California Department of Transportation
Division of Design
Office of Special Projects

# Value Analysis Program

## ANNUAL REPORT

## Federal Fiscal Year 2008/2009

**October 1, 2008 - September 30, 2009**

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# EXECUTIVE SUMMARY

The Federal Fiscal Year (FY) 2008/09 was a busy year for the Department's Value Analysis (VA) Program. Utilizing our VA contracts, many Districts have studies performed continuously throughout the year. Although many studies were not finalized by FY end, over 52 task orders were written to perform studies. It requires a great deal of effort and persistence to coordinate and perform these studies. The team of VA Coordinators work diligently to ensure the success of the VA program here in the Department.

Last year, 48 studies were completed on projects with a total cost (capital and support) of over $3.3 billion. Of the 48 studies, 25 were performed by Caltrans staff with consultant Certified Value Specialist (CVS) team leaders. The other 23 studies were performed by our local partners such as: city, counties, and local transportation authorities. These studies were also included in this annual federal VA report.

The Department reported a savings of $171 million to the Federal Highway Administration (FHWA). These savings were derived from the "Accepted Alternatives" proposed by the VA teams and implemented by the decision-makers, project managers, functional managers, and Project Development Teams (PDT). In comparing the cost savings to the cost to conduct the studies, the Department achieved a Return on Investment (ROI) of 79:1 meaning $79 in savings for every dollar spent on conducting the study.

The Joint Stewardship and Oversight Agreement between the Department and the FHWA lists four performance indicators/measures for the Value Analysis Program: percent of required studies conducted, number of non-required studies conducted, percent project cost savings, and implementation rate. The Department conducted 100 percent of all required studies for the 2008/09 Federal Fiscal Year. In addition, the Department performed five studies on projects costing less than the $25 million threshold. The Department also reported an average cost savings of 5 percent, which is consistent with the national average and meets the stewardship target. The implementation rate is determined by comparing the number of proposed recommendations to the number of implemented recommendations. The Department's implementation rate was 68 percent for last year.

In an effort to improve the delivery of projects, the VA Program is always looking for opportunities to improve the Department's business practices. Several District and Headquarters (HQ) units utilized the VA process in FY 2008/09 to streamline the way they do business. Although many of these studies were not complete by the end of the fiscal year, hundreds of ideas were generated and improvements are being implemented throughout the Department.

This past year included an opportunity for the Department to share our successes at the National level. The American Association of State Highway Transportation Officials (AASHTO) Value Engineering Conference was held in San Diego during the summer. Many District VA coordinators and project managers showcased our successful VA studies to other State DOTs, AASHTO members, FHWA partners, our local partners, and other VE experts. The Department was recognized for three VA studies at the conference.

# 2008/2009 PROGRAM RESULTS

During the federal fiscal year ending September 30, 2009 the Department completed the following Value Analysis activities:

- Forty eight (48) studies were completed including five (5) non-mandated studies. The total estimated project cost of the forty-eight (48) transportation projects completed was $3,396,361,000. Of the 48 studies, Caltrans performed 25 studies using our A&E contracts, and the remaining studies were performed by our local partners.

- An additional thirty (30) transportation project studies were performed, but not completed this FY. The results of these studies will be reported when complete.

- Along with project VA studies, four process VA studies were performed including: GIS Corporate Structure, Hazardous Material Process, Bridge Design Project Delivery Process, and Document Retrieval System. These studies are in the process of being completed and will be distributed, via the intranet at a later date.

- Forty-three (43) Cost Reduction Incentive Proposals (CRIPs), otherwise known as Value Engineering Change Proposals (VECPs), were submitted by contractors and approved by the Department resulting in savings of $3,688,500 (the State shared 50% of these savings).

- Project teams implemented 135 of 199 proposed recommendations resulting in $170,587,000 in savings. Table 1 below summarizes the results of the VA transportation project studies.

## Table 1: Value Analysis Studies – Federal FY 2008/2009

| Study Sponsor | No. of Studies | Original Project Costs | Value Analysis Alternatives | | | | Total Study Cost | Return on Investment | Project Savings | Implementation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Proposed | | Implemented | | | | | |
| | | ($Million) | No. | Savings ($Million) | No. | Savings ($Million) | (x1000) | | | |
| Caltrans | 25 | $1,876 | 77 | $133 | 54 | $78 | $1,226 | $64:1 | 4% | 70% |
| Local Agency | 23 | $1,520 | 122 | $125 | 81 | $93 | $925 | $100:1 | 6% | 66% |
| Total | 48 | $3,396 | 199 | $257 | 135 | $171 | $2,151 | $79:1 | 5% | 68% |

The VA program has been striving to improve the quality of alternatives so that the decision-makers can be confident in approving and implementing recommended changes. The **total implementation rate** of the VA Program (the percentage of Implemented Alternatives with respect to Proposed Alternatives) was **68%**. This is a significant improvement from our past years of less than 50%. One of the main barriers to implementation is the timing of the study. Table 2 shows the average return on investment, implementation rate and savings by project phase. The greatest return investment is when a study is performed in the 0 phase (prior to Draft ED). If the project is not well defined or already bound by constraints, the implementation rate and return on investment fall dramatically.

## Table 2: VA Study Results by Phase

| Project Phase | # of Studies | ROI ($ ratio) | Implementation Rate (%) | Savings (%) |
|---|---|---|---|---|
| K | 2 | 44 | 42 | 2 |
| 0 | 29 | 106 | 70 | 9 |
| 1 | 17 | 56 | 83 | 6 |

Table 3 shows a comparison of results by District. Districts 4 and 8 completed the most studies (8 and 13 respectively) last year. District 10 had the highest return on investment (198:1), however Districts 6, 8, and 12 achieved more than 100:1 ROI. Districts 11 and 2 had the highest implementation rates (100% and 83% respectively). District 10 had the highest average cost savings (21 percent) with District 12 also having an impressive savings of 14%.

## Table 3: VA Study Results by District

| District | # of Studies | ROI ($ ratio) | Implementation Rate (%) | Avg. Project Savings (%) |
|---|---|---|---|---|
| 1 | 2 | 7 | 69 | 1 |
| 2 | 2 | -7 | 83 | -1 |
| 3 | 5 | 76 | 65 | 3 |
| 4 | 8 | 63 | 68 | 3 |
| 5 | 4 | 32 | 73 | 3 |
| 6 | 3 | 103 | 79 | 7 |
| 7 | 5 | 42 | 75 | 5 |
| 8 | 13 | 125 | 60 | 7 |
| 9 | 0 | 0 | 0 | 0 |
| 10 | 3 | 198 | 50 | 21 |
| 11 | 1 | 66 | 100 | 4 |
| 12 | 2 | 105 | 80 | 14 |

# PERFORMANCE CRITERIA

In addition to realizing substantial cost savings by performing the VA study early in the delivery process, the Department is also working closely with our local partners to find common ground to maximize the performance of the project. This year marked the second year that FHWA required the Department to report how the VA studies affected the performance of the projects. The Department's VA program was the first program in the nation to use performance criteria during VA studies. Now, years later, the FHWA has adopted these measures to capture the successes of VA alternatives.

The FHWA has broken down the performance criteria into five categories; Safety, Mobility, Operations, Environmental Impacts, and Innovative Construction. These differ slightly from the Department's standard performance measures. The Department includes Maintainability and measures Local Operations and Mainline Operations separately. FHWA has asked the states to identify the number of accepted alternatives that impact one or more of the five performance categories significantly. At this time, only positive impacts are being reported, see Table 4.

This year the Department reported 2 accepted alternatives that improved performance in the area of Safety, 6 alternatives in Mobility, 20 alternatives in Operations, 31 alternatives in Environmental Impacts, and 70 alternatives that improved the Constructability of the project.

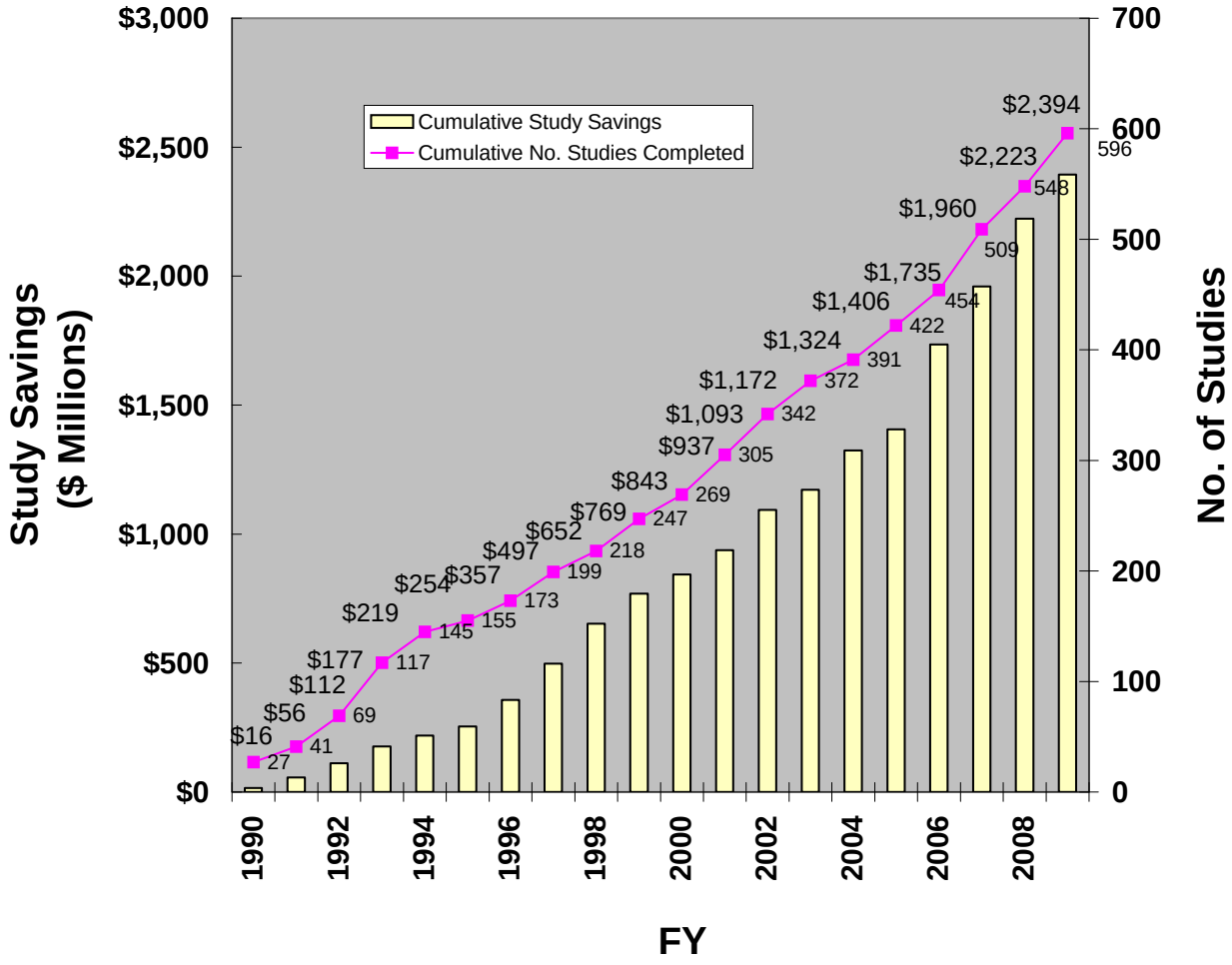
## Table 4: Positive Performance Improvements by District

| District | Safety | Mobility | Operations | Environmental | Innovative Construction | Other |
|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 4 | 1 | 3 |
| 2 | | | 3 | | 2 | 4 |
| 3 | | | | 1 | 8 | 1 |
| 4 | | 2 | 2 | 7 | 18 | 6 |
| 5 | | 1 | | 4 | 7 | 1 |
| 6 | | | 1 | 3 | 6 | 1 |
| 7 | 1 | | 4 | | 5 | 7 |
| 8 | | 2 | 6 | 6 | 16 | 5 |
| 9 | | | | | | |
| 10 | | | 1 | 3 | 4 | 1 |
| 11 | | | | 2 | 2 | 2 |
| 12 | | | 2 | 1 | 1 | 3 |
| **Total** | **2** | **6** | **20** | **31** | **70** | **34** |

# HISTORICAL PROJECT SAVINGS

The historical savings from the Department's VA program are presented graphically in the following charts. Chart 1 shows the cumulative savings over the past 20 years. Almost $2.4 billion in savings has been realized from the nearly 600 studies performed by the VA Program. Table 5 indicates the number of studies performed by each District over the last 20 years.

**Chart 1:**
**Cumulative Project Saving**



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## Table 5: Number of VA studies Completed (1990-2009)

| District | Fiscal Year | | | | | | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | |
| **1** | 1 | 0 | 2 | 3 | 2 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 2 | **18** |
| **2** | 2 | 6 | 0 | 6 | 3 | 0 | 2 | 3 | 0 | 1 | 1 | 2 | 1 | 0 | 1 | 1 | 1 | 3 | 0 | 2 | **35** |
| **3** | 0 | 1 | 1 | 2 | 0 | 2 | 1 | 0 | 1 | 2 | 0 | 4 | 1 | 1 | 1 | 3 | 1 | 4 | 4 | 5 | **34** |
| **4** | 2 | 4 | 5 | 6 | 6 | 0 | 8 | 10 | 6 | 6 | 6 | 7 | 15 | 6 | 5 | 4 | 9 | 8 | 8 | 8 | **129** |
| **5** | 1 | 5 | 6 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 2 | 2 | 8 | 0 | 4 | **34** |
| **6** | 0 | 2 | 2 | 4 | 0 | 0 | 0 | 2 | 2 | 2 | 0 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | **33** |
| **7** | 1 | 0 | 0 | 4 | 1 | 1 | 0 | 2 | 8 | 7 | 1 | 5 | 6 | 9 | 6 | 5 | 3 | 5 | 5 | 5 | **74** |
| **8** | 0 | 1 | 0 | 7 | 11 | 0 | 1 | 2 | 1 | 2 | 3 | 3 | 4 | 9 | 1 | 9 | 7 | 16 | 8 | 13 | **98** |
| **9** | 2 | 1 | 1 | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 3 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **15** |
| **10** | 2 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 0 | 2 | 2 | 0 | 1 | 0 | 1 | 6 | 5 | 5 | 3 | **33** |
| **11** | 2 | 4 | 5 | 12 | 5 | 5 | 3 | 7 | 6 | 6 | 5 | 7 | 1 | 1 | 3 | 3 | 1 | 2 | 5 | 1 | **84** |
| **12** | 0 | 3 | 0 | 1 | 2 | 0 | 2 | 1 | 2 | 3 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 2 | 2 | **22** |
| **Total** | **13** | **29** | **22** | **48** | **34** | **9** | **18** | **29** | **29** | **29** | **22** | **36** | **37** | **30** | **19** | **31** | **32** | **55** | **39** | **48** | **609** |

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# LOCALLY FUNDED PROJECTS

The District VA Coordinators (DVAC) work vigilantly to assure that all federally mandated studies are performed. Along with tracking the Department's project, the DVACs also track local projects on the federal aid system. According to federal law (SAFETEA-LU), all projects on the federal-aided system (NHS and Interstate) over $25 million are required to perform a VA study prior to construction. These projects also include locally funded projects.

As part or the stewardship agreement with FHWA, it is the Department's responsibility to assure these locally funded projects over $25 million have a VA study performed. Besides assuring compliance with the mandate, the Department also requires the local agency to send the VA study results to the HQ VA program manager for proper reporting of the VA performance measurements to FHWA. As the oversight agency responsible for proper highway improvements, local agencies are encouraged to include the Department in the VA process. However, due to limited oversight funding, our participation can be limited.

Since Senate Bill 45 (SB45), more than 75% of STIP transportation funding is flowing to the local agencies. Along with local measures (sales tax funding), many of today's state highway projects are being developed outside of the Department. The VA program is continuing to educate the local agencies about their responsibility to perform studies on these projects. Many local agencies have embraced the value engineering principles and perform the study as recommended (early PA&ED). See Table 6 for the distribution of local agency studies. On the other hand, some are waiting too long and trying to short cut the process. Hopefully, through education and persistence, everyone will embrace VE for the good of the project.

| District | # of Studies | Implementation Rate (%) | ROI ($ ratio) | Avg. Project Savings (%) |
|---|---|---|---|---|
| 3 | 3 | 73 | 69 | 3 |
| 4 | 4 | 62 | 58 | 4 |
| 6 | 2 | 75 | 125 | 12 |
| 7 | 1 | 83 | 87 | 9 |
| 8 | 12 | 58 | 126 | 7 |
| 12 | 1 | 75 | 7 | 1 |

**Table 6: VA studies Completed by Local Agencies**

# AASHTO VALUE ENGINEERING

This year was an exciting year for the VA Program. The Department had an opportunity to share our successes at the National level. The biennial 2009 American Association of State Highway Transportation Officials (AASHTO) Value Engineering Conference was held in San Diego during the summer and the Department showcased our successful VA studies to other Departments of Transportation, AASHTO members, FHWA partners, the VE consultant community, other VE experts, and our local partners.

During the course of the three day conference, not only did the Department gain valuable information from other successful State DOT's value engineering programs, but we also showcased to others how we do business in California including achieving maximum performance, integrating VE into project development, improving mobility across borders, and bridging the gap between the Department and major stakeholders.

During the Keynote session, Director Randy Iwasaki and Chief Engineer, Rick Land, delivered opening remarks noting the importance of VE and the role of the AASHTO VE Technical Committee. Especially in today's economic times, VE has been a proven process that can deliver value to the project, while saving money at the same time. These savings are even more critical today. Money saved from VE is re-programmed into other much needed projects to keep California moving.

Director Randy Iwasaki addresses the 2009 AASHTO VE Conference

Chief Engineer, Rick Land, discusses the importance of AASHTO and the role of the VE Technical committee at the 2009 AASHTO VE Conference.

# AWARDS

Caltrans was honored at the 2009 American Association of State Highway and Transportation Officials (AASHTO) Value Engineering Conference in San Diego. The awards were rated by the AASHTO Value Engineering Technical Committee representatives from around the country. The Department received three awards in the following categories:

Most Value Added Proposal – Pre-Construction $25 - $75 million

Most Value Added Proposal – Pre-Construction over $75 million

Most Value Added Proposal – Improved Process

**District 11 was recognized for the Most Value Added Proposal – Pre-Construction $25 - $75 million for the I-5 and I-8 Northbound Connector Project Study**

*Photo by Richel Espinoza-Noss, HQ Design*

**From left to right: Director Randy Iwasaki; Troy Tusup, HQ VA Program Manager; Chili Cilch, District VA Coordinator, Sam Amen, District 11 Design Manager; Mina Pezeshpour, District 11 Structures Design; Lou Melendez, District 11 Project Manager; Ron Tanenbaum, Value Management Strategies; Rick Jaffe, AASHTO Value Engineering Technical Committee Chairman.**

The team's analysis and traffic modeling performed during the workshop determined that the $40.7 million baseline design would not provide the operational benefits anticipated. This analysis was confirmed by an independent traffic analysis conducted after the workshop. Project decision-makers accepted VA alternatives that significantly reduced the length of roadway widening.

The decreased length resulted in a **$20,168,000** (57%) cost reduction and resulted in the following performance benefits:

- Eliminated right-of-way acquisition
- Avoided gas line impact
- Reduced roadway and ramp widening
- Eliminated bridge widening at Tecolote Creek
- Eliminated need for retaining wall
- Avoided railroad conflicts
- Preserved oleander planted in median

**District 7 received an Honorable Mention in the "Most Value Added Proposal – pre-Construction over $75 million" category with their efforts on the State Route 138 Study.**

*Photo by Chili Cilch, District 11*

**From left to right: Director Randy Iwasaki; Osama Megalla, District 7 Project Manager; Rob Stewart, Value Management Strategies; Troy Tusup, HQ VA Program Manager; Rick Jaffe, AASHTO Value Engineering Technical Committee Chairman.**

The Value Analysis (VA) study helped to build consensus with local partners including: City of Palmdale, Los Angeles World Airport, Los Angeles County, and the Los Angeles County Metropolitan Transit Authority. This project which is over $800 million is a new alignment north of existing State Route 138. The project improvement is needed to provide access to the proposed Palmdale Regional Airport and to accommodate the growing travel demand in the Antelope Valley. The VA alternatives included realignment of the proposed route, reduction of embankment height, dike improvements, and constructing detention basins to obtain fill material. Total cost savings of more than $74 million (9% project savings) were identified and performance was improved by 22%.

**The Department was recognized with an Honorable Mention in the "Most Value Added Proposal – Improved process" category for their improving the Discovery of Underground Utility Study.**

*Photo by Chili Cilch, District 11*

**From left to right: Rick Land, Caltrans Chief Engineer; Laurie Dennis, RH & Associates; Vasant (Nick) Kale, District 11 Utilities; Mat Mathews, District 11 Utilities; Rick Jaffe, AASHTO Value Engineering Technical Committee Chairman.**

Laurie Dennis of RH & Associates was the leader of the multidisciplinary team of District experts and HQ Division of Design, Right of Way and Land Surveys, IT, Maintenance, and GIS experts. The 14-member value analysis (VA) team focused on improving operations, project delivery schedule, customer service, and increase the amount of standardized utility data stored. The team developed a roadmap where Districts could re-allocate resources to create Utility Engineering Squads, and start the development of a statewide database. These efforts created a huge performance improvement at virtually no extra cost.

# VALUE ANALYSIS TRAINING

The Department maintains an active VA training program. This year, 38 employees were trained in the VA methodology. Since 1982 the Department has trained over 1400 individuals.

The VA program offers three types of training courses:

- Module 1 Value Methodology Training Workshop - This course is a 40-hour workshop comprised of 50% lecture and 50% hands-on training. The course is designed to teach the VA Methodology, provide the Department with trained Value Specialists, and motivate employees to participate as team members on upcoming VA studies.

  Both the Society of American Value Engineers (SAVE) and the Project Management Institute (PMI) have approved the course. The successful completion of this course allows employees to apply for the Associate Value Specialist (AVS) certification through SAVE. In addition, this course has been approved by PMI and is worth 40 Professional Development Units (PDUs).

- Module 2 Value Methodology (VM) Training Workshop - This 24-hour seminar provides a comprehensive overview of advanced VM techniques ranging from FAST diagramming, Value Metrics, and Value Program Management.

  This is a SAVE accredited course that provides students the ability to apply to become a Certified Value Specialist (CVS) from SAVE International. Like Module 1, this course is also approved by PMI and is worth 24 PDUs.

- VA Overview for Project Managers and Management – This is a two-hour seminar focusing on the roles and responsibilities of Project Managers and functional unit managers. This interactive seminar is designed to give a brief overview of VA Methodology, federal legislation requirements, the Department's VA program work plans, and "when" to use VA in the project delivery process to maximize the benefits from VA.

- Other VA seminars include the Design Senior Seminars, PM and PE staff meetings.

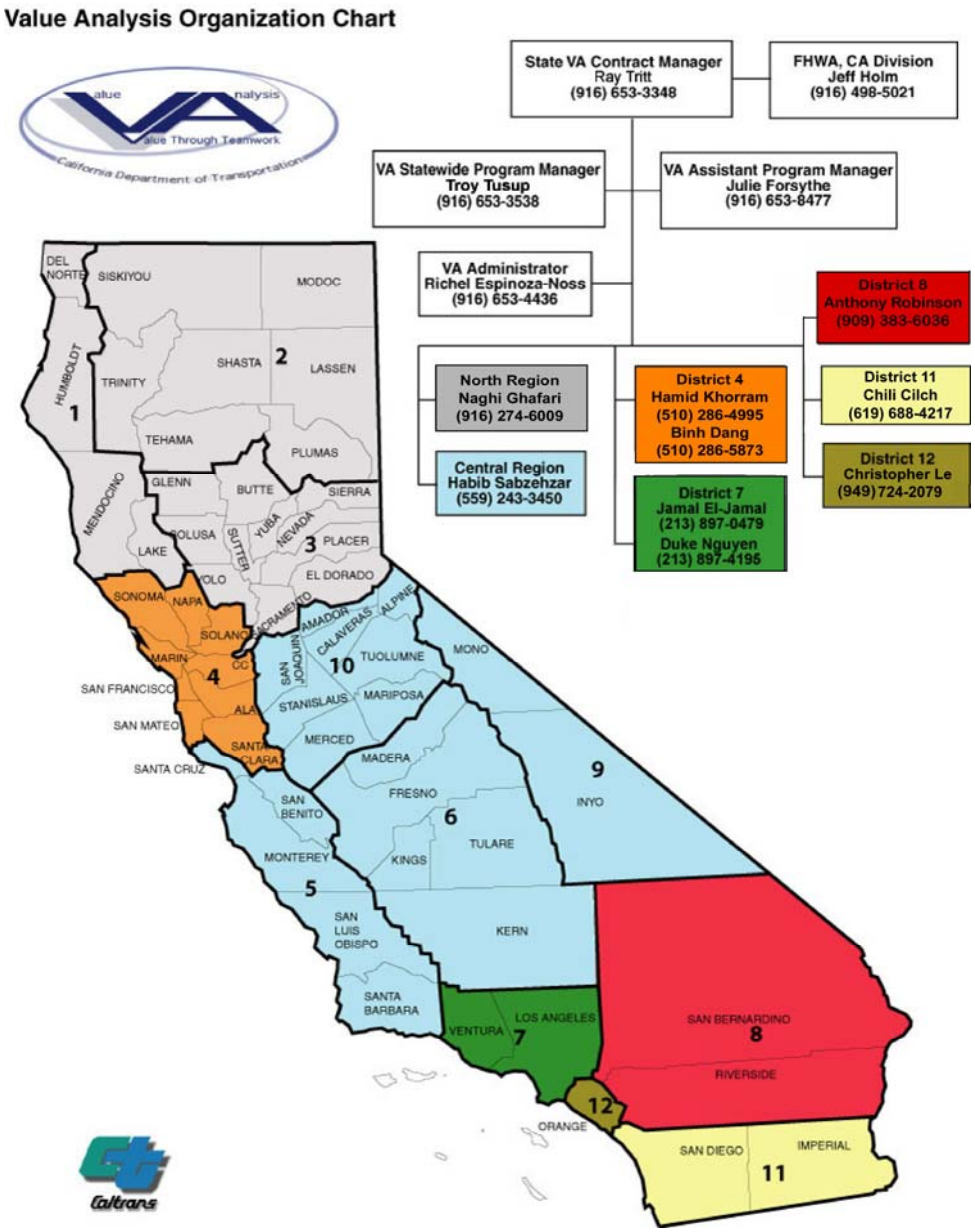
To learn more about VA Training, or to attend a course, please contact your District VA Coordinator (DVAC) or the HQ VA Program Manager. You may register for Module 1 and 2 through the Learning Management System (LMS), course #100563 and #100764 respectfully. Both courses are brought to you by: the HQ VA Program and Capital Project Skills Development (CPSD) unit.

# VA PROGRAM ORGANIZATION

The Department has been actively engaged in Value Analysis (VA) for more than 40 years. Both consultants and in-house VA team leaders are used to organize and conduct VA studies under the leadership of District VA Coordinators (DVAC). The Office of Special Projects in the Headquarters Division of Design manages the VA Program for the entire state.

**VA Program Mission:** Provide stewardship and improve mobility across California through application of the VA methodology on the Department's projects, products, and processes.

**VA Program Vision:** The Department is a leader in the application of Value Analysis in the transportation industry.



# VALUE ANALYSIS WEBSITE

Along with the Headquarters Division of Design's intranet website, the VA website (See Figure 1) has been completely reorganized. Better organization allows for more information to be easily browsed. The intranet VA page also links more information to the external VA internet website so information can be shared worldwide. Many of our external partners utilize our information to establish standards within their own organization. The Department is among the leaders in the VA world.

The VA website can be found at:

Internal Intranet: http://onramp.dot.ca.gov/hq/design/specproj/value-analysis.php

External Internet: http://www.dot.ca.gov/hq/oppd/value/index.htm

In addition to the website overhaul, the Department's VA program is working with the Data Retrieval System (DRS) unit to archive the VA Final reports in the DRS Database. Over 300 reports can be found within DRS and can be searched by District and/or project details.

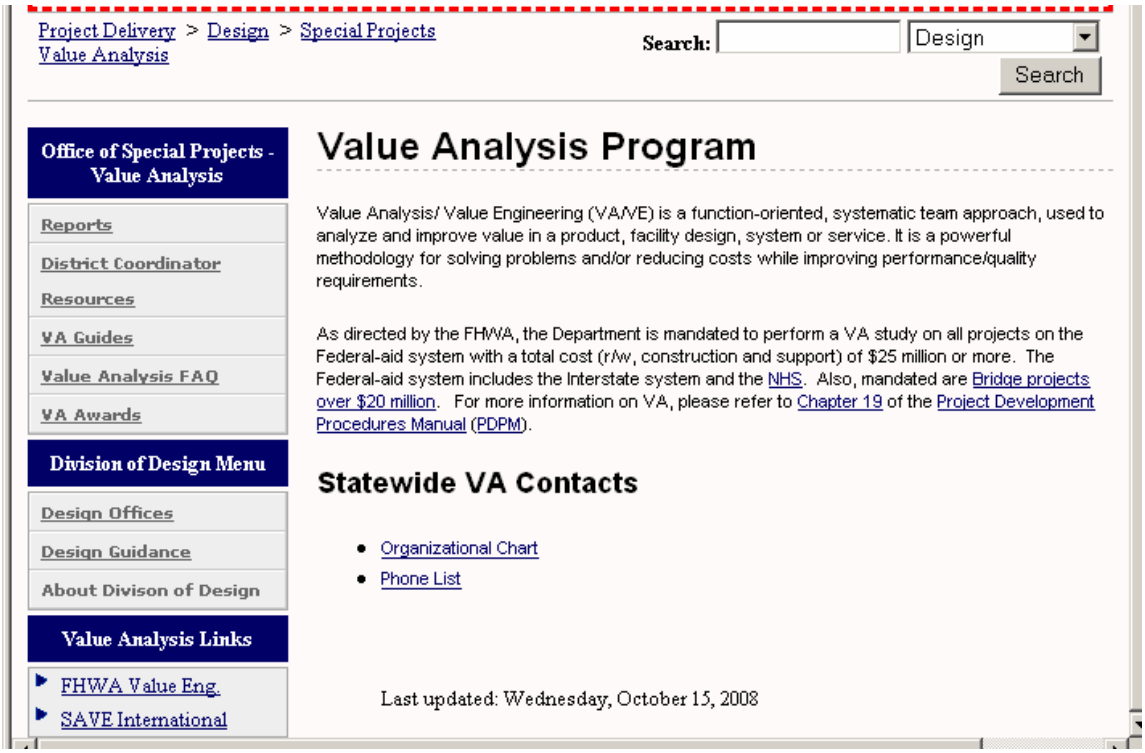



**Figure 1**: HQ Value Analysis Program Intranet page

# UPCOMING EVENTS

- Thirty other studies were performed, but not finalized, in fiscal year 2008/2009. These studies are in various stages of progress and most will be reported next year. Many of these studies were performed on local projects where the Department played an oversight role in the process.

- The VA Program is frequently contacted to improve the Department's business practices. This year will be no exception. We will continue to initiate several studies throughout the Department. Later this year, the comprehensive reports will be available, and an abstract of each study will be bound and distributed to share ideas between Districts and local partners.

- As an AASHTO VE Technical Committee member, we are continually moving VE into the 21 century. This year we are developing a hybrid training course to combine on-line and workshop experience to develop more efficient VE Team Members. Working with our FHWA partners, this course will be available from the National Highway Institution (NHI) this summer.

- The Department's VA Program continues to maintain the VA Website. The website includes: manuals, guides, blank VA Task Order forms, and a complete list of contact numbers for the entire VA Team.

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