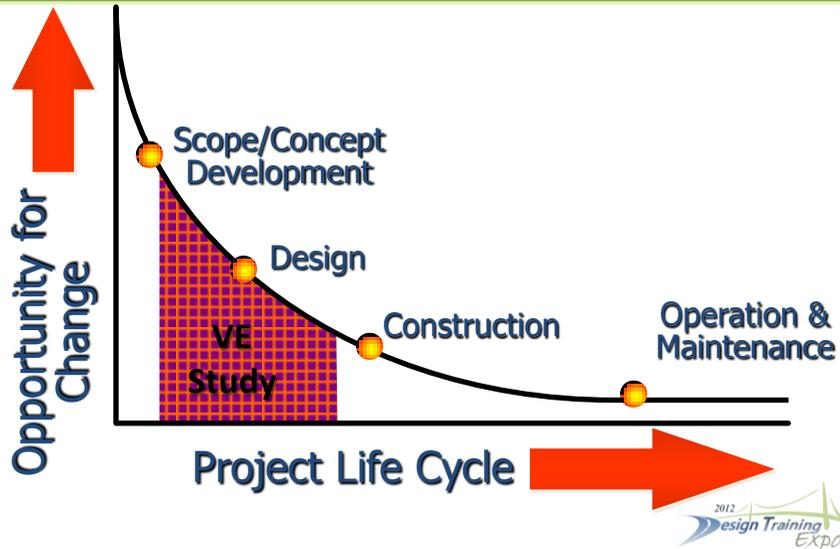


How Can VE Help - Nine Knowledge Areas

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



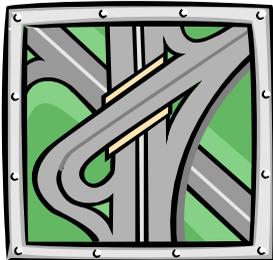
When to apply VE



When is VE Performed

➤ Planning

Typical Information Required :



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

When is VE Performed

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



When is VE Performed

Design

Typical Information Required :

- Drainage Information
- Typical Sections
- Plan & Profile
- Intersection & Interchange Layouts
- Cross Sections
- Structure Info
- Traffic Control Plans
- Preliminary Cost Estimate



When is VE Performed

Design/Build Projects

- Conducted prior to release of RFP
- Design/Build Rule – 23 CFR 627.5



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)

- \$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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VE Team Study



How Is VE Done?

VE Job Plan

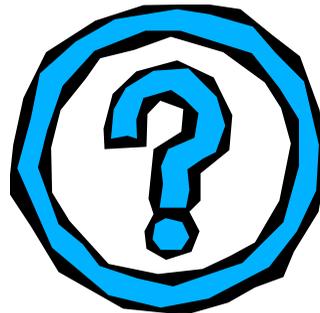
- Pre-Study
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5 QUESTIONS

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

- **Introductions**
- **Review Project Information**
- **Team briefing by design team**
- **Site Visit**
 - Video Logs
 - Google Earth



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



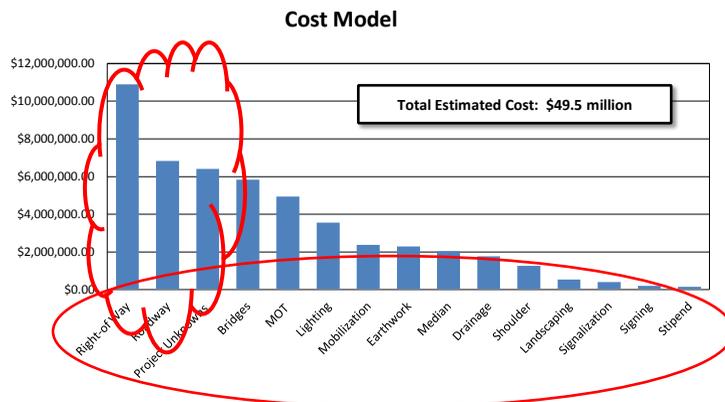
Information Phase

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



Cost Model - Pareto

- *20% of functions contain 80% of cost*



How Is VE Done?

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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?

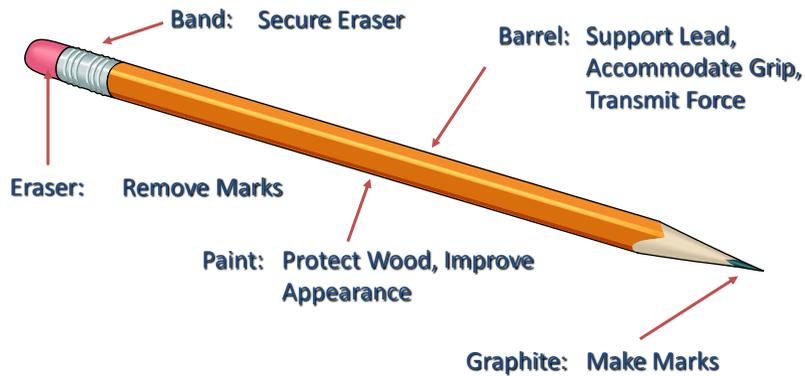
WHAT DOES IT DO IT TO?



Function Analysis Phase

What is the function of this pencil?

“make marks”



Function Analysis Phase

Random Function Generation

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



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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?



Creative Phase Brainstorming Rules

- 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



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



Evaluation Phase

What is It?

- Evaluate the ideas generated during the Creative Phase

Why is it important?

- Not enough time to develop all ideas generated during Creative Phase



Evaluation Phase

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



Evaluation Phase

- **Typical Criteria:**

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



How Is VE Done?

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Development Phase

Write-up Ideas

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



How Is VE Done?

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Presentation Phase

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



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Report Results

VE PROGRAM: PROJECT COST AVOIDANCE IN DESIGN (VE)

PROJECT COST AVOIDANCE IN DESIGN (VE)									
FY 2012									
PERFORMANCE REVIEW REPORT 5/17/12									
FY 2012 2012-2014 LETTINGS- AVERAGE MONTHLY PER DISTRICT ACCUMULATED THRU 4/12	D1	D2	D3	D4	D5	D6	D7	TE	SW
\$168.7	\$208.7	\$184.3	\$113.2	\$262.7	\$117.1	\$299.0	\$222.0	\$1575.7	
# VE STUDIES	2	3	2	7	1	1	0	1	17
ANNUAL APPROVED COST AVOIDANCE/SAVINGS ADOPTED RECOMMENDATIONS									
SM RECOMMENDED	\$0	\$118.86	\$3.23	\$3.80	\$14.79	\$0	\$0	\$7.63	\$148.31
*SM APPROVED	\$0	\$14.33	\$1.35	\$3.59	\$10.91	\$0	\$0	\$7.63	\$37.81
ANNUAL APPROVED VALUE ADDED ADOPTED RECOMMENDATIONS									
SM RECOMMENDED	\$0	\$50.91	\$0.17	\$0.21	\$0.04	\$0.90	\$0	\$0	\$52.23
SM APPROVED	\$0	\$5.91	\$0	\$0.21	\$0.02	\$0.90	\$0	\$0	\$7.04
ANNUAL ADOPTION RATE (TARGET 40% - 60%)									
# RECOMMENDED	0	54	8	23	12	1	0	2	100
# APPROVED	0	22	4	20	9	1	0	2	58
% APPROVED	0%	41%	50%	87%	75%	100%	0%	100%	58%
PERCENT PROJECT SAVED									
% PROJECT SAVED (VE SAVINGS DIVIDED BY COST OF PROJECTS VE'D)	0%	0.58%	1.28%	6.70%	1.72%	0%	0%	16.53%	0.96%
% PROGRAM SAVED (VE SAVINGS DIVIDED BY *3 FY'S LETTINGS- MONTHLY AVERAGE FOR THE DISTRICT ACCUMULATED TO DATE)	0%	6.87%	0.73%	3.71%	4.15%	0%	0%	3.44%	2.40%

43



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.



2011 AASHTO Value Engineering Awards

Pre-Construction Engineering
>\$75 M

... And the Winner is ...

FDOT – District 4
SR 710/Warfield Boulevard



National Value Engineering Award

Most
Value Added
Proposal



Pre-Construction
Engineering
\$75 million or Greater

Florida Department of Transportation
District Four
SR 710/Warfield Boulevard

*For Demonstrating Outstanding Value Engineering Achievements
in Teamwork, Cost Savings, Enhanced Performance, or Expedited Project Delivery
That Resulted in an Overall Improved Project*

Presented by the AASHTO Value Engineering Technical Committee
September 19, 2011

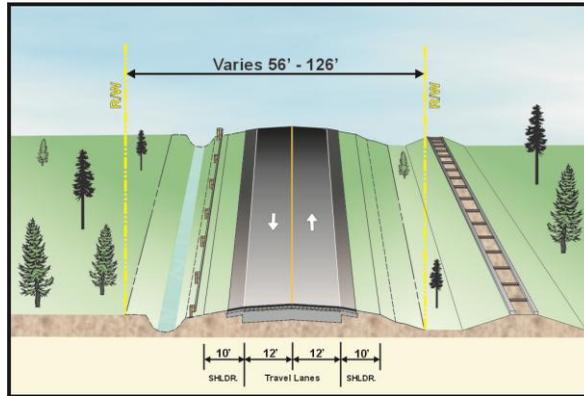
Project Description

- PD&E Study Limits:
From the Okeechobee/
Martin County Line to
CR-609 (15 Miles)
- Rural Principal Arterial
- Significant Intrastate
Traffic
- Significant Truck Traffic
(over 25%)
- Hurricane Evacuation
Route
- Connects to the Port of
Palm Beach

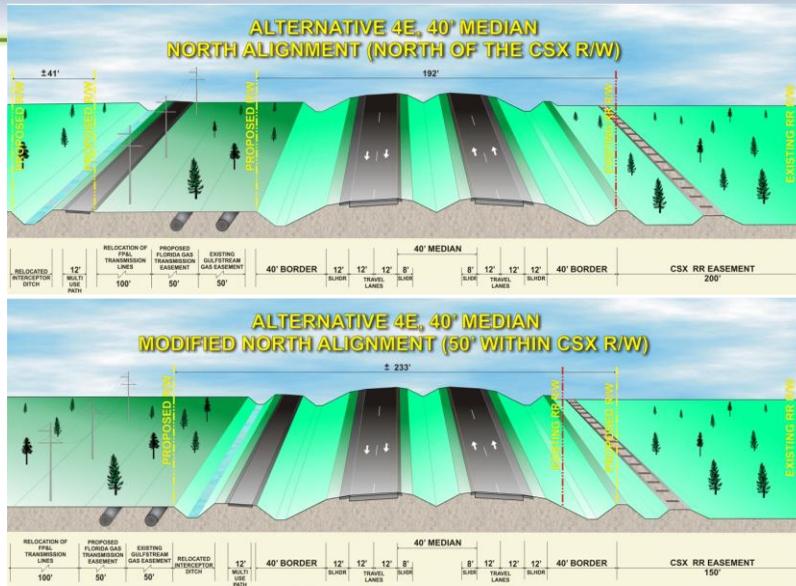


Existing Roadway Characteristics

- Conventionally crowned undivided 2-lane, two way roadway
- CSX RR runs parallel along entire project limit
- Roadside swale on the north serves as runoff from SR 710 and as a regional drainage system for approx. 25,000 acres.
- Numerous major utilities located on north side



Proposed Typical Sections



Cost Estimate

- Construction Cost - Typical 4E Approx \$170M
- Construction Cost – Typical 4E Mod \$140M (includes split bridges at RR)
- ROW – Typical 4E - \$80.5M (no CSX)
- ROW – Typical 4E Mod - \$43.1M

VE Recommendations

- Move proposed future gas line out of roadway - \$14.8 M
- Construct multi-use path within existing utility easement rather than acquire new easement - \$2.5M
- Eliminate unwarranted illumination - \$11M
- Re-use existing roadway for future EB lanes - \$60M



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



Reference

- FDOT Value Engineering Procedure 625-030-002
- VE SharePoint Site



<http://fdotsharepoint.dot.state.fl.us/sites/Officeofdesign/SpecsEst/ValueEngineering/default.aspx>



Questions



Thank You

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(850) 414-4787

