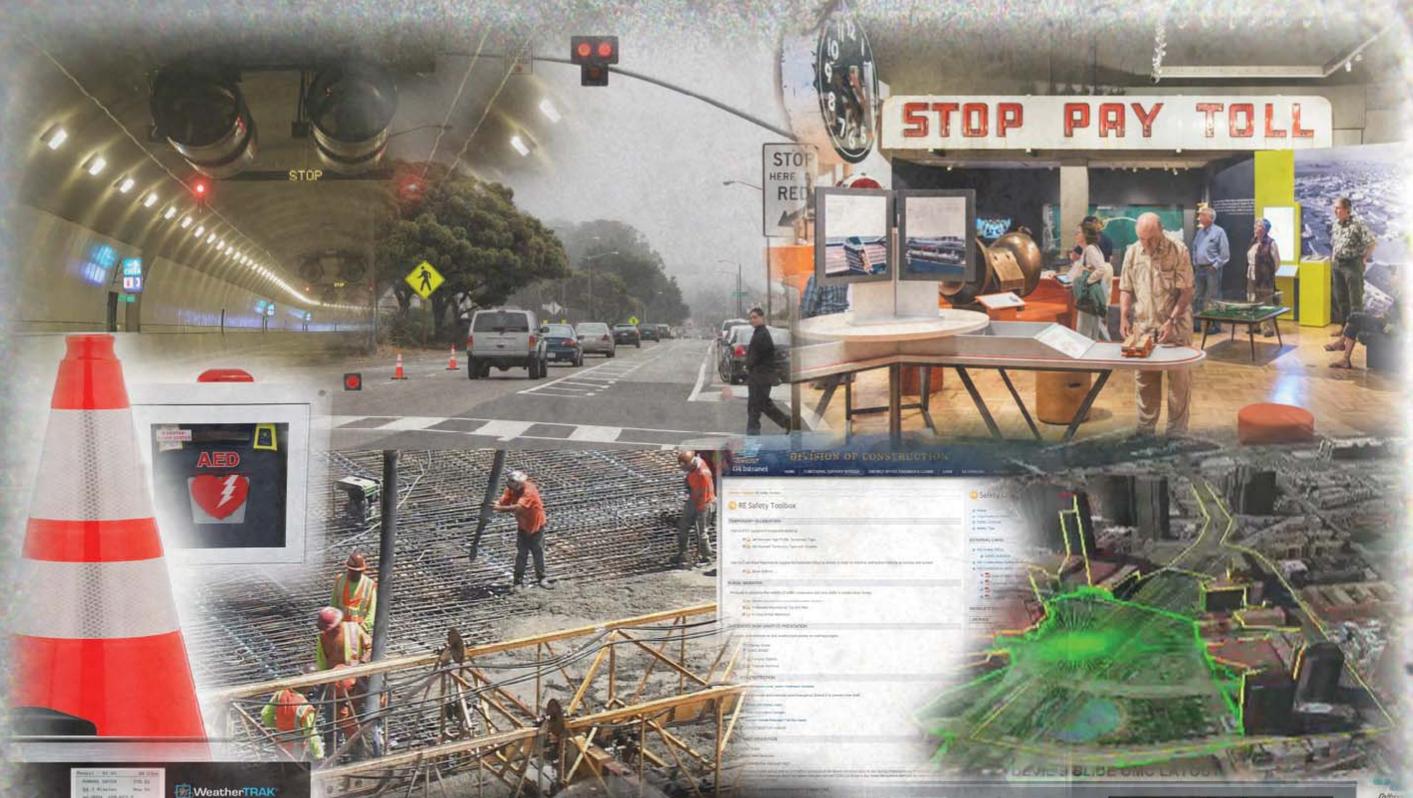




DISTRICT 4

EMPOWER | INNOVATION | CHAMPIONS
INNOVATION FAIR 2014

Caltrans Employees Seek Creative Solutions and Take Intelligent Risks



Wednesday August 13, 2014
Thursday August 14, 2014
9:30 am - 3:30 pm
6th Floor Atrium



RTL Delivery Results	Number of Programmed RTL Projects				Total	Programmed Construction Capital Value (Millions)				
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
100%	2	7	7	20	36	\$34.3	\$124.0	\$229.3	\$236.8	\$624.4
100%	12	4	8	22	46	\$10.0	\$24.4	\$204.6	\$304.0	\$543.0
100%	5	10	20	18	53	\$60.3	\$83.7	\$213.9	\$334.2	\$692.1
100%	4	21	8	13	46	\$282.0	\$77.5	\$371.3	\$133.0	\$863.8
100%	13	10	25	9	57	\$189.8	\$137.0	\$646.5	\$31.7	\$1,005.0
100%	15	11	16	18	60	\$165				
100%	5	12	9	18	44	\$32.1	\$155.1	\$36.5	\$100.8	\$324.5

Caltrans Director Malcolm Dougherty

will be visiting August 14 to review exhibits and discuss ideas with D4 employees

MISSION: Provide a safe, sustainable, integrated & efficient transportation system to enhance California's economy & livability



DISTRICT 4

EMPOWER | INNOVATION | CHAMPIONS

INNOVATION FAIR 2014

Please visit <http://www.dot.ca.gov/dist4/ifair2014> for videos and handouts



Caltrans Innovation Fair 2014

Representatives of the Caltrans Executive Board including CalSTA Undersecretary Brian Annis joined Director Malcolm Dougherty, District Director Bijan Sartipi, and D4 Chief Deputy District Director Dan McElhinney at the Caltrans I-Fair 2014 in Oakland, California on August 14, 2014, where employees presented innovative solutions and technologies being deployed to make a difference for the traveling public.

U.S. Secretary of Transportation Anthony Foxx joined FHWA and Caltrans in San Francisco to be briefed on the Innovative CCC/Caltrans Internship Program



U.S. Secretary of Transportation Anthony Foxx at our SF Rickard Yard met with FHWA CA Administrator Vince Mammano, District Director Bijan Sartipi, D4 Chief Deputy District Director Dan McElhinney, and California Conservation Corps managers and interns in September 2014 to discuss the Innovative CCC/Caltrans Internship program available statewide.

I-Fair FHWA EDC Facts



DISTRICT 4

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Please visit <http://www.dot.ca.gov/dist4/ifair2014> for videos and handouts

FHWA EDC Partner Caltrans Delivers the Innovation Fair 2014

In alignment with the Federal Highway Administration's Every Day Counts (EDC) initiative goals, Caltrans employees seek creative solutions and innovative ideas for addressing current and future transportation challenges. District 4 San Francisco Bay Area Innovation Fair 2014 shared and highlighted the innovative approaches and methods that the District has undertaken to address a wide range of issues including safety improvements, congestion reduction, efficient project delivery acceleration, higher quality requiring less maintenance, carbon footprint reduction and response to climate change.

Following are some of the key topics of the Caltrans District 4 Innovation Fair 2014 held August 13-14 in Oakland:



Caltrans Innovation Fair (I-Fair) 2014 – FHWA California Division Administrator Vince Mammano joined Caltrans Director Malcolm Dougherty and District 4 Director Bijan Sartipi at I-Fair 2014 in Oakland as employees presented innovative transportation solutions and technologies being deployed to make a difference for the traveling public.



New "i-TEAM" Business Model for Santa Clara County

Caltrans and the Valley Transportation Authority (VTA) established a collaborative decision-making structure, the Innovative Delivery Team (iTEAM), to improve project delivery, highway traffic operations, and local assistance services in Santa Clara County and City of San Jose.

Planning Public Engagement Contract (PPEC)

District 4 uses the PPEC to work with our funding partners to enhance awareness of transportation options, to facilitate planning meetings/workshops, to promote public engagement events and to achieve measurable results. PPEC activities result in effective partner and public outreach during Caltrans' initial transportation planning activities, increase of public support of planning/programming efforts, and continuous public and local officials participation.



Planning the Future of State Route 9



The Promise and Future of LiDAR

District 4 utilized Light Detection and Ranging (LiDAR) surveying technology for the preservation of the US-101 Presidio Parkway historic buildings during construction, the design and construction acceleration of the emergency repair of the 580/880 MacArthur Maze collapse, and for the accurate construction as-builts of the Route 1 Devil's Slide tunnels. Future use of LiDAR for safely collecting overhead sign vertical clearances was also presented.

Green Concrete on the SFOBB

Two percent of greenhouse gases in the U.S. come from cement manufacturing (1 ton of Portland cement manufacturing results in approximately 1 ton of CO₂). Caltrans used Supplementary Cementitious Materials (SCM) in place of Portland cement in quantities of up to 50% in the new I-80 Bay Bridge project. Some SCM, e.g. flyash and slag, are byproducts of power plant coal-fired furnaces and iron production blast furnaces. Use of SCM not only reduces Portland cement use, but also helps to recycle waste products as part of the Green Concrete solution.



Ergonomic Traffic Cones

I-Fair 2014 presented new 28" safety cones with a recess near the top providing a better grip for easier use, reduced weight by 3.5 pounds, and less sticking when stacked on the belt of a cone truck. They are made of at least 60% recycled materials by weight and are 100% recyclable, which exceeds the standards of Public Contract Code 12209(f)(1). These prototypes are being tested by Caltrans crews, who report easier deployment minimizes worker exposure and enhances work zone safety for all.

Resident Engineer's Safety Toolbox Webpage

This online platform was implemented to share innovative ideas/methods/products proven to be effective in enhancing safety, reducing maintenance frequency, and shortening construction operations during the construction phase of projects. The Resident Engineer's safety toolbox webpage provides information, internet links, photos, and videos of the products and methods successfully used in previous construction projects to enhance lessons learned for designers and REs.



Smart Irrigation Controllers

In response to California's severe drought, District 4 uses smart irrigation controllers to help Caltrans achieve the Governor's goal of 20% water usage reduction by 2020 and Caltrans Director's goal of reducing Caltrans' water usage by 50%. By tailoring watering schedules and run times based on weather conditions, smart irrigation controllers reduce overall water usage by an average of 25%. It also minimizes on-site operations and time spent in the field improving employee safety.



Construct Roadway Diet and Install HAWK Pedestrian Signal

District 4, in partnership with the City and County of San Francisco, constructed a roadway diet project on Route 35 (Sloat Blvd) and installed the High intensity Activated crosswalk (HAWK) pedestrian crossing beacon, which was the first on a state highway. The project provides a protected crossing phase for pedestrians, reduces pedestrian exposure to vehicular traffic, enables pedestrians to become more conspicuous to motorists via bulb-outs, and provides greater off-set distance between vehicles and pedestrians crossing.

Cormorant Management for the SFOBB Project

During the new I-80 Bay Bridge project, Caltrans managed Double Crested Cormorant habitats by the avoidance of impacts during nesting season (March-August) and by creation of new habitat. To mitigate the removal of the habitat on the original Bay Bridge, nesting platforms were added to the new east span. Decoy Cormorants, three sided mirror boxes, and Cormorant calls were used as the enticement measures to draw Cormorants to the new habitat during bridge demolition.



Noise Reduction and Air Quality Innovations

Occupational exposure to excessive noise and silica dust are serious health and safety problems. Along with personal protective equipment guidelines and administrative controls already in place, Caltrans is now providing additional safety solutions to significantly reduce noise and silica dust exposure in the workplace. Since January 2014, District 4 Maintenance crews have tested the use of innovative noise reduction and silica dust control equipment. Due to the positive results, those noise and silica dust reduction solutions may be adopted throughout District 4 in the near future.

Tunnel Control Systems for Safer Tunnels

Implementation of state of the art Tunnel Control and Traffic Operations Systems (TCTOS) at the Caldecott and Devil's Slide tunnels allows real-time monitoring of the facilities' life-safety systems and traffic operations while minimizing times for incident detection, response, and clearance. The TCTOS monitor and control numerous field elements such as lighting, signals, air quality, fire and intrusion detection, gas sensors, linear heat detector sensors, call boxes, AM/FM rebroadcast systems, traffic monitoring stations, CCTV cameras, changeable and variable message signs. In addition, TCTOS facilitates timely coordination and information exchange between the tunnel operators and Caltrans/CHP Transportation Management Center in Oakland to ensure efficient regional incident management and to help disseminate real-time traveler information about these critical transportation facilities to the traveling public.



Posters



EMPOWER | INNOVATION | CHAMPIONS
INNOVATION FAIR 2014

Caltrans Employees Seek Creative Solutions and Take Intelligent Risks



Wednesday August 13, 2014
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6th Floor Atrium

# of Primary Contracts	Number of Programmed RTL Projects				Programmed Construction Capital Value (Millions)						
	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total		
100%	2	7	7	20	36	\$34.3	\$124.0	\$229.3	\$236.8	\$624.4	
75	100%	12	4	8	22	46	\$16.0	\$24.4	\$204.6	\$304.0	\$543.0
75	100%	5	10	20	18	53	\$46.3	\$83.7	\$213.9	\$334.2	\$692.1
75	100%	4	21	8	13	46	\$282.0	\$77.5	\$371.3	\$133.0	\$863.8
75	100%	13	10	25	9	57	\$189.8	\$137.0	\$646.5	\$31.7	\$1,005.0
75	100%	15	11	16	18	60	\$165.0	\$13.4	\$5.8	\$13.5	\$388.2
75	100%	5	12	9	18	44	\$32.1	\$133.1			

Caltrans Director Malcolm Dougherty

will be visiting August 14 to review exhibits and discuss ideas with D4 employees

MISSION: Provide a safe, sustainable, integrated & efficient transportation system to enhance California's economy & livability

INNOVATION FAIR 2014



**EMPOWER
INNOVATION
CHAMPIONS**

D I S T R I C T 4

AUGUST 13-14, 2014

ATRIUM | AUDITORIUM



DISTRICT 4

CALTRANS DISTRICT 4

Innovation Fair 2012

We are empowered to seek creative solutions and take intelligent risks. District 4 employees will display innovative ideas for improvements to current and future challenges. Share your insights and celebrate Caltrans innovations at the D4 I-Fair 2012.

Caltrans Director Malcolm Dougherty will be visiting to review exhibits and discuss ideas with D4 employees.

Date: Tuesday August 7, 2012
Time: 9:00 am - 4:00 pm
Loc: 6th Floor Atrium & San Leandro Yard
Encore: Wed. Aug. 8, 2012, 9 am - Noon

CALTRANS IMPROVES MOBILITY ACROSS CALIFORNIA

INTEGRITY
INNOVATION
COMMITMENT
LEADERSHIP
TEAMWORK

CALTRANS DISTRICT 4

Innovation Fair 2010

We are empowered to seek creative solutions and take intelligent risks. District 4 employees will display innovative ideas for improvements to current and future challenges. Share your insights and celebrate Caltrans innovations at the D4 I-Fair 2010.

- An encore event requested by Director Cindy McKim following the D4 August I-Fair 2010 success!
- Caltrans Division of Research and Innovation (DRI) is joining us with an Innovation Team exhibit.
- FHWA managers and Director Cindy McKim will be visiting.
- Chief Engineer Rick Lord and All District Directors will be touring the exhibits.

Date: Tues. Sep. 14 2010
Time: Open House 11.30 am - 1.00 pm
Loc: D4 D.O. 6th Floor Atrium

CALTRANS IMPROVES MOBILITY ACROSS CALIFORNIA

INTEGRITY
INNOVATION
COMMITMENT
LEADERSHIP
TEAMWORK

2012 INNOVATION FAIR

August 7, 2012
District 4

Caltrans

CALTRANS DISTRICT 4

Innovation Fair 2010

We are empowered to seek creative solutions and take intelligent risks. District 4 employees will display innovative ideas for improvements to current and future challenges. Share your insights and celebrate Caltrans innovations at the D4 I-Fair 2010.

Caltrans Director Cindy McKim will be in attendance to tour the display tables and meet Caltrans D4 staff.

Date: Thurs. Aug. 26 2010
Time: 10.00 am - 1.00 pm
Loc: D4 D.O. 6th Floor Atrium

CALTRANS IMPROVES MOBILITY ACROSS CALIFORNIA

INTEGRITY
INNOVATION
COMMITMENT
LEADERSHIP
TEAMWORK

INNOVATION FAIR 2012

Exchange Ideas
Intelligent Risks
Creative Solutions

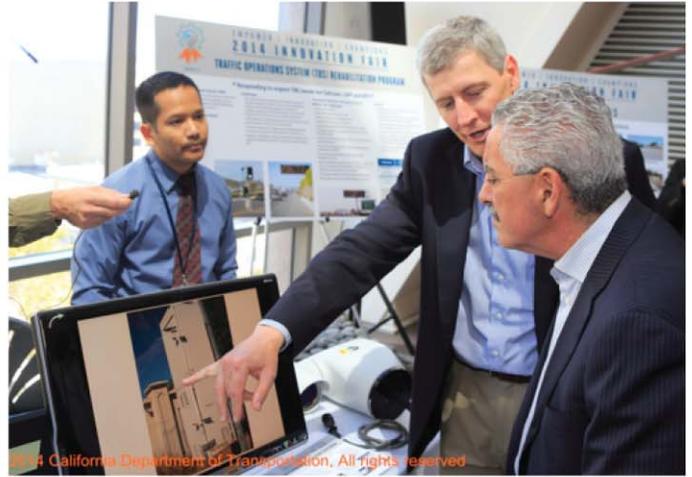
INNOVATION AHEAD

AUGUST 2012
CALTRANS DISTRICT 4

I-Fair 2014 Photos









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EMPOWER | INNOVATION | CHAMPIONS
2014 INNOVATION FAIR
 DIVISION OF
CONSTRUCTION
 DISTRICT 4

WATER CONSERVATION FOR HIGHWAY CONSTRUCTION PROJECTS

Map showing various water conservation programs for highway construction projects across California, including programs like 'Recycled Water Program' and 'Water Conservation Program' in various counties and cities.

EMPOWER | INNOVATION | CHAMPIONS
2014 INNOVATION FAIR
 DIVISION OF
CONSTRUCTION
 DISTRICT 4

Resident Engineer's Safety Toolbox Webpage

Construction personnel based in field offices now have a tool to simplify the sharing of innovative tools, products, and ideas that have worked to address construction site issues.

The DA Construction staff on the SR99 Widening projects in Pittsburg and Antioch researched and implemented several new products and ideas to improve the awareness of the traveling public as they passed through a series of construction sites involving traffic closures and frequently changed driving conditions.

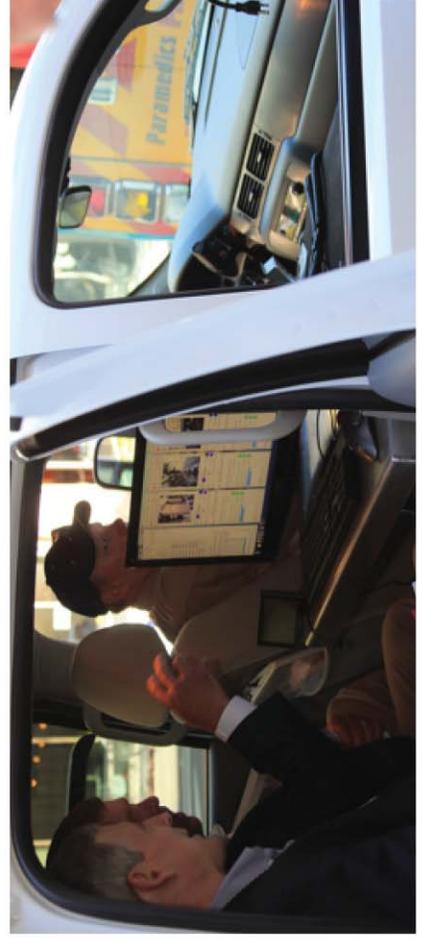
These projects and the products and ideas they used were presented to Resident Engineer's at the Annual RE Meeting, which generated a series of requests for more information from other RE's facing similar situations. A platform was needed in order to provide product information, photos, videos, and contact links so that the information could be distributed more widely, easily, and consistently. The RE Safety Toolbox is the online webpage provides the platform.

Topics Currently Addressed:

- TEMPORARY DELINEATION
- K-RAIL MARKERS
- OVERHEAD SIGN GRAFFITI PREVENTION
- SPEED LIMIT REDUCTION METHODS
- PULLBOX PROTECTION

AGC / CALTRANS WORKZONE SAFETY COMMITTEE







Awards 2013-2014



EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

Awards and Recognition

This list is a reflection of the hard work and innovative ideas of our employees that continue to claim honors and recognition for District 4 from our partners and peers.

Bay Area Chapter of Women in Transportation

Innovative Transportation Solutions Award - **Caldecott Fourth Bore Project**-2014

San Francisco Business Times

Infrastructure Real Estate Deal of the Year - **Caldecott Tunnel & Devil's Slide**-2014

Infrastructure/Public Private Partnership - **Presidio Parkway**-2013

California Transportation Foundation

Winning Projects 2014

Project of the Year - **Caldecott Fourth Bore Project**

Special Recognition - **San Francisco-Oakland Bay Bridge New East Span**

Sustainable/Environmental Enhancement - **Mountain Lake Stone Column**

Conventional State Highway - **Devil's Slide Tunnel Project**

Safety Project - **Cordelia Truck Scales**

Finalist 2014

Community Enhancement - **San Francisco-Oakland Bay Bridge New East Span Bicycle/Pedestrian Path**

Seismic - **Micropile Foundation System SR92/I-280 Interchange**

Transportation Systems Operations Improvement - **Tunnel Control & Traffic Operations Systems**

Winning Projects 2013

Project of the Year - **Santa Clara SR 237 Express Lanes**

Structure of the Year - **Presidio Parkway-Southbound Battery Tunnel and Temporary Bypass**

Interchange Project of the Year - **Doyle Drive Contract 3**

Finalists 2013

Safety - **Alameda 880 Concrete Overlay**

Conventional Highway Project - **Contra Costa 4**

Interchange - **Alameda 580 Isabelle Avenue, Livermore**

Excellence in Transportation

Winning Projects 2014

The Highway Rural - **Devil's Slide Tunnel Project**

Major Structures - **San Francisco-Oakland Bay Bridge East Span Seismic Safety Project**

Transportation System Operations Improvements-**Tunnel Control and Traffic Operations Systems**

Excellence in Transportation

Winning Projects 2013

Historic Preservation/Cultural Enhancement - **Garnett Creek Bridge/Napa 29**

Context Sensitive Solutions - **Rincon Hill Dog Park**

Seismic - **Dumbarton and Antioch Bridges Seismic Retrofit**

American Society of Civil Engineers San Francisco Section

Winning Projects 2013

Seismic Retrofit Project of the Year - **Micropile Foundation System SR92/I-280 Interchange**

Structural Engineering Project of the Year - **Dumbarton Bridge Seismic Retrofit**

Urban or Land Development Project of the Year - **Rincon Hill Dog Park**

Transportation Project of the Year - **San Francisco-Oakland Bay Bridge New East Span**

American Council of Engineering Companies Outstanding Civil Engineering Excellence Award

Tom Lantos Tunnels at Devil's Slide-2014

AASHTO Faces of Transportation - Photography Award

Martin Chandrawinata-Grand Prize

Bill Hall-People's Choice Award - Building the Future

Roads and Bridges

Caldecott Fourth Bore, ranked number 1 for roadways

East Bay Bike Coalition

Platinum Pedal Award - Completion of Bike path from Emeryville onto the east span of the Bay Bridge-2013

Western Association of State Highway and Transportation Officials

Under Budget, large project - **Caldecott Fourth Bore Project-2014**

Best Use of Innovation, large project - **San Francisco-Oakland Bay Bridge East Span-2014**

Under Budget, medium project (Advanced to national competition) - **Dumbarton Bridge-2013**

Solano Transportation Authority

Special Award - **I-80 Eastbound Cordelia Truck Scales Relocation Project-2013**

Congratulations



The winner of the 14th Annual Garrett Morgan Sustainable Transportation Symposium this year was District 4's Juan Crespi Middle School of El Sobrante, CA. Juan Crespi is the first middle school to have won first place in this competition two years in a row, 2013 and 2014 respectively.

The winning project this year was, *StarTrans, Inc. Ride With the Stars....*Making way for a cleaner future. The Juan Crespi students with the help of the teachers and Caltrans mentors presented a well thought out project built on the concept of ride sharing as a more efficient means of carpooling. Juan Crespi Middle School represented Caltrans District 4 in this years' Garrett Morgan Symposium competing nationally against 5 middle schools and one high school participating.

Juan Crespi Middle School located in El Sobrante CA, serves a diverse population of 7th and 8th grade students. The student body includes approximately 580 students from the Richmond, San Pablo, and the El Sobrante areas, which have long held a reputation for being underserved and economically challenged.

Congratulations Juan Crespi Middle School of El Sobrante, CA!

Administration



EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF ADMINISTRATION

NOISE REDUCTION INNOVATIONS TO IMPROVE SAFETY

Exposure to excessive noise in the workplace is a serious health and safety problem. Hearing loss or impairment can result from exposure to excessive noise caused by equipment and the work environment. Along with engineering solutions, administrative controls, and personal protective equipment guidelines already in place, Caltrans is now providing an additional engineering solution to reduce noise exposure. The Office of Health, Safety and Training has partnered with D4 Division of Maintenance to review and recommend the purchase of the Hilti TE 70-ATC / AVR Combihammer and the Hilti TE-1000 AVR Jackhammer to replace pneumatic drills and jackhammers, alleviating the need for air compressors.



D4 Maintenance Crew Using the Hilti TE-1000 AVR Jackhammer



D4 Employee using Hilti TE 70-ATC / AVR Combihammer

DECIBEL COMPARISON

The noise level generated by Hilti's TE 70-ATC / AVR Combihammer is 99.5 decibels (dB), slightly louder than an electric drill. The Hilti TE-1000 AVR Jackhammer is 87 dB, slightly quieter than a passing motorcycle. For comparison, a pneumatic drill is 120 dB, the same as an ambulance siren. A pneumatic jackhammer is 130 db, the same as a jet plane taking off at a close distance.

GENERATORS VS. AIR COMPRESSORS

The Hilti TE 70-ATC / AVR Combihammer and the Hilti TE-1000 AVR Jackhammer are both powered by electricity, either from an outlet or a generator. On the other hand, pneumatic tools run on air compressors, which are very loud compared to generators. This reduces noise emissions even more at the worksite. There is a gain in productivity, as well. Setting up tools to run on an air compressor takes a significant amount of time and also poses other safety risks, while equipment running on a generator requires no set up.

INNOVATIONS TO CONTROL SILICA DUST EXPOSURE

The Office of Health, Safety and Training has long been concerned about the health challenges posed by silica dust in the workplace. Silica dust is a potential occupational carcinogen which has been associated with respiratory and other diseases. Occupational exposure to silica dust often occurs as part of common workplace operations involving cutting, sawing, drilling, and crushing of concrete, brick, rock, and stone products. In the past, Caltrans has provided engineering solutions, administrative controls, and personal protective equipment, and now Caltrans is providing another engineering solution. The Office of Health, Safety and Training has partnered with D4 Division of Maintenance to review and recommend the purchase of the Hilti TE-CD Hollow Drill Bit and the VC 20-U Vacuum Cleaner. This engineering solution replaces the conventional rotohammer. The innovations described here make the workplace safer by preventing employee exposure to silica dust.



D4 Employees Working In Confined Area without Vacuum



Hilti TE-CD Hollow Drill Bit

HOW DOES THIS TECHNOLOGY WORK?

As a hole is drilled, the vacuum pulls silica dust—along with other materials such as concrete dust, concrete slurry, wood chips, other dust, and debris—through the hollow bit and a HEPA filter and into the vacuum tank.

IMPACTS OF USE

Improved Worksite Safety: Caltrans employees are exposed to silica dust and other particles on a daily basis in the workplace. For example, the top right photo shows a situation of maximum exposure when employees are working in a confined area. The second and third photos show employees using the Hilti TE-CD Hollow Drill Bit and the VC 20-U Vacuum Cleaner in common work settings. When using the Hilti VC-20-U Vacuum with HEPA filter, 99.97% of silica particulates of 0.03UM or larger are removed from the environment. This technology keeps harmful dust out of the air, making the workplace safer and reducing need for masks and respirators.

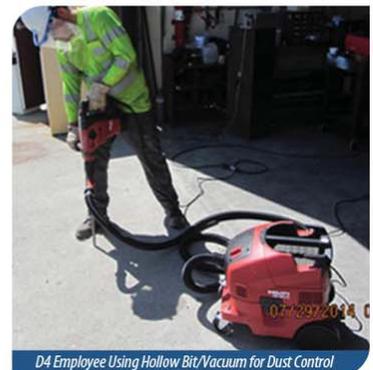
Productivity Gains: Because dust is vacuumed during drilling, there is a gain in productivity because manual cleaning of the holes is no longer necessary. Employees do not have to blow and brush the holes. Dust is removed while drilling is in progress. Setting can be done safer and faster.



D4 Employee Using Hollow Bit/Vacuum for Dust Control



Hilti VC20-U Vacuum Cleaner Attached to Drill with Hollow Bit



D4 Employee Using Hollow Bit/Vacuum for Dust Control

IMPLEMENTATION

The noise reduction and silica dust control equipment has been used since January 2014 by four to five crews in the South / West Bay Maintenance Region and by Specialty Region Electrical. Because there has been such a positive response from employees using this equipment, we anticipate that these innovative engineering solutions to silica dust and noise reduction will be adopted throughout District 4 in the near future.



EMPOWER | INNOVATION | CHAMPIONS

2014 INNOVATION FAIR

DIVISION OF ADMINISTRATION

Deputy District Director: Premjit Rai

Number of Division Employees: 94

Contact Person: Joey Crocker

NOISE REDUCTION & AIR QUALITY INNOVATIONS TO IMPROVE SAFETY

The Office of Health, Safety and Training has long been concerned about the health challenges posed by excessive noise levels and silica dust in the workplace. Excessive noise caused by equipment is associated with hearing loss or impairment. In addition, silica dust is a potential occupational carcinogen which has been associated with respiratory and other diseases. Occupational exposure to silica dust often occurs as part of common workplace operations involving cutting, sawing, drilling, and crushing of concrete, brick, rock, and stone products. In the past, Caltrans has provided engineering solutions, administrative controls, and personal protective equipment, and now Caltrans is providing another engineering solution. The Office of Health, Safety and Training has partnered with D4 Division of Maintenance to review and recommend the purchase of new products developed by Hilti. The innovations described here make the workplace safer by reducing noise caused by compressors and pneumatic equipment and by preventing employee exposure to silica dust.

NOISE REDUCTION TECHNOLOGY

After reviewing product options, the Office of Health, Safety and Training recommended that the Division of Maintenance purchase the Hilti TE 70-ATC / AVR Combiammer and the Hilti TE-1000 AVR Jackhammer. This engineering solution replaces pneumatic drills and jackhammers, alleviating the need for air compressors.

Decibel Comparison

The noise level generated by Hilti's TE 70-ATC / AVR Combiammer is 99.5 decibels (dB), slightly louder than an electric drill. The Hilti TE-1000 AVR Jackhammer is 87 dB, slightly quieter than a passing motorcycle. For comparison, a pneumatic drill is 120 dB, the same as an ambulance siren. A pneumatic jackhammer is 130 db, the same as a jet plane taking off at a close distance.

Generators vs. Air Compressors

The Hilti TE 70-ATC / AVR Combiammer and the Hilti TE-1000 AVR Jackhammer are both powered by electricity, either from an outlet or a generator. On the other hand, pneumatic tools run on air compressors, which are very loud compared to generators. This reduces noise emissions even more in the workplace. There is a gain in productivity, as well. Setting up tools to run on an air compressor takes a significant amount of time and also poses other safety risks, while equipment running on a generator requires no set up.



D4 Maintenance Crew Using the Hilti TE-1000 AVR Jackhammer



Hilti TE-CD Hollow Drill Bit



Hilti VC 20-U Vacuum Cleaner Attached to Drill with Hollow Bit

IMPROVING AIR QUALITY - SILICA DUST

Another recommendation by the Office of Health, Safety and Training was the purchase of the Hilti TE-CD Hollow Drill Bit and the VC 20-U Vacuum Cleaner. This engineering solution replaces the conventional rotohammer.

How Does This Technology Work?

As a hole is drilled, the vacuum pulls silica dust --along with other materials such as concrete dust, concrete slurry, wood chips, other dust, and debris---through the hollow bit and a HEPA filter and into the vacuum tank.

Impacts of Use: Improved Worksite Safety & Productivity Gains

When using the HILTI VC-20-U Vacuum with HEPA filter, 99.97% of silica particulates of 0.03UM or larger are removed from the environment. This technology keeps harmful dust out of the air, making the workplace safer and reducing need for masks and respirators. Also, because dust is vacuumed during drilling, there is a gain in productivity because manual cleaning of the holes is no longer necessary.

IMPLEMENTATION

The noise reduction and silica dust control equipment has been used since January 2014 by four to five crews in the South / West Bay Maintenance Region and by Specialty Region Electrical. Because there has been such a positive response from employees using this equipment, we anticipate that these innovative engineering solutions to silica dust and noise reduction will be adopted throughout District 4 in the near future.



DISTRICT 4

EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF ADMINISTRATION

WATER CONSERVATION MEASURES IN THE DISTRICT OFFICE

Water conservation has been a front-burner concern in the State of California recently, but District 4 has been working on ways to conserve water for a few years now. Innovations in the District Office building that focus on water conservation are: installation of green technology, posting of instructional signage, and procedural changes.



Automatic Faucets in the Restroom

GREEN TECHNOLOGY

Low-Flow & Automated Fixtures have been installed by Facilities Management in conjunction with the Department of General Services. This technology results in impressive cuts in usage:

- ▶ **Low-Flow Automatic Faucets:** 152 installed in restroom sinks; Water usage reduced from 1.5 gallons per minute to 0.5 gallons per minute
- ▶ **Low-Flow Automatic Toilet Flushers:** 165 installed; Water usage reduced from 3.5 gallons per flush to 1.6 gallons per flush
- ▶ **Low-Flow Urinal Flushers:** 38 installed; Water usage reduced from 1.5 gallons per flush to 0.5 gallons per flush
- ▶ **Low-Flow Aerators:** 24 installed in kitchenette faucets; Water usage reduced from 1.5 gallons per minute to 0.5 gallons per minute
- ▶ **Low-Flow Showerheads:** 6 installed in Basement & 7th floor showers; Water usage reduced from 2.5 gallons per minute to 1.5 gallons per minute



Low-Flow Automatic Toilet Flusher



Gauge Sensor on Cooling Tower

Gauge sensors have been installed by Facilities Management in partnership with Department of General Services. Gauge sensors monitor the behind-the-scenes water use in the District Office:

- ▶ Our Cooling Tower on the roof is an "open loop" system, and gauge sensors tell us exactly the water level to precisely monitor evaporation rates, particularly identifying seasonal fluctuations.
- ▶ The Chiller/Boiler system in the Penthouse is a "closed loop" system, and gauge sensors are used to identify leaks. Without gauge sensors, leaks were not identified as quickly.



Close up Shot of Gauge Sensor

INSTRUCTIONAL SIGNAGE

Facilities Management, in partnership with the Audio Visual, Graphics, and Reprographics Services Branch, has designed and posted instructional signs throughout the District Office building in kitchenettes and restrooms. These signs encourage employees and visitors to conserve water. Instructional signage has been shown to have a strong impact and change behavior.

Our water conservation instructional signs are both visually appealing and persuasive. Facilities Management will be posting additional signs in the future to continue to remind visitors and employees in the District Office to conserve water.



Example of Signage

PROCEDURAL CHANGES

Procedural changes have been implemented to conserve water. For example, Facilities Management has decreased the number of times the loading dock and sidewalks are pressure washed. Instead of pressure washing once a week, now it's done once a month.



Signage Posted in Restroom

D4 AUTOMATED EXTERNAL DEFIBRILLATOR (AED) PROGRAM

Early this year, the Office of Business Management, in partnership with the Office of Health, Safety and Training, kicked off its AED Program. AED units were installed throughout the District Office building. These are located in alarmed, wall-mounted boxes. In March, AED/CPR training was provided to Building Emergency Personnel and other district employees. Ongoing maintenance involves monthly checks of the units to ensure the batteries remain in working order.

WHAT IS AN AED?

The AED is a portable electronic device that automatically diagnoses the life threatening cardiac arrhythmias of ventricular fibrillation and ventricular tachycardia (sudden cardiac arrest) in a patient, and is able to treat them through defibrillation, the application of electrical therapy which stops the arrhythmia, allowing the heart to reestablish an effective rhythm.

WHERE ARE THE AEDs IN THE DISTRICT OFFICE?

Floors 6 through 15: In right side of the common area overlooking atrium; **Ground:** Near the entrance to the Cafeteria; 2nd floor: In Automotive Office; **Basement:** Across from the elevator; **Penthouse:** On the wall to the right near door.



Alarmed AED Box



Powerheart® AED G3 Plus

WHO CAN USE THE AED?

AEDs are fully automated, so that anyone can provide care. These units provide voice prompts and on-screen messages that walk the caregiver through CPR and AED use.

PROGRAM DESCRIPTION

Facilities Management has designated an AED Program Coordinator to work with our contractor Rescue Training Institute to monitor and administer the program, which has three components: **MedAED:** Medical Oversight, Prescription, Reporting and Review. **TracAED:** Program Management Database and Training Reminders. **SupplyAED:** Program Maintenance and Maintenance Reminders. The D4 AED Program provides another layer of safety for employees and visitors to the District Office Building.



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2014 INNOVATION FAIR

DIVISION OF ADMINISTRATION

Deputy District Director: Premjit Rai

Number of Division Employees: 94

Contact Person: Kim Byrne

WATER CONSERVATION MEASURES IN THE DISTRICT OFFICE

Water conservation has been a front-burner concern in the State of California recently, but District 4 has been working on ways to conserve water for a few years now. Innovations in the District Office building that focus on water conservation are: installation of green technology, posting of instructional signage, and procedural changes.



Automatic Faucets in the Restroom

GREEN TECHNOLOGY

Low-Flow & Automated Fixtures have been installed by Facilities Management in conjunction with the Department of General Services. This technology results in impressive cuts in usage: **Low-Flow Automatic Faucets:** Water usage reduced from 1.5 gallons per minute to 0.5 gallons per minute; **Low-Flow Automatic Toilet Flushers:** Water usage reduced from 3.5 gallons per flush to 1.6 gallons per flush; **Low-Flow Urinal Flushers:** Water usage reduced from 1.5 gallons per flush to 0.5 gallons per flush; **Low-Flow Aerators:** Water usage reduced from 1.5 gallons per minute to 0.5 gallons per minute; and **Low-Flow Showerheads:** Water usage reduced from 2.5 gallons per minute to 1.5 gallons per minute.

Gauge sensors have been installed by Facilities Management in partnership with Department of General Services. Gauge sensors monitor the behind-the-scenes water use in the District Office by telling us exactly the water level in the Cooling Tower and alerting us to leaks in the Chiller/Boiler system.

INSTRUCTIONAL SIGNAGE

Facilities Management, in partnership with the Audio Visual, Graphics, and Reprographics Services Branch, has designed and posted instructional signs throughout the District Office building in kitchenettes and restrooms. These signs encourage employees and visitors to conserve water. Instructional signage has been shown to have a strong impact and change behavior.

PROCEDURAL CHANGES

Procedural changes have been implemented to conserve water. For example, Facilities Management has decreased the number of times the loading dock and sidewalks are pressure washed. Instead of pressure washing once a week, now it's done once a month.

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Powerheart® AED G3 Plus



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DIVISION OF ADMINISTRATION

GPS / TELEMATICS PROGRAM FOR D4'S FLEET VEHICLES

The Office of Business Management has partnered with HQ Division of Equipment (DOE) to implement the fully wireless Global Positioning System (GPS) / Telematics Program for District 4's Fleet Vehicles. A pilot program started in July 2012 has demonstrated the benefits of using this technology. Starting in August 2014, Networkfleet units are being installed in 1,451 vehicles in District 4. This program promises four main advantages to D4 fleet management: 1) reduced fuel consumption; 2) enhanced driver safety; 3) improved repair capabilities; and 4) improved emergency response.

NEED FOR INNOVATION

The goal in implementing the GPS / Telematics Program is to eliminate the current system, Cartags, which depends on operators to provide mileage and hourly vehicle usage. The new system monitors miles driven, idle time, and fuel use and wirelessly reports these statistics to Networkfleet servers. The Office of Business Management, as Program Coordinator, is working with DOE, the vendor, and D4 managers to develop innovative strategies to maximize the use of this accurate and real-time vehicle data.

HOW DOES THIS TECHNOLOGY WORK?



The Networkfleet units use GPS to monitor and collect data on performance metrics and engine diagnostics. Then, this data is transmitted wirelessly over the vendor's cellular network. Reports compiled from this data provide accurate information on vehicle usage and maintenance issues, which improves fleet management and efficiency. Telematics is the name of this approach to fleet management. The GPS / Telematics Program allows for smart, timely decisions that enhance safety. It provides actionable data to improve efficiency and reduce costs.

PILOT RESULTS: FUEL CONSUMPTION & COST SAVINGS

The pilot study on 50 vehicles has shown strong impacts on driver behavior, particularly with regard to fuel consumption:

- Increased Miles per Gallon:** The average miles per gallon (MPG) for the pilot vehicles increased by 2MPG, which translates into cost efficiency and reduced carbon footprint.
- Decreased Idling Time:** Idle events (>5 minutes) decreased significantly. This means less fuel being wasted and cost savings for District 4.

PROGRAM FEATURES THAT IMPROVE FLEET MANAGEMENT

- Fuel Use:** Fuel Usage and MPG Report monitors fuel used by each vehicle, reconciles gallons consumed with fuel card expenses; and monitors miles each vehicle has driven; Idle Time Report allows management to view the number of hours of idle per vehicle, compare an individual vehicle's idle time with peer vehicles and pinpoint underutilized or inactive driving hours; and Stop Detail and Idle Time Report enables management to review a vehicle's stops and pinpoint excessive idling.
- Safety:** Driver Safety Suite exonerates drivers who were not speeding at the time of an accident; Speed Violations Report improves safety and creates and enforces a speed policy to promote driver safety; diagnostics alerts notify of vehicle problems, such as a multi-cylinder misfire, that could cause a breakdown on the road; recall data notify about vehicle manufacturer safety recalls online; and location data enhances safety.
- Emergency:** Accurate Reporting of vehicle and fuel usage data to control agencies; and location of closest vehicle to a specific address speeds emergency response time.
- Maintenance:** Accurate mileage information; daily odometer updates; maintenance alerts; customized reports; and automatic alerts for diagnostic trouble codes.



Construction



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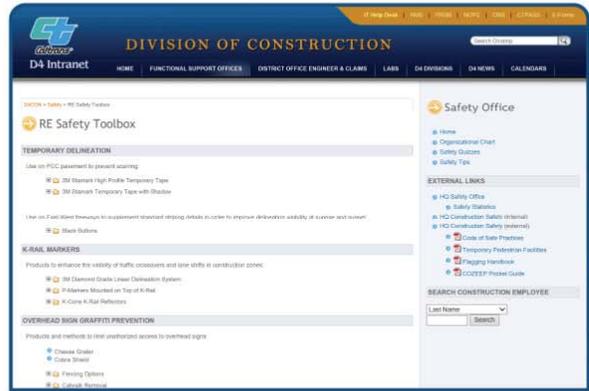
DIVISION OF CONSTRUCTION

Resident Engineer's Safety Toolbox Webpage

Construction personnel based in field offices now have a tool to simplify the sharing of innovative tools, products, and ideas that have worked to address construction site issues.

The D4 Construction staff on the SR4 Widening projects in Pittsburg and Antioch researched and implemented several new products and ideas to improve the awareness of the travelling public as they passed through a series of construction sites involving traffic crossovers and frequently changed driving conditions.

These projects and the products and ideas they used were presented to Resident Engineer's at the Annual RE Meeting, which generated a series of requests for more information from other RE's facing similar situations. A platform was needed in order to provide product information, photos, videos, and internet links so that the information could be distributed more widely, easily, and consistently. The RE Safety Toolbox site on the d4con webpage provides this platform.



Topics Currently Addressed:

TEMPORARY DELINEATION



K-RAIL MARKERS



OVERHEAD SIGN GRAFFITI PREVENTION



SPEED LIMIT REDUCTION METHODS



PULLBOX PROTECTION



AGC / CALTRANS WORKZONE SAFETY COMMITTEE



EMPOWER | INNOVATION | CHAMPIONS

2014 INNOVATION FAIR

DIVISION OF CONSTRUCTION

Deputy District Director: Bob Finney
Number of Division Employees: 705
Contact Person: Andrew Baskerville

Resident Engineer's Safety Toolbox Webpage

The screenshot shows the Division of Construction website interface. At the top, there is a navigation bar with the Gibsons logo and the text 'D4 Intranet'. The main header reads 'DIVISION OF CONSTRUCTION'. Below the header is a navigation menu with links for HOME, FUNCTIONAL SUPPORT OFFICES, DISTRICT OFFICE ENGINEER & CLAIMS, LABS, D4 DIVISIONS, D4 NEWS, and CALENDARS. A search bar is located in the top right corner. The main content area displays the 'RE Safety Toolbox' page, which is categorized under 'TEMPORARY DELINEATION' and 'K-RAIL MARKERS'. The 'TEMPORARY DELINEATION' section lists products like '3M Stamark High Profile Temporary Tape' and '3M Stamark Temporary Tape with Shadow'. The 'K-RAIL MARKERS' section lists '3M Diamond Grade Linear Delineation System' and 'P-Markers Mounted on Top of K-Rail'. A sidebar on the right contains a 'Safety Office' section with links to Home, Organizational Chart, Safety Quizzes, and Safety Tips. Below this is an 'EXTERNAL LINKS' section with links to HQ Safety Office, Safety Statistics, HQ Construction Safety (internal), HQ Construction Safety (external), Code of Safe Practices, Temporary Pedestrian Facilities, Flagging Handbook, and COZEEP Pocket Guide. At the bottom of the sidebar is a 'SEARCH CONSTRUCTION EMPLOYEE' field.

Construction personnel based in field offices now have a tool to simplify the sharing of innovative tools, products, and ideas that have successfully addressed construction site issues.

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Topics Currently Addressed:

➤ TEMPORARY DELINEATION



➤ K-RAIL MARKERS



➤ OVERHEAD SIGN GRAFFITI PREVENTION



➤ SPEED LIMIT REDUCTION METHODS



➤ PULLBOX PROTECTION



➤ AGC / CALTRANS WORKZONE SAFETY COMMITTEE

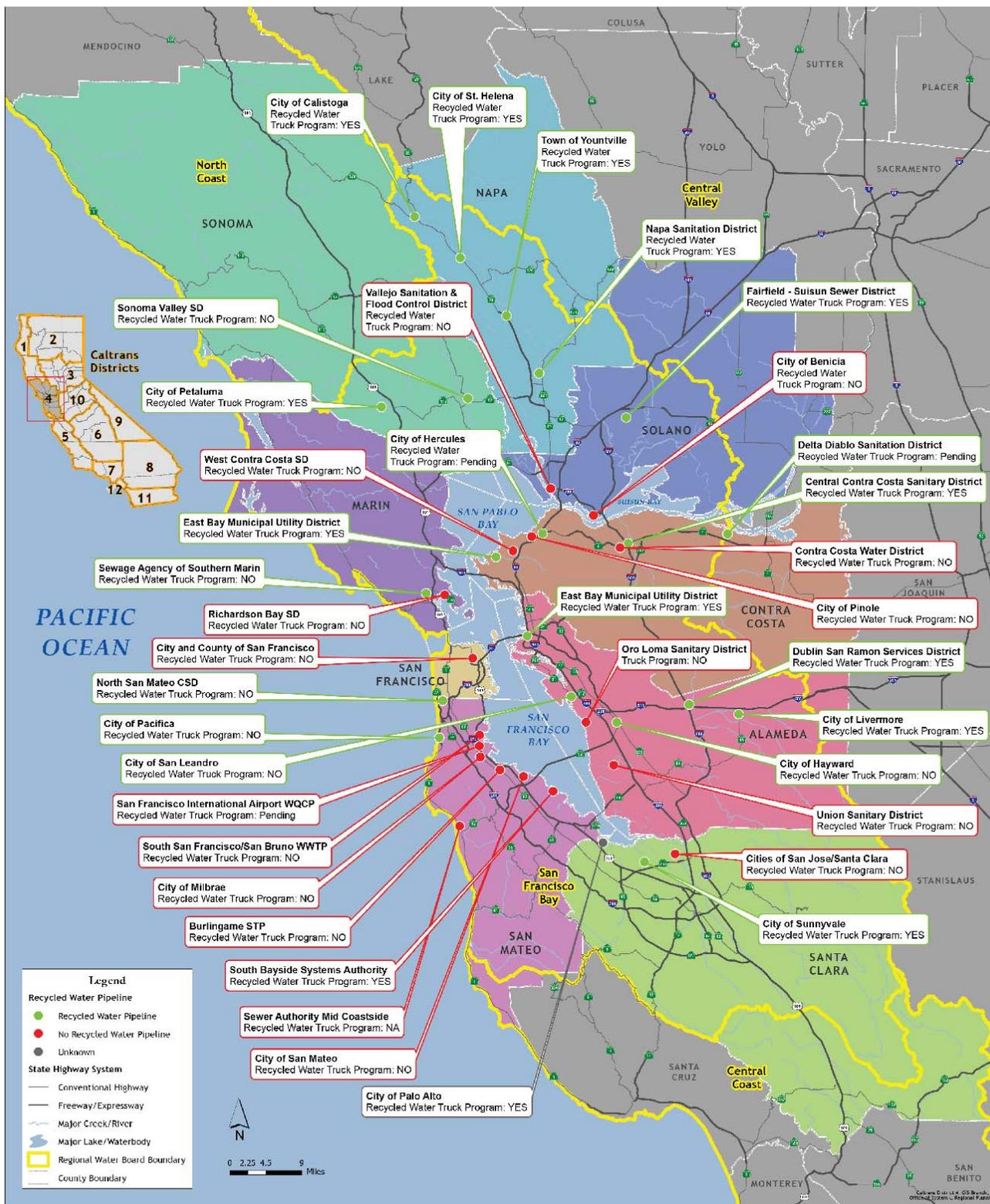


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DIVISION OF CONSTRUCTION

DISTRICT 4

WATER CONSERVATION FOR HIGHWAY CONSTRUCTION PROJECTS





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2014 INNOVATION FAIR

DIVISION OF CONSTRUCTION

Deputy District Director: Bob Finney
Number of Division Employees: 705
Contact Person: Mussie Tesfamariam

D4 - DIVISION OF CONSTRUCTION DROUGHT RESOURCES WEBSITE

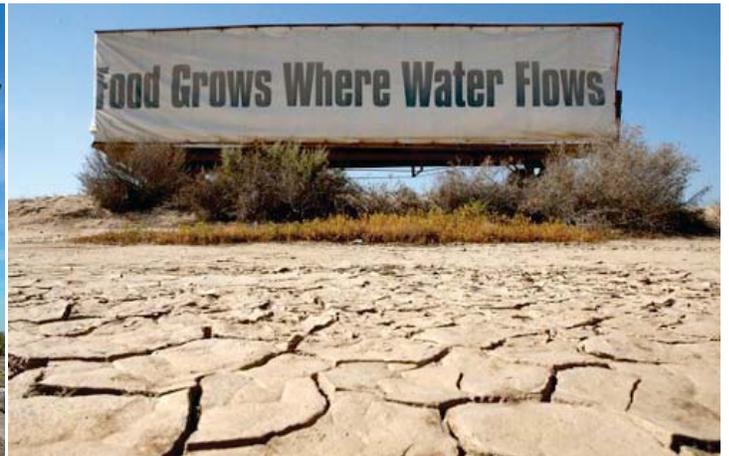
Caltrans has been a leader in water conservation practices in project design, building operations, construction and maintenance activities.

To comply with the Governor's emergency drought declaration and in anticipation of future additional restrictions we must do our part to conserve water at our state owned facilities and in maintenance and construction activities. We are facing a difficult situation, but with prudent and practical actions each of us can contribute to conserving water this year to meet the Governor's goal of a 20% reduction in water use and assist our fellow Californians to get through the drought with as little impact as possible.

PUBLIC DROUGHT AWARENESS



Caltrans has been posting a drought advisory statewide on more than 700 Freeways sign as part of educational campaign urging Californians to conserve water.



Prime agricultural Land - is being hit the hardest by the state drought which could cause catastrophic losses to crops and food supply.





As part of our "Change Your Clocks, Check Your Sprinklers" campaign, we have put together some tools for our office partners to use on their website, social media channels and Overhead Freeway signs. We are encouraging California to check their sprinkler systems when they turn their clocks forward.



The Purple Pipe Hydrant - Recycled water.



California is currently experiencing its worst drought in 500 years.



Drought Tolerant Landscape Intersection Route 80, California.

Water Conservation Techniques:

1. Select plant material appropriate to the local rainfall, soil, and Exposure. Native plants shall be used to the maximum extent feasible.
2. When specifying containerized plant material and the project sites with compacted soils (if not already root able), fracture or rip the soils to 3' depth and incorporate a minimum of 1" of composed in to the top 12 inches of soil.
3. Apply 2" to 3" of wood chip or bark mulch in a 2' to 3' diameter around the plant to conserve moisture and control weeds.
4. Use the recycled water or non potable whenever available, consistent with quality and healthy standard and within justification cost.

Design



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DIVISION OF DESIGN

GREEN CONCRETE ON THE SFOBB

- ▶ About 7% of greenhouse gas worldwide & about 2% in USA comes from the manufacture of cement.
- ▶ Rule of thumb: 1 ton of Portland cement results in 1 ton of CO₂ (greenhouse gas)
- ▶ So reducing the amount of Portland cement in concrete will directly reduce CO₂.
- ▶ Supplementary Cementitious Materials (SCM) can be used to reduce the amount of Portland cement.
- ▶ Flyash and slag are used as SCMs. They are also waste products which are being reused, so we have the double benefit of recycling plus greenhouse gas reduction!
- ▶ SFOBB design team's drive to use SCMs were based on improvements to workability, durability, strength and cost reduction. Resulting "green" benefits were secondary advantages.



Superstructure:
25% flyash
30% slag

YBITS



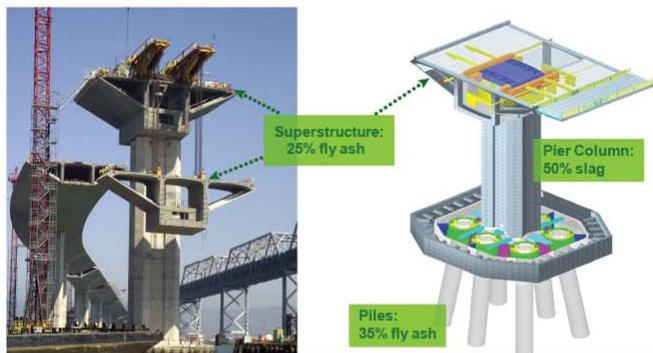
50% Flyash in massive footings

YBITS



40% Flyash in W2W & W2E Mass Concrete Footing/Anchor

SAS (Self-Anchored Suspension)

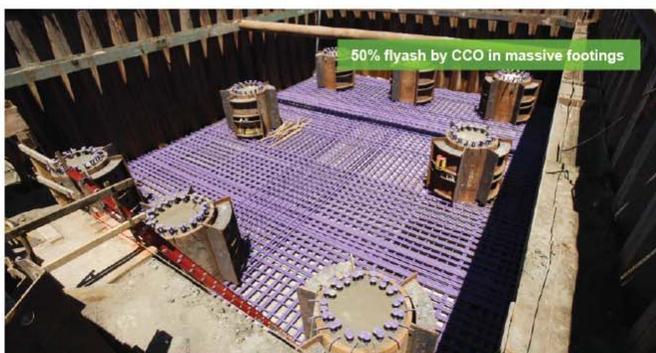


Superstructure:
25% fly ash

Pier Column:
50% slag

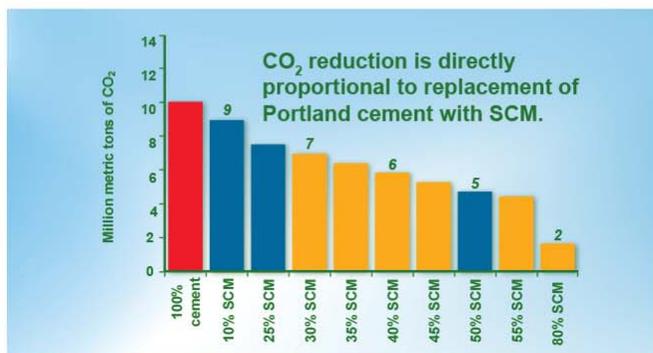
Piles:
35% fly ash

Skyway



50% flyash by CCO in massive footings

Oakland Touchdown



Supplementary Cementitious Material (SCM)



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DIVISION OF DESIGN

Deputy District Director: Helena "Lenka" Culik-Caro

Number of Division Employees: 314

Contact Person: Ric Maggenti

GREEN CONCRETE ON THE SFOBB

Overview of the Office of Toll Bridge Design

This Office is very similar to other Design Offices and, until recently, focused primarily on toll bridge retrofit and/or replacement projects. One aspect of this Office that is unique is that it also comprises structure engineers, structure specification writers, and a structure cost estimator. This Office is responsible for: preparation of Project Reports; preparation of PS&E and/or oversight of consultant prepared PS&E; coordination with FHWA and local/permitting agencies; determine right of way needs for projects; support Construction during the construction phase of the project; processing design fact sheets; district utility engineering; preparation of cost estimates on a quarterly basis for the Toll Bridge Seismic Retrofit Program Reports for the California Legislature.

Quick facts about greenhouse gases as they relate to concrete:

- ▶ Main type of greenhouse gas is CO₂.
- ▶ More than 90% of greenhouse gases stem from fossil fuel combustion.
- ▶ About 7% of greenhouse gas worldwide & about 2% in USA comes from the manufacture of cement.
- ▶ Rule of thumb: 1 ton of Portland cement results in 1 ton of CO₂
- ▶ So reducing the amount of Portland cement in concrete will directly reduce CO₂. Supplementary Cementitious Materials (SCM) can be used to reduce the amount of Portland cement.

SCMs are used to reduce the amount of portland cement in concrete:

Portland cement can be partially replaced by Supplementary Cementitious Materials (SCM). Some examples of SCMs are: flyash, blast furnace slag, silica fume, and natural pozzolans. SCMs are primarily used for improved workability, durability and strength. They offset some of the undesirable effects (like thermal cracking) of Portland cement. Flyash is a byproduct of coal-fired furnaces at power plants. Slag is a byproduct of blast furnaces used for iron production. Silica is a byproduct of silicon metal production. Natural pozzolans are derived from volcanic regions – in fact, the word "pozzolan" comes from the town of Pozzuoli, near Mt. Vesuvius, where volcanic ash was used to make concrete by the Romans.



Flyash: a byproduct of coal



The Colosseum, Rome



So what makes the use of SCM “green”?:

- ▶ Greenhouse gas production is reduced by using SCMs in place of cement (remember, 1 ton of cement = 1 ton of CO₂)
- ▶ flyash and slag are waste products which are being reused in concrete => recycling!

We have to confess, “green concrete” was not the initial intent, but rather, a welcomed benefit

Caltrans used SCMs because of the long-term strength benefits they provide: reduced heat rate of cement reaction, increased durability, and less cost than cement. Before 1995 Caltrans sometimes used 15% flyash for durability, usually dictated by the aggregate. After 1997 25% flyash was used in almost all structural concrete. But on the SFOBB (Bay Bridge), we outdid ourselves and used:

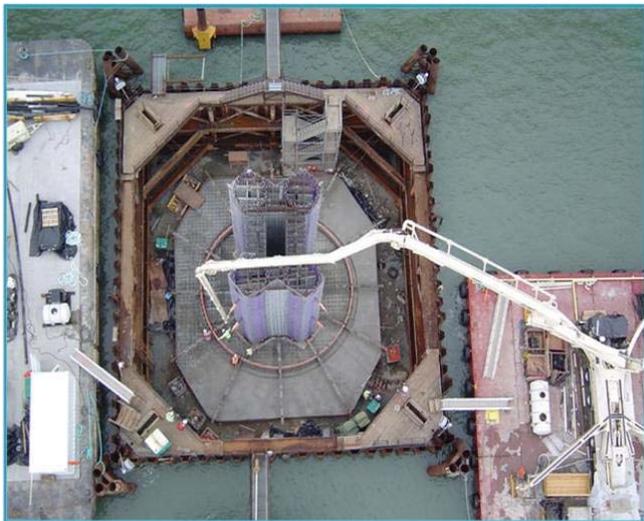
35% IN THE LARGE PILES (MORE WAS ALLOWED)



35% - 50% IN THE ALL MASSIVE FOOTINGS

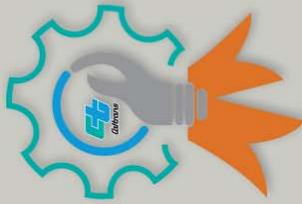


50% SLAG IN THE PIER COLUMNS FOR SKYWAY



50% SCM (20% FLYASH & 30% SLAG) ON YBI.



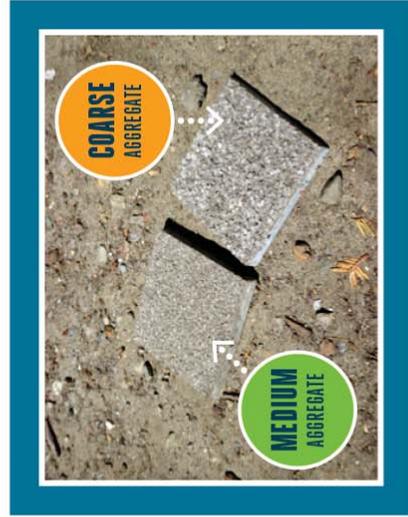


DISTRICT 4

EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF DESIGN

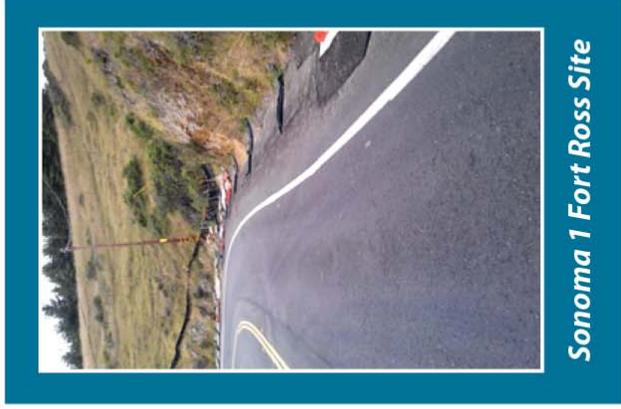
Natural Low Visual Impact Surfacing



A new material that protects our roadways over time without compromising public safety, and with minimal visual impact on the communities we serve.

It can be placed over asphalt or concrete in areas where additional surfacing is required but the visual impact of these raw materials over the stretch of a wide shoulder or vegetation control area would adversely affect the setting of nearby communities.

Quartz aggregate and polyester resin selected for adjacent terrain



Sonoma 1 Fort Ross Site



EMPOWER | INNOVATION | CHAMPIONS

2014 INNOVATION FAIR

DIVISION OF DESIGN

Deputy District Director: Helena "Lenka" Culik-Caro

Number of Division Employees: 314

Contact Person: Harold Gaskill

Natural Low Visual Impact Surfacing

Office of Engineering Services

District 4 Engineering Services – Materials is responsible for providing materials recommendations and reports for all the federal and state highways in the District's nine county jurisdiction. This includes, but is not limited to pavement design using both hot mix asphalt and concrete materials and corrosion investigations for culvert design. Additionally, Materials provides materials support as well as forensics studies to Caltrans field personnel in construction and maintenance. Materials also operates the District 4 Materials Laboratory in addition to the Independent Assurance Sampling and Testing Group that certifies all testers and qualifies labs to perform tests on Caltrans construction projects.



Close-up View of Polyester-Quartz Surface



Finishing of Test Strip behind Metal Beam Guard Rail

Overview of Low Visual Impact Polyester-Quartz Surfacing on Route 1 in Sonoma County

In order to obtain permits for the construction of a new retaining wall and rock slope protection (RSP) to preserve this stretch of Highway 1 near Fort Ross along the coast of Sonoma County, aesthetic enhancements were implemented, including low visual impact surfacing, native seed mix, and backfill of voids in RSP with native soil. In this project, vegetation control and swale paving are required to blend in with the natural coastal setting.

The resin used has been tested widely by the Department in bridge overlays and joint replacements and meets stringent mechanical requirements. With the addition of red and yellow iron oxides, titanium dioxide, and carbon black, a chemically stable color will last through the years. A thin coating of polyester resin (below left) is applied to the prepared surface, onto which the quartz aggregate (below right) is spread. After a nominal 1-hour 'green' cure time, the surface is wire-brushed to remove loose or partially bonded quartz grains. The resulting surface is expected to outlast the adjacent HMA roadway requiring no maintenance over the pavement life.





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DIVISION OF DESIGN

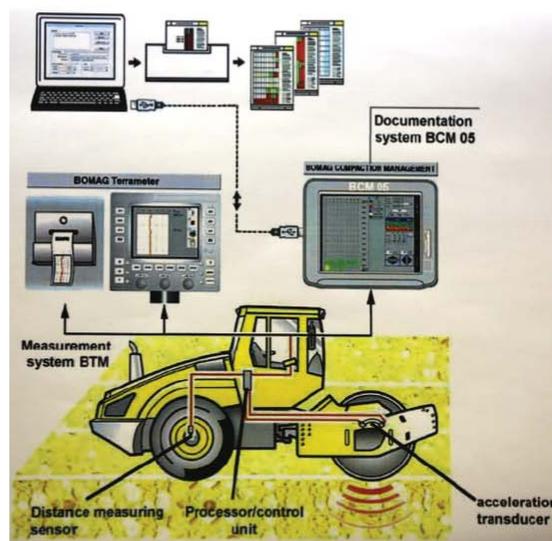
THE USE OF INTELLIGENT COMPACTION (IC) ON HMA ROADS AND SUBBASES

Office Of Engineering Services

Engineering Services (ES) is responsible for providing materials recommendations and reports for all the federal and state highways in the District's nine county jurisdiction. This includes, but is not limited to, pavement design using both hot mix asphalt and concrete materials and corrosion investigations for culvert design. Additionally, ES provides materials support as well as forensics studies to Caltrans field personnel in construction and maintenance. ES also operates the Materials Laboratory in addition to the Independent Assurance Sampling and Testing Group that certifies all testers and qualifies labs to perform tests on Caltrans construction projects.

Intelligent Compaction

The intelligent compaction (IC) system is a compaction technology used for materials including soils, aggregates, and asphalt mixtures, by using vibratory rollers equipped with an in-situ measurement system and feedback control. Rollers are equipped with a real-time kinematic (RTK) Global Positioning System (GPS), a roller-integrated measurement system (normally accelerometer-based), feedback controls, and an onboard real-time display of all IC measurements.



Infra-red temperature sensor on a smooth drum roller

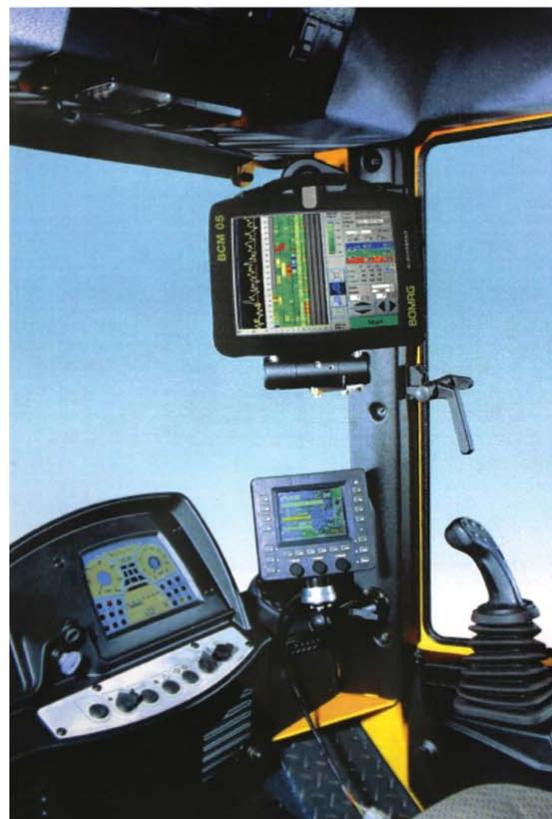


RTK GPS receiver and antenna on a roller

IC rollers maintain a continuous record of measurements that include the number of roller passes, roller-integrated measurement value (ICMV), GPS locations of the roller, roller vibration amplitudes/frequencies, and HMA surface temperatures.

Based on the real time onboard color-coded display of the above measurements, the roller operators can either manually or automatically allow the IC rollers to adjust the machine settings for optimum compaction. ICMV is used to evaluate the level of compaction.

With 100 percent coverage on the compacted area, the IC technology can be used to produce uniformly compacted pavement products that perform better and last longer. The uniqueness of IC is in its ability to adjust to density variances in subsurface or HMA conditions in real time.





EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF DESIGN

THE USE OF INTELLIGENT COMPACTION (IC) ON HMA ROADS AND SUBBASES

Benefits of IC Technologies

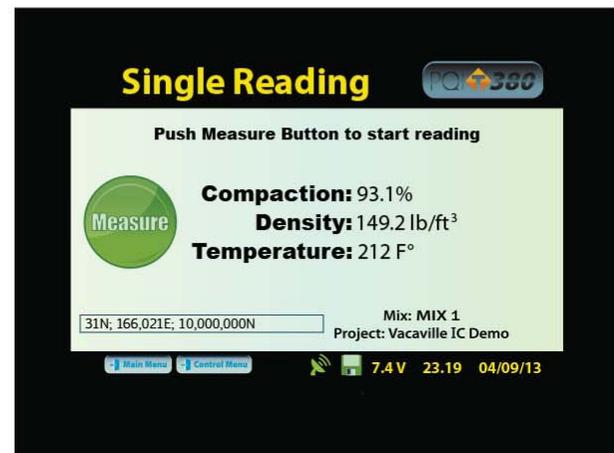
The immediate benefits of intelligent compaction technologies common to both the earthwork and paving include:

- ▶ Mapping of the existing support layers in identifying weak support areas for corrective action prior to the compaction of the upper layers.
- ▶ With hot mix asphalt intelligent compaction, tracking roller passes and hot mix asphalt surface temperatures provide necessary means to maintain a consistent rolling pattern within optimal ranges of temperatures for 100 percent coverage of a construction area.
- ▶ Intelligent Compaction technologies can be especially beneficial to maintain consistent rolling patterns under lower visibility conditions such as night paving operations.

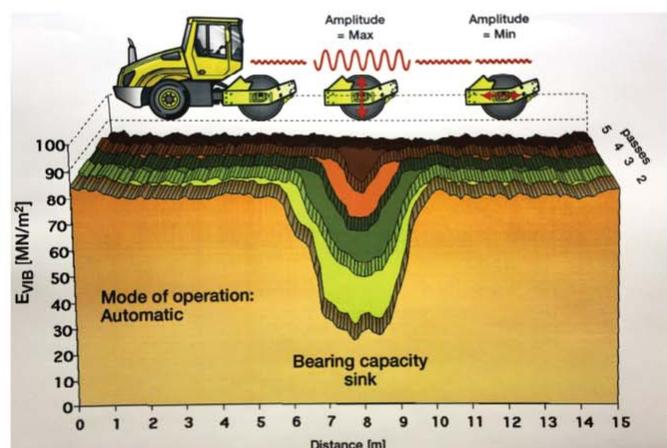
As a result Intelligent Compaction leads to:

- ▶ Improved density
- ▶ Increased productivity
- ▶ Reduction of highway repair
- ▶ Identification of non-compactable areas and
- ▶ Improved depth of compaction

The hope is to one day fully implement this technology in our construction operations to ensure we deliver a quality, long-lasting roadway to our consumer, the motoring public.



A single-drum roller equipped with roller-integrated measurement system on-board display units with software.





EMPOWER | INNOVATION | CHAMPIONS
2014 INNOVATION FAIR
DIVISION OF DESIGN - ENGINEERING SERVICES

Deputy District Director: Helena "Lenka" Culik-Caro
Number of Division Employees: 314
Contact Person: Tinu Mishra

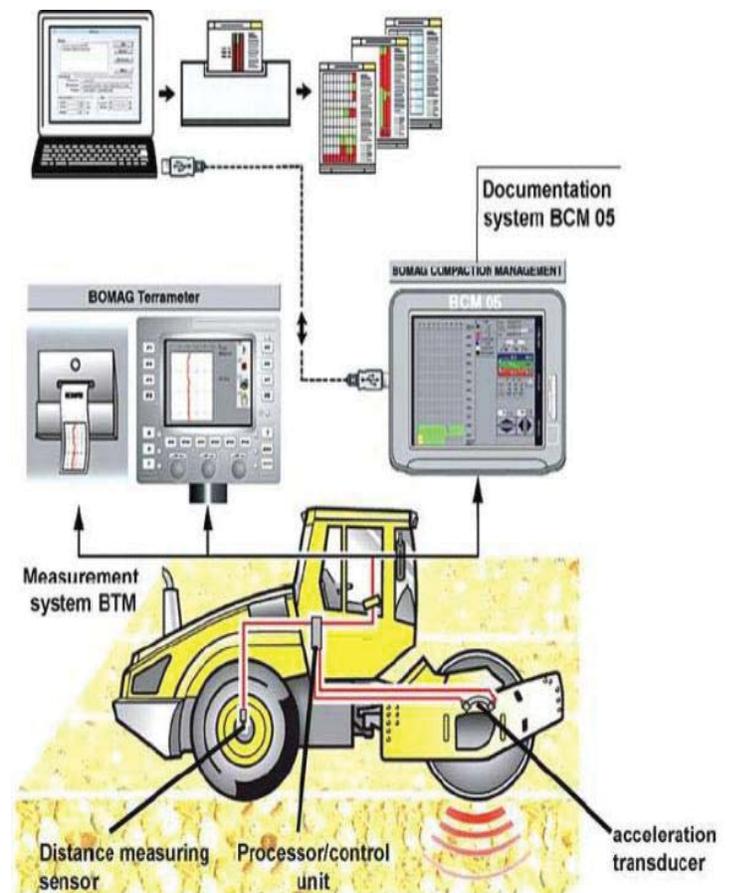
THE USE OF INTELLIGENT COMPACTION (IC) ON HOT MIX ASPHALT ROADS AND SUBBASES

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With 100 percent coverage on the compacted area, the IC technology can be used to produce uniformly compacted pavement products that perform better and last longer. The uniqueness of IC is in its ability to adjust to density variances in subsurface or HMA conditions in real time.



Benefits of IC Technologies

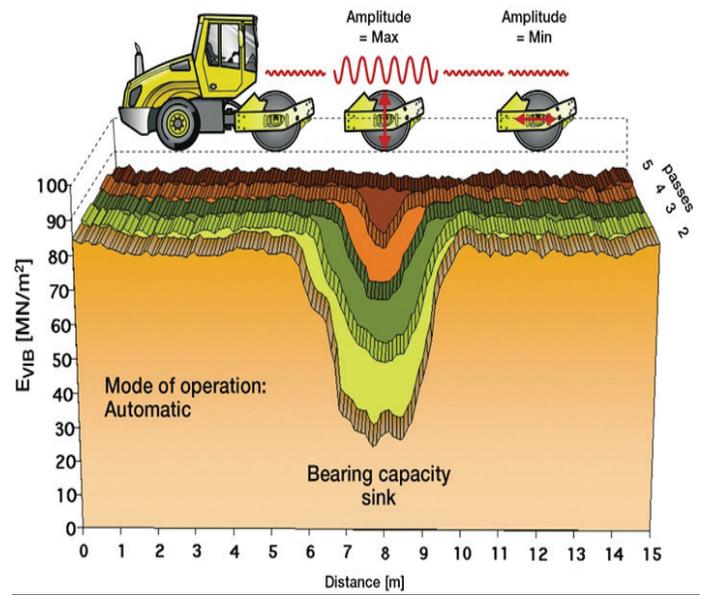
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- Mapping of the existing support layers in identifying weak support areas for corrective action prior to the compaction of the upper layers.
- With hot mix asphalt intelligent compaction, tracking roller passes and hot mix asphalt surface temperatures provide necessary means to maintain a consistent rolling pattern within optimal ranges of temperatures for 100 percent coverage of a construction area.
- Intelligent Compaction technologies can be especially beneficial to maintain consistent rolling patterns under lower visibility conditions such as night paving operations.

As a result Intelligent Compaction leads to:

- Improved density
- Increased productivity
- Reduction of highway repair
- Identification of non-compactable areas and
- Improved depth of compaction

The hope is to one day fully implement this technology in our construction operations to ensure we deliver a quality, long-lasting roadway to our consumer, the motoring public.



Thomas E. Stanton

• *Retires With International
Renown After 39 Years*

By F. N. HVEEM, Materials and Research Engineer

ON MAY 31, 1951, Thomas E. Stanton, Materials and Research Engineer of the Division of Highways, reached the age of 70 and therefore automatically became an heir to the benefits and privileges of the State Retirement System for the creation of which



THOMAS E. STANTON—1951

he himself was largely responsible. Mr. Stanton was in state service for more than 39 years, his name first appearing on the pay roll of the California Highway Commission on April 1, 1912, at which date he was appointed Assistant Division Engineer, Division VI, with headquarters in Fresno.

In 1912 the California Highway Department was in its infancy and the initial work was being planned and organized. Prior to that time Stanton had served as Assistant Engineer in the City Engineer's Office in Los Angeles for a period of seven years, and after entering the employ of the State he

served successively as Assistant Division Engineer, then as Assistant State Highway Engineer, and finally, Materials and Research Engineer from 1928 until his retirement at the end of May, 1951.

• Pioneer Family

Tom Stanton was the first native son of a pioneer family and the third by the name of Thomas Elwood Stanton. His grandfather, Thomas Elwood Stanton, the first of the name, had crossed the plains to California during the gold rush in 1849. Having left a wife and eight children at home, he soon became homesick and returned to Indiana, where he spent the next eight years trying to persuade the entire family to move to California, which was finally accomplished in 1859, after a sojourn in the northeastern part of Iowa where Thomas Elwood Stanton the second was born, near Frankville on April 2, 1854. After the usual hardships attendant upon the long trip across the plains by wagon train, the family finally settled in Santa Barbara, in the area now known as Miramar.

Thomas Stanton the second moved to Los Angeles where he became one of the leading photographers of the era, having studios in the Temple and Downey Blocks at Main and Temple Streets. It was there that Thomas Elwood the third was born on Temple Street between Spring and Broadway, on May 31, 1881, the centennial year of the city. Tom grew up in Los Angeles, attended grammar schools and later graduated from St. Vincent's College in 1889 with the degree of A.B. He then attended the University of California at Berkeley entering in 1889 with the class of 1903. Because it was necessary to work during a portion of his college years, he did not graduate until 1904, receiving a B.S. degree in mining.

Joins Division of Highways

Having no immediate opportunity to follow mining as a profession and hav-

ing passed a civil service examination as instrument man in the City Engineer's Office in Los Angeles, he went to work for the city in 1905. After seven years with the Los Angeles City Engineer's Office, during which he served successively as instrument man,

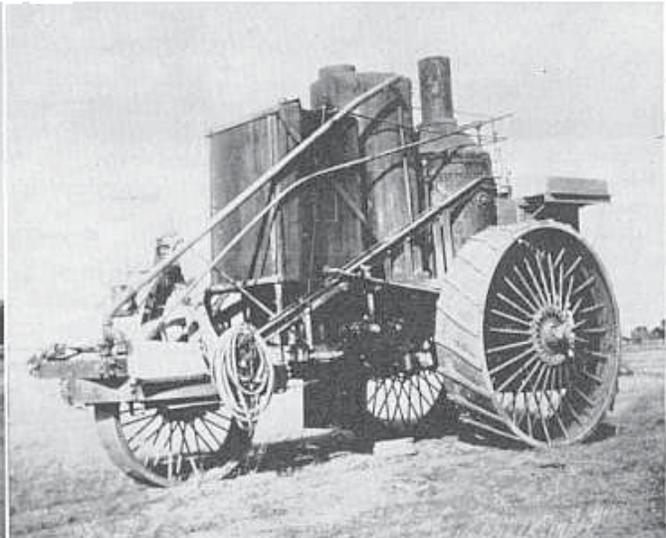
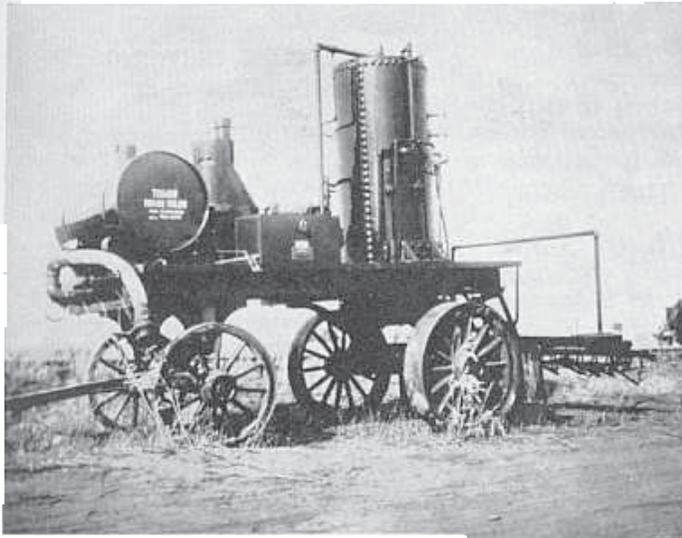


THOMAS E. STANTON—1912

chief of party and as assistant engineer in charge of sewer and paving design and construction, he was lured away by the rosy prospects offered by J. B. Woodson, the new Division Engineer of the California Division of Highways, who offered him an increase of \$5 per month if he would accept the position of Principal Assistant Division Engineer with headquarters in Fresno. Thus, the first pay roll shows that he received a salary of \$150 per month in April of 1912.

Earns Promotion

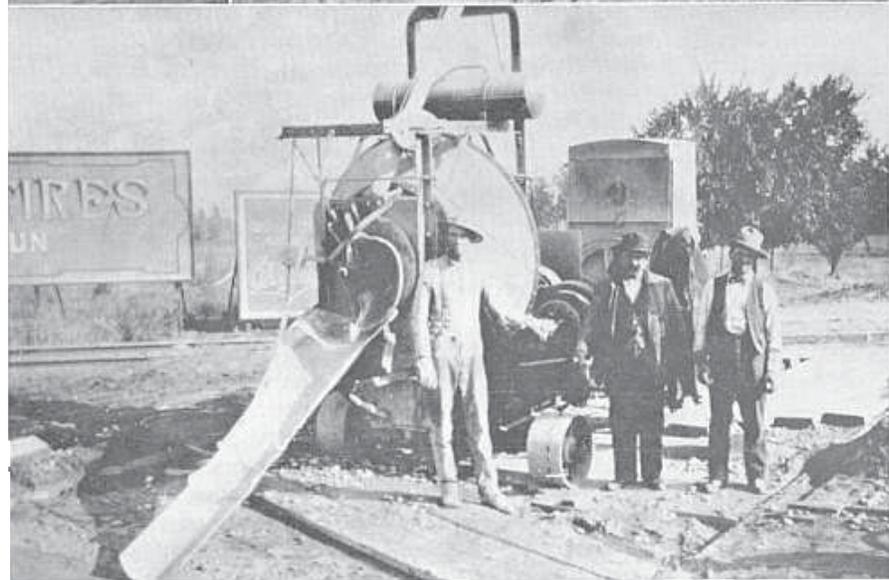
Tom once stated that during the time when he was Assistant Division



Engineer in Fresno he made it a point to be as well informed on the details of headquarters operations as anyone actually in the department at Sacramento. It may be suspected that this fact was responsible for his appointment in 1914 to the position of Principal Assistant Division Engineer in Sacramento. In 1920 he was made Assistant Highway Engineer in charge of general inspection throughout the southernly portion of the State. In 1921, when the Department of Public Works was formed, Mr. Stanton was appointed Assistant State Highway Engineer, in which capacity he served under State Highway Engineers Austin B. Fletcher, Robert M. Morton and Charles H. Purcell until his appointment as Materials and Research Engineer in 1928, which position he occupied for the succeeding 23 years until his retirement on May 31, 1951.

In the earlier years of the Division of Highways, a great many interesting and often colorful experiences were the lot of the pioneering engineers. Ruts and chuckholes were synonymous with roads in those days, and pavements were virtually unheard of outside the limits of incorporated cities. The sums of money available for highway construction and improvement were small indeed compared to modern standards, and everyone in the organization was very close to the problem which often meant being intimately mixed with the mud and dust of the rural roads.

and Public Works



UPPER LEFT—Tomer road oiler used on US 99 in Madera on one of Stanton's early jobs in 1912. UPPER RIGHT—Traction engine used on US 99 in Madera in 1912. LOWER—Foote one-sack paving mixer used on US 99 in Fresno, 1912, and superseded later by two-sack mixer, which was considered the ultimate in mixer size.

Times Do Change

The records show that a seminar of department heads was held in Sacramento May 26th and 27th in 1914, and among the various papers presented was one on accounting by Mr. J. H. Small, Chief Accountant. Mr. Stanton was selected to discuss the paper, and his comments on the organization of the District office work carry the following rather illuminating paragraph: "A variety of such forms makes it possible for one employee who is both clerk and stenographer to handle *all of*

the clerical work of the division of-fice." Times have indeed changed.

The pioneering urge was obviously strong in the Stanton family, and it appears that Tom inherited a full measure of the energy and initiative that led his namesake to move to California in the days of '49. Thomas Elwood the third has continued to pioneer, and the catalog of his activities represents an extensive and impressive list. It is indeed difficult to sum up in any brief or simple phraseology the impressions and far reaching effects produced throughout the lifetime of an energetic and

**RESOLUTION
OF APPRECIATION**

WHEREAS, On January 15, 1950, Thomas Elwood Stanton completed over 18 years of service as a member and from 1934 to 1950 as President of the Board of Administration, California State Employees' Retirement System; and

WHEREAS, The State Employees' Retirement System started in January, 1932, with approximately 14,000 members and has since grown to include approximately 100,000 members, and

WHEREAS, The System has now invested in excess of 160 millions of dollars, without the loss of one penny in interest or principal during all of the time, due to the good judgment of the members of the Board of Administration; and

WHEREAS, This service of Mr. Stanton as member and president of the board has been given without thought of financial return to himself; and

WHEREAS, The Retirement System, under the leadership of Mr. Stanton and his associates on the Board of Administration has been beneficial to thousands of state employees; therefore, be it

Resolved, That the General Council of the California State Employees' Association, assembled in Long Beach, California, February 11, 1950, hails Thomas Elwood Stanton as a true friend and leader, in whose debt they shall always be for his service in behalf of the Retirement System.

1949 OFFICERS	1950 OFFICERS
<i>President</i>	
W. Rex Servoss	Stanley B. Fowler
<i>Past President</i>	
F. M. Carter	W. Rex Servoss
<i>Vice President</i>	
Stanley B. Fowler	Thomas A. Stead
<i>Secretary-Treasurer</i>	
Charles Smith	Charles L. Smith
<i>Director of Law and Legislation</i>	
Theodore H. Jenner	A. W. Hislop
<i>Director of Civil Service</i>	
A. W. Hislop	T. W. Martin
<i>Director of Public Relations</i>	
Dale B. Frady	Dale B. Frady

capable man devoted to his work and to the public interest.

In addition to other honors for notable contributions he was awarded the Wason Medal in 1934 and the Norman Medal in 1943, both for outstanding work on Portland cement concrete.

Gained Wide Renown

While many research projects have been conducted in the Materials and Research Department which have attracted attention in engineering organizations through the United States and in foreign countries around the world, he is probably best known for work on the durability of Portland cement concrete, and among the various aspects of the durability problem. Mr. Stanton was the first to discover that one of the most marked forms of deterioration in Portland cement concrete was attributable to an internal reaction between constituents in the cement and in the aggregate. In other words, certain brands of Portland cement may contain small percentages of alkalis which cause no trouble unless the sand used contains certain minerals such as opal or similar forms of silica which will react with the alkalis in the cement.

In addition to professional activities, much of which were devoted to the committees having to do with retirement benefits, membership qualifications and professional conduct, Tom was also a member of the Committee on Salaries for the American Society of Civil Engineers, and his interest in the welfare of civil engineers and public employees in general is illustrated by his activities in community affairs such as the Red Cross, Community Chest, Boy Scouts, etc., and most noteworthy of all, of course, are his outstanding efforts and achievements in organizing the State Employees' Association and supervising the development and form of the Employees' Retirement System through its early days, until it became firmly fixed in the State law of California in a manner that renders it free from political manipulation or unfavorable influence.

Those who have had occasion to observe Tom in action during employee meetings or those of other groups have

**RESOLUTION IN HONOR OF
THOMAS ELWOOD STANTON**

WHEREAS, The approaching retirement of Thomas Elwood Stanton has come to the notice of Chapter 2 of the California State Employees' Association; and

WHEREAS, Mr. Stanton is a charter member of this chapter and is one of those engaged in the preliminary steps leading to the organization of the California State Employees' Association, and of Chapter 2 of the association; and

WHEREAS, Mr. Stanton has served the employees of the State in many important capacities, including chairman of the Campaign Committee for a State Retirement System; first president of the California State Employees' Association; chairman of the Civil Service Constitutional Committee; member and president of the Board of Administration, State Employees' Retirement System; Delegate to every meeting of the General Council of the California State Employees' Association; and

WHEREAS, Mr. Stanton in his profession as an engineer has held high and important stations in the Division of Highways of this State; and

WHEREAS, Mr. Stanton has received national and international recognition for his work as an engineer, as shown by his holding national office in engineering organizations and by the publication of articles on engineering practices which have been recognized by merit awards from national engineering societies; therefore, be it

Resolved, That Thomas E. Stanton be congratulated for his achievements, for his contributions, and leadership, and that he be informed by the passage of this resolution of the esteem and good will in which he is held by the members of this association; and be it further

Resolved, That a copy of this resolution be presented to Mr. Stanton at the public meeting to be held in his honor in the City of Sacramento, California, May 25, 1951.

SACRAMENTO CHAPTER NO. 2
CALIFORNIA STATE EMPLOYEES
ASSOCIATION
By HERBERT G. GASKILL,
President, 1951

... Continued on page 52

Moving Forward

Continued from page 51 . . .

Avenue, Rosecrans Avenue, Platt Avenue, Imperial Highway, Firestone Boulevard, Florence Avenue, Atlantic Boulevard, Bandini Boulevard and Washington Boulevard.

Railroad grade separation problem studies are in progress where crossings of the freeway are made with the Pacific Electric Railway main line to Santa Ana, the main line of Union Pacific Railway, the Central Manufacturing District house tracks that are now serving the various industrial plants in the Bandini area, and the main lines to the east of the A. T. & S. F. and Union Pacific Railroads.

Freeway agreements have been entered into with the Cities of South Gate, Lynnwood, Compton, Long Beach and the County of Los Angeles so that the entire length, 16.2 miles, of the Los Angeles River Freeway between its southerly terminus at Pacific Coast Highway and its northerly terminus at the junction of the Santa Ana Freeway has been covered by freeway agreements.

In the establishment of the Los Angeles River Freeway location every effort has been made to cause the least possible interference with existing industries. A freeway, such as the Los Angeles River Freeway, cannot be located so as to be entirely in the clear of all important installations. It is unfortunate that there is no way to avoid interference with the oil refinery fa-

cilities of the Richfield Oil Company northerly of Firestone Boulevard or the manufacturing plant of the American Brake Shoe Company near Slau-son Avenue. Another very important installation, which is affected, is the U. S. Army 822d Air Force Specialized Depot in Maywood. Many conferences have been held with high ranking officers of the Air Force in connection with the freeway location in this vicinity. A design has been worked out which causes a minimum of damage to the Air Force installations. None of the buildings will be affected by the freeway construction but many alterations will have to be made in the railroad siding tracks.

The Los Angeles River Freeway connecting as it will the vast industrial and manufacturing areas easterly of the City of Los Angeles with Long Beach Harbor facilities, is of vital importance as a major north and south traffic artery. The total estimated cost of this freeway is about \$30,000,000 for the 16.2 miles. This is an average cost of considerably less than \$2,000,000 a mile, which is very low for a modern six-lane freeway complete with grade separation structures at all important cross streets and all railroad tracks. This freeway will undoubtedly be classified as of strategic military importance and it can be expected that each year substantial allocations will be made in future state highway budgets so that this freeway can be completed as rapidly as possible.

TESTIMONIAL DINNER

Four hundred-odd co-workers and friends of Thomas E. Stanton tendered him a testimonial dinner on the night of May 25th. The affair was held in Governor's Hall on the State Fair Grounds in Sacramento. Many sections of the State were represented.

Mr. Stanton was presented with a number of gifts among which was a bound volume of hundreds of letters and telegrams from almost every state in the Union and from foreign countries wishing him a happy retirement. Also he was given \$500 worth of camera equipment, including a camera and projector.

Thomas E. Stanton

Continued from page 10 . . .

often been impressed by his ability to direct the activities and especially his capacity to introduce a strong element of sanity and common sense on those occasions when ill-advised or unsound moves have been proposed. It is not difficult for a man in a position of authority to control and direct the organization that must look to him for guidance. It does require a much higher type of ability to guide the actions and procedures of a group in a democratic meeting where many suggestions are inevitably made without considering the long range effects of or all of the implications.

In addition to his many contributions toward the security and welfare of his fellow-employees, Tom Stanton has also established in the minds of those who have known him and worked with him a reputation for personal integrity that is equaled by few, and quoting one of his subordinates who worked in close contact with him for nearly 20 years, "Mr. Stanton is the most honest man whom I have ever known."

of practical value in supplementing the basic course content.

Cordially yours,
ROBERT C. GILLINGHAM, Chairman
Social Science Department

OFF WITH THE OLD; ON WITH THE NEW

In his column "On the Square" appearing in the *Pasadena Independent* on May 20th last, Ed Essertier has this comment:

"MONEY'S WORTH — Just 40 years ago this week, the city bonded itself for \$100,000 to pay half the cost of the Colorado Street bridge. (The county paid the other half.) This week, as a new \$3,500,000 bridge begins taking shape, city directors will make the last payment on the old one. Total interest on the bonds, at 4½ percent over 40 years, has been \$92,250."

COLLEGE APPRECIATIVE

COMPTON COLLEGE
Compton, California

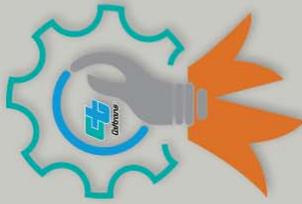
June 4, 1951

KENNETH C. ADAMS, *Editor California Highways and Public Works*, Sacramento, California

DEAR EDITOR, I am writing to again express the appreciation of myself and our institution of the receipt of your magazine, *California Highways and Public Works*, during the passed school year.

This publication has been circulated in our economic and government classes, now numbering in excess of 600 students. We find such material to be

Environmental Planning & Engineering



EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF ENVIRONMENTAL PLANNING & ENGINEERING

DISTRICT 4

Innovation: Cormorant Management for the San Francisco-Oakland Bay Bridge

As mitigation for the loss of nesting habitat on the original bridge, innovative nesting platforms and enticements were installed on the new bridge



Mirrors to visually increase cormorant numbers



Decoy Nests



Decoys



This year monitors counted over 530 nests on the original east span



Double Crested Cormorants have nested on the bridge since 1984



Enticements added to the new bridge are colony sounds, decoys, artificial nests, and mirrors



Cormorant Nesting Colony Area

Foundation Decoys

Platforms for 1000 nests

Roosting habitat includes the cable crossing box and pier foundations





EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF ENVIRONMENTAL PLANNING AND ENGINEERING

Deputy District Director: **Melanie Brent**

Number of Division Employees: **145**

Contact Person: **Stefan Galvez**

INNOVATION: CORMORANT MANAGEMENT FOR THE SFOBB PROJECT

Double Crested Cormorant (*Phalacrocorax auritus ssp. albociliatus*)



Natural History:

Habitat: fresh, brackish, and saline waters along the coast, in estuaries, lakes, ponds, rivers, lagoons, and reservoirs.

Life History: Colonial with a nesting season that lasts from March-August. They lay an average of four eggs which hatch after 30 days of incubation. Young fledge at approximately six weeks.

Background

In 1984, a cormorant colony was found on the original east span of the San Francisco-Oakland Bay Bridge. Currently, several hundred cormorants nest on the original bridge, particularly between piers E7 and E10. The cormorants nest underneath the bridge deck and in the girders of the towers.

Management Strategy

Cormorant impacts are being managed through two major efforts: 1) creation of new habitat and enticement and 2) avoidance of impacts during nesting season (March-August).

Cormorant Nesting Platforms and Enticement

To mitigate for the removal of the habitat on the original bridge, nesting platforms were added to the new span. The platforms were constructed in 2006 and positioned adjacent to the colony center on the original span. The platforms are designed to accommodate 1,000 nests spaced approximately three feet apart. In order to draw the cormorants to the new habitat, several enticement measures have been implemented.

As colonial nesting birds, the cormorants are drawn to nesting sites that are already in use by other cormorants. To simulate this scenario on the new habitat, the Department installed several decoy cormorants and nest starts. Three sided mirror boxes help to create the illusion that more birds are nesting on the platforms. In addition, a set of speakers play cormorant calls during nesting season to attract cormorants to the site. The platforms have been available as habitat since 2009 but have yet to host a nesting pair.





EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF ENVIRONMENTAL PLANNING & ENGINEERING

ABOVE AND BELOW: STORIES FROM OUR CHANGING BAY

About the Division

Caltrans formed the Division of Environmental Planning & Engineering in 1970s in response to the enactment of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). The Division is obligated for managing Caltrans' responsibilities under all applicable federal and state environmental laws and regulations. The Division consists of an interdisciplinary team of planners, engineers, archaeologists, architectural historians, biologists, and landscape architects. Their mission plays an integral role in the Project Development process.

Background

On October 17, 1989, the Loma Prieta earthquake rocked the San Francisco Bay Area, causing significant damage throughout the region, including the failure of a portion of the San Francisco-Oakland Bay Bridge. After a protracted process that took nearly ten years, the decision was made to replace the East Span with a new structure. Consultation under Section 106 of the National Historic Preservation Act resulted in a finding of adverse effect – several historic properties would be impacted as part of the replacement project, including the historic San Francisco-Oakland Bay Bridge. To mitigate adverse effects, the consulting parties entered into a Memorandum of Agreement outlining dozens of stipulations to be implemented. One required Caltrans to create an exhibit relating to the history and engineering of the major bridges of the San Francisco Bay. Above & Below: Stories From Our Changing Bay, presented at the Oakland Museum of California, the "OMCA," is the result.

Project Description

Caltrans partnered with the Oakland Museum of California to present the museum exhibition titled Above and Below: Stories From Our Changing Bay, which ran from September 2013 until February 2014, and reached approximately 62,000 visitors. The exhibition explored the historically layered hybrid landscapes in which human engineering and natural processes have come together over time to shape and re-shape the land and water around the San Francisco Bay. The goal was for visitors to see the Bay and its history in the current landscape and to better understand how our lives are continually shaped by the natural world of the Bay, and how we in turn shape it.

The exhibition was visually appealing and rich with historical artifacts from throughout the Bay Area. Evidence of human interaction with the environment over time is etched in traces and scars upon the natural environment. Sunken ship hulls, cannon balls and other human detritus covered with blooming marine life helped tell the story. Salvaged parts from the Bay Bridge were displayed as well, including the 12 foot tall neon clock and "stop pay toll" sign which once graced the Oakland toll plaza. Video and audio clips made from around the San Francisco Bay augmented the complicated story. Technology played an important role throughout the exhibition.

Innovation

The mitigation was innovative for a number of reasons:

- 1) The scale of the exhibition was much larger than anything previously undertaken by Caltrans, within District 4 as well as across the state. The exhibition filled three exhibit halls at the Oakland Museum of California.
- 2) Holistic approach, contextualizing the unique cultural resources within framework of the entire Bay, allowing us to present a range of topics in an interconnected network, while focusing on the unique engineering achievement that is the original San Francisco-Oakland Bay Bridge.
- 3) Partnership with the Oakland Museum of California allowed for us to leverage their strengths, using various technologies, social media and oral histories.



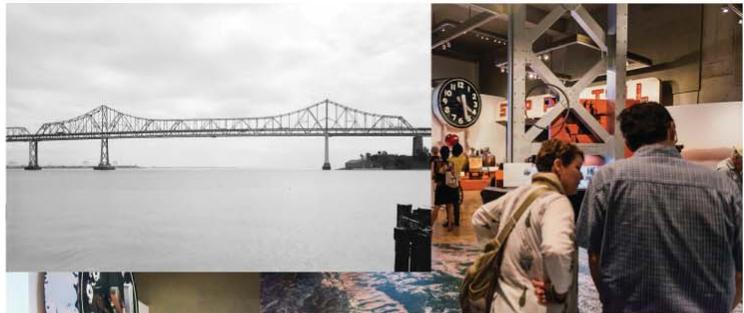
Oral Histories

A separate mitigation measure required the completion of oral history interviews focused on men and women who spent their careers working on the San Francisco-Oakland Bay Bridge. The Regional Oral History Office, part of Bancroft Library at University of California, Berkeley, was contracted to complete interviews and contribute the results to Above and Below. Twelve oral histories, totaling approximately 30 hours, were conducted. Video recordings of interview are interspersed throughout the exhibition adding richness and a personal dimension. Additionally, the transcripts and video clips are posted on the web accessible to students, scholars, and the public interested in the San Francisco Bay.

<http://bancroft.berkeley.edu/ROHO/projects/baybridge/about.html>

New Technology

A combination of historic photography combined with the recreated landscape helped guide the recreation of a 14-foot-high, 3D projection of Emeryville Shellmound, the location of Native American habitation site. Visitors passed under an arbor of willow and tule to enter "behind" and "in" the mound. A timeline mural with dense graphics and text along the back wall explored the complex accretion of history at this particular shellmound site.





EMPOWER | INNOVATION | CHAMPIONS
2014 INNOVATION FAIR
DIV OF ENVIRONMENTAL PLANNING & ENGINEERING

Deputy District Director: Melanie Brent

Number of Division Employees: 145

Contact Person: Noah Stewart

ABOVE AND BELOW: STORIES FROM OUR CHANGING BAY

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Above & Below: Stories From Our Changing Bay was developed to mitigate adverse effects on cultural resources from the San Francisco-Oakland Bay Bridge (SFOBB) East Span Seismic Safety Project.



Visitors examine at historical objects from the original SFOBB.



Visitor engages with a model building activity describing engineering of the Self Anchored Suspension segment of the new East Span of the SFOBB.



External Affairs



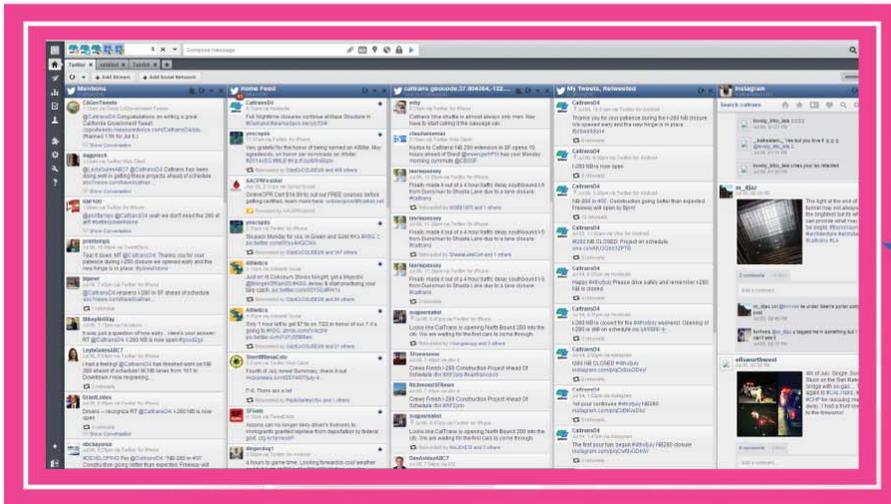
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2014 INNOVATION FAIR

DISTRICT 4

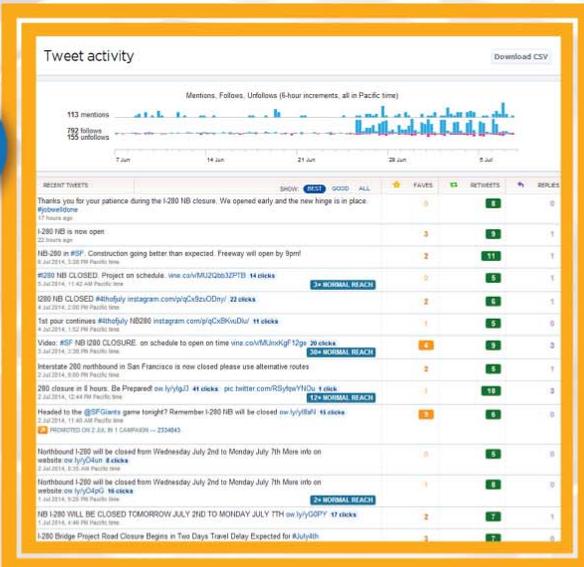
DIVISION OF

EXTERNAL AFFAIRS



Social Media Manager
allows for the
management of multiple
accounts at once

Analytics of campaigns
provide data points on
information and rates of
engagement



Statistical data
allows for target
constituents with
precision

Notifications tracking
allows for real time
interaction and
engagement



Caltrans I-280 Social Media Outreach

Social Media Tools & Statistical Analysis

Twitter

562K

People Reached

Facebook

442K

People Reached

Backlink
Engagement

1M+
ER 2.7%

Backlink
Engagement

Backlink
Engagement

Google

79K
Reached

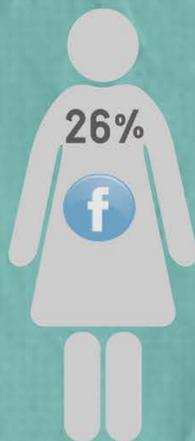
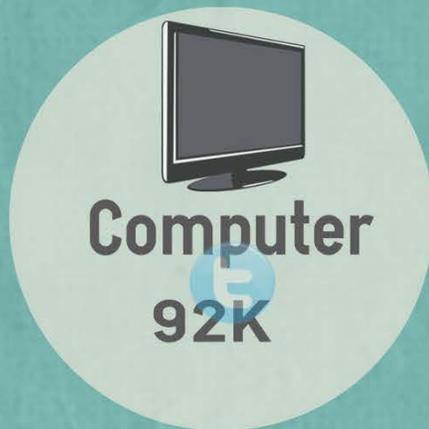
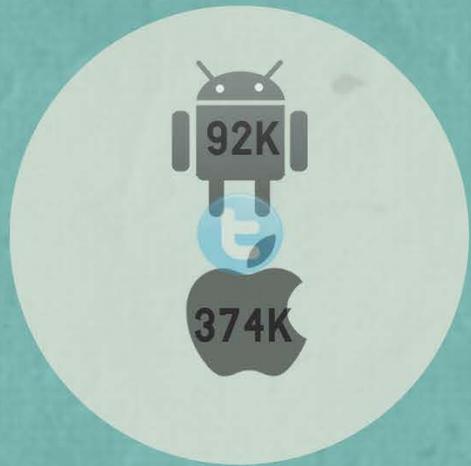
YouTube

Over 30K
Video Views



Caltrans®

How Is the Information Consumed?



Women

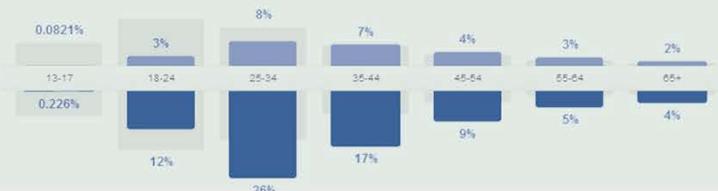
26% Your Fans

46% All Facebook

Men

73% Your Fans

54% All Facebook



Maintenance



EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF MAINTENANCE

Challenge: Reduce water consumption during prolonged drought **Innovation:** Smart Irrigation Controllers

Smart irrigation controllers reduce overall water usage by an average of 25% by tailoring watering schedules and run times based on current weather conditions, site conditions, and other landscape needs. This helps Caltrans achieve the Governor's goal of 20% water usage reduction by 2020 (Executive Order B-18-12) and Director Dougherty's goal of reducing Caltrans' water usage by 50%.

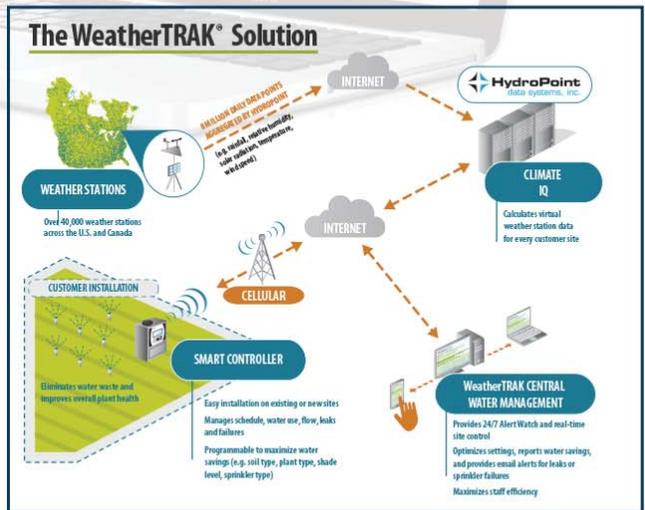
Safety to Employees: Minimizes on-site operations and time spent in the field. The controller system provides alerts to staff including locations and type of problem.



Image Courtesy of Olle Ealy, Caltrans District 4

Sr. Landscape Architect Lorena Wong, Landscape Associate Lori Richardson, and Hydropoint Personnel programming smart controllers in San Jose.

Cost and Time: The service has a minimal ongoing subscription fee, which is offset by reduced water bills. Timely repairs of broken irrigation systems due to automatic alerts also reduce costs of replacement plantings and repairing other incidental damage. No IT infrastructure or software is required, only internet access via computers, laptops, or smart phones.



Bottom Left: Image of WeatherTrak ET Pro 3 | Image courtesy of HydroPoint Data Systems, Inc.



EMPOWER | INNOVATION | CHAMPIONS

2014 INNOVATION FAIR

DIVISION OF MAINTENANCE

Deputy District Director: Nader Eshghipour

Number of Division Employees: 1315

Contact Person: Lorena Wong

Challenge: Reduce water consumption during prolonged drought

Innovation: Smart Irrigation Controllers

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EMPOWER | INNOVATION | CHAMPIONS
2014 INNOVATION FAIR
DIVISION OF MAINTENANCE

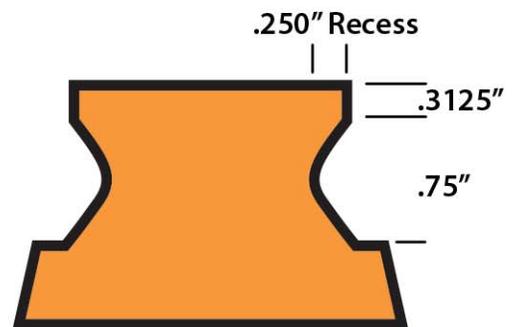
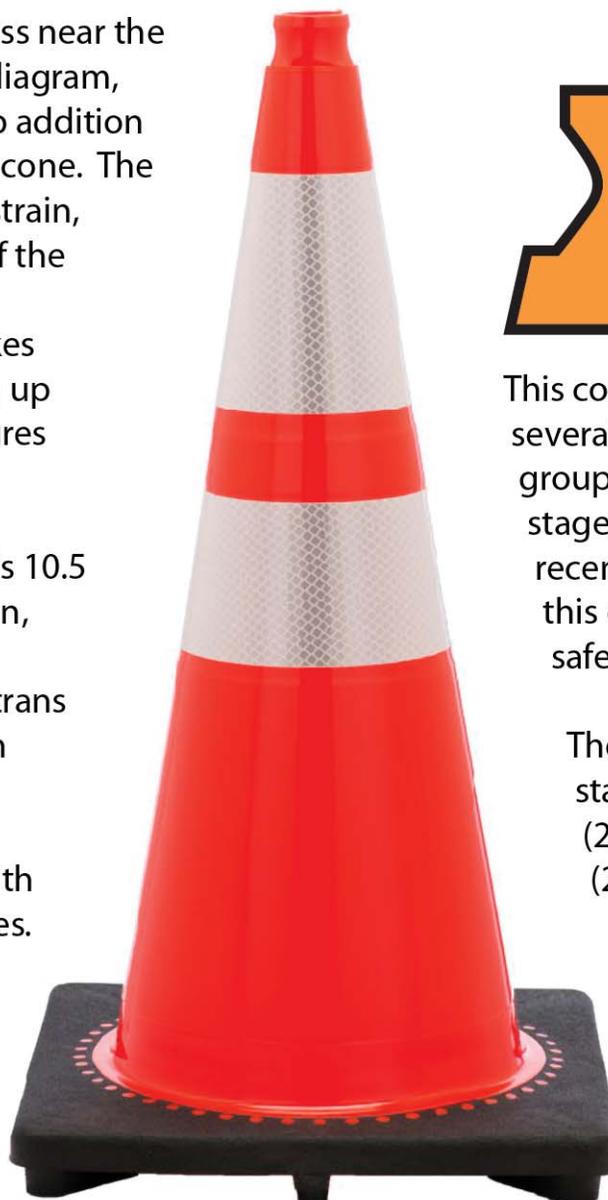
Deputy District Director: Nader Eshghipour
Number of Division Employees: 1315
Contact Person: Vincent Esguerra

Challenge: Heavy and Cumbersome Safety Cones
Innovation: Ergonomic Traffic Cones

The addition of a recess near the top, as shown in the diagram, provides a simple grip addition to a traditional safety cone. The recess reduces hand strain, while leaving much of the original cone design unchanged. This makes dropping and picking up cones from lane closures easier.

The 28 inch tall cone is 10.5 pounds. In comparison, some 28 inch cones currently used by Caltrans forces normally weigh over 14 pounds.

The cone can stack with traditional safety cones. Additionally, cones will not stick together when stacked on the belt of a cone truck.

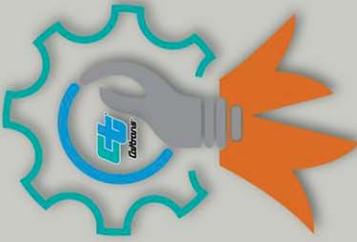


This cone has been tested by several Caltrans Maintenance groups while in the prototype stage. The manufacturer has recently decided to incorporate this design feature into all of its safety cones.

These cones meet all standards for CA MUTCD (2012) and FHWA MUTCD (2009). The product is made of at least 60% recycled materials by weight and is 100% recyclable, exceeding the standards of Public Contract Code 12209(f)(1).

Above: RS70045CT+3M64 28" Safety Cone. Images courtesy of JBC Safety Plastic Inc.

Traffic Operations



EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DISTRICT 4

TRAFFIC OPERATIONS SYSTEM (TOS) REHABILITATION PROGRAM

Responding to urgent TMC needs for Caltrans, CHP and MTC

Transportation Management System (TMS)

A collective approach comprised of devices and systems to effectively and efficiently manage the state highway transportation system including the TOS field equipment serving the Traffic Management Center (TMC), CHP, Freeway Service Patrol, and 511.

Why do we have TMS in the Bay Area?

- Real-time Traffic Monitoring
- Incident Management and Response
- Traveler Information
- Corridor Management
- Performance Measurement

TOS field equipment

- Ramp Meters (RM)
- Changeable Message Signs (CMS)
- Closed Circuit TVs (CCTV)
- Vehicle Detection Stations (VDS)
- Highway Advisory Radio (HAR)

Challenges

- The current and planned operational strategies (Integrated Corridor Management, Express Lanes, Freeway Performance Initiative, Active Traffic Management, etc) required a significant expansion of TOS infrastructure over the last two decades and it will continue to grow in the coming years.
- Traffic Operations and Maintenance have not been able to fully fund the resource needs of the system growth.
- The District experiences a high system monthly degradation rate due to the age of the system devices, wire thefts, etc.
- Equipment degradation competes monthly with repairs at 2:1 requiring monthly investment for performance goal of above 90%

Innovative Solutions and Approaches To Address The Challenges

- Inventory assessment
- District TOS program/process review
- Resource redirection and reorganization
- Technical and coordination workshops
- Regular Caltrans/MTC/CHP focus workgroup meetings
- Emergency contracts in teamwork with industry for the immediate repairs
- Evaluation and implementation of the wire theft deterrent methods/measures
- Wire theft reporting procedure, information sharing and collaboration with CHP
- Bi-weekly progress briefings to District Executive Management team
- Inform stakeholders (Caltrans, MTC, CHP, CMAs, counties and cities, etc) involved in the investment, deployment, use, operation and maintenance of the system
- TOS progress briefings to MTC Operations Subcommittee
- Public updates quarterly at MTC Operations Committee

Results

- Streamlined District TOS troubleshooting and repair processes/procedures
- Involvement and teamwork from all appropriate District Divisions for TOS Rehab Program
- Improved communication and coordination with the stakeholders such as MTC, CHP, etc
- Caltrans/MTC pilot TMS service contract for I-880
- Roadmap to address the long-term TMS/TOS program needs working collaboratively with Caltrans HQ, MTC and local partners.
- District TOS system performance improvements and above 90% Goals

TOS Element	#	Operational Performance	
		Jan 2013	Aug 2014
Ramp Meters	403	86%	94% +8%
Changeable Message Signs	156	65%	93% +28%
Closed Circuit TVs	412	44%	75% +31%
Vehicle Detection Sensors	8539	51%	53% +2



Mission: Provide a safe, sustainable, integrated & efficient transportation system to enhance California's economy & livability



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DISTRICT 4

TRAFFIC OPERATIONS SYSTEM (TOS) REHABILITATION PROGRAM

* Responding to urgent TMC needs for Caltrans, CHP and MTC*

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AVI GRAPHICS | CTCS&I | MAR 2014 | 081114



EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF TRAFFIC OPERATIONS

Deputy District Director: Sean Nozzari

Number of Division Employees: 279

Contact Person: Cheema Gursharnjeet

TUNNELS CONTROL SYSTEMS

OVERVIEW

Tunnel Lighting Control: Photoelectric sensor provides outside ambient light data to SCADA for analysis and control of lighting circuits for optimal lighting in the tunnel.

Carbon Mono Oxide (CO) and Nitro Oxide (NO) Control: If CO or NO exceeds the pre-set limits, SCADA will activate jet fans closest to the sensors with alarming information. If sensors continue to report above the pre-set limit, all other jet fans will be activated in sequence and alarm will notify operator for further actions.

Linear Heat Detector Control: Sensors at various zones in the tunnel constantly provide status information, when pre-set limits exceeds, SCADA will activate the jet fans and alarms the operator for further actions.

Changeable Message Sign (CMS) and Variable Message Sign (VMS) Control: CMS and VMS display pre-set or free form messages to motorists during emergencies and non emergencies situations.

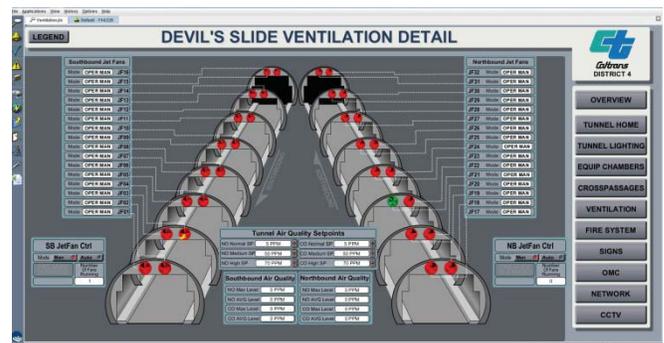
Call Boxes: Call boxes in the tunnel provide status report to SCADA system, which activates alarm and inform the operator the activated call box location.

Radio- Rebroadcast (AM & FM) Systems: AM and FM systems broadcast pre-set or live messages via operator during emergencies.

Closed Circuit TV Cameras: Allows operator to verify incidents and facilitates timely dispatch of appropriate response to the scene.



Caldecott Control System



Devil's Slide Ventilation System





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DIVISION OF TRAFFIC OPERATIONS

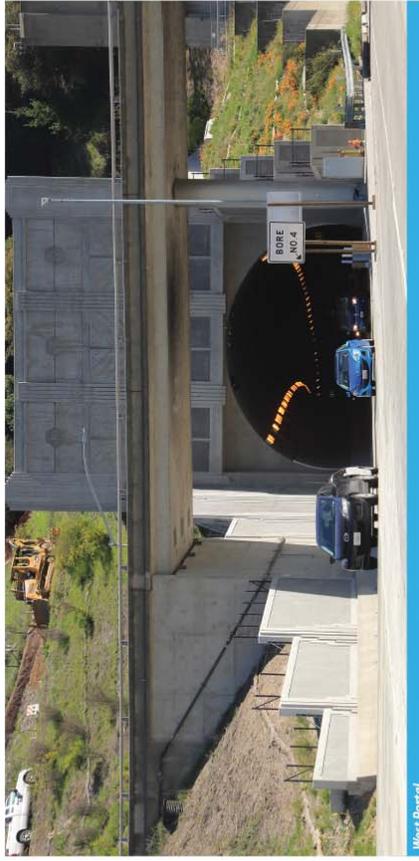
DISTRICT 4

DEVIL'S SLIDE TUNNELS

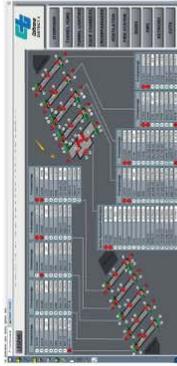


South Portal

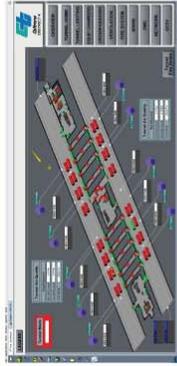
CALDECOTT TUNNELS



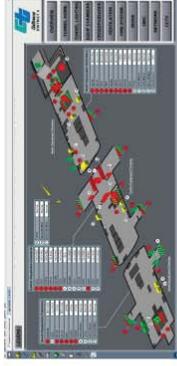
West Portal



Crosspassage Detail



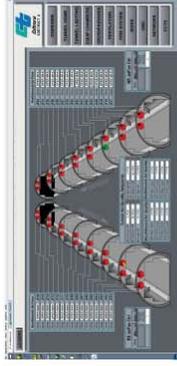
Fire System Detail



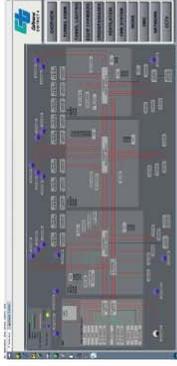
Equipment Chambers Detail



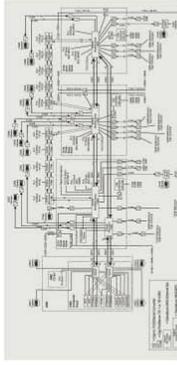
Lighting Control



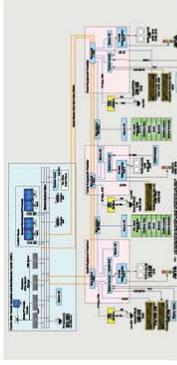
Ventilation Detail



Network



Data Communications Network



Control System Configuration



VMS & Jet Fan Detail



Cross Passage Entrance



Jet Fan Installation Detail



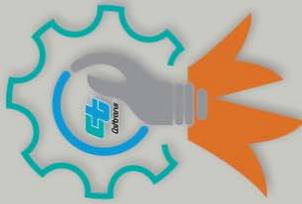
SCADA Control Room



Call Box & Fire Equipment Niche



Substation Room



DISTRICT 4

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DIVISION OF TRAFFIC OPERATIONS

ROUTE 35 (Sloat Boulevard) – City of San Francisco

ROADWAY DIET

Increases pedestrian safety by shortening their crossing distance and decreasing their exposure to traffic.



PRE-ROADWAY DIET CONFIGURATION



POST-ROADWAY DIET CONFIGURATION



POST-ROADWAY DIET CONFIGURATION



POST-ROADWAY DIET CONFIGURATION

SIDEWALK BULB OUTS

Increases pedestrian safety by making them more conspicuous to motorists while waiting to cross the highway.



SW CORNER OF FOREST VIEW/VALE



SE CORNER OF FOREST VIEW/VALE



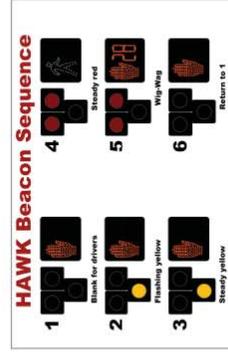
NW CORNER OF FOREST VIEW/VALE



WEST MEDIA OF FOREST

HIGH INTENSITY ACTIVATED CROSSWALK BEACON

Increases pedestrian safety by providing a protected phase for pedestrians to cross the highway.



HAWK BEACON SEQUENCE



"BLANK" HAWK



"FLASHING/STEADY YELLOW" HAWK



"STEADY RED" HAWK



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2014 INNOVATION FAIR

DIVISION OF TRAFFIC OPERATIONS

Deputy District Director: Sean Nozzari

Number of Division Employees: 279

Contact Persons: Ramiel Gutierrez & Einar Acuna

CONSTRUCT ROADWAY DIET AND INSTALL HAWK PEDESTRIAN SIGNAL

Location:

In the City of San Francisco, on Route 35 (Sloat Boulevard), from Everglade Drive (PM 2.4) to Route 1 (19th Avenue) (PM 3.2).

Problem:

How to increase the safety of pedestrians who are crossing in the marked crosswalks at the unsignalized intersections on Route 35 (Sloat Boulevard), between Everglade Drive and Route 1 (19th Avenue). As traffic signal warrants are not satisfied at any of the unsignalized intersections, traffic signals cannot be placed.

Solution:

- 1) Restripe Route 35 (Sloat Boulevard), between Everglade Drive and Route 1 (19th Avenue), from six lanes to four lanes to reduce pedestrian exposure to vehicular traffic by shortening their crossing distance.
- 2) Install the enhanced striping and signing package at the intersections to direct motorists to stop 20 feet in advance of the marked crosswalk when yielding to pedestrians who are crossing at the intersection.
- 3) Construct a bulb-out at each corner to make pedestrians more conspicuous to motorists, and install a HAWK (High-Intensity Activated Crosswalk) Beacon that, once activated, will give pedestrians a protected crossing phase at the Sloat Boulevard/Vale Avenue/Forest View Drive intersection.

Benefits

- Reduced pedestrian exposure to vehicular traffic
- Greater off-set distance between vehicles and pedestrians crossing
- Bulb-outs enable pedestrians to become more conspicuous to motorists
- HAWK beacon manufactures a protected crossing phase for pedestrians



New lane configuration along Route 35 (Sloat Blvd)



EB Route 35 (Sloat Blvd) traffic stopped for "steady red" light on HAWK at Forest View/Vale intersection as prepares to cross. Bulb-out shown on SE corner of intersection.



Program/Project Management



DISTRICT 4

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DIVISION OF
PROGRAM/PROJECT MANAGEMENT





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2014 INNOVATION FAIR
DIVISION OF PROGRAM/PROJECT MANAGEMENT

Deputy District Director: Doanh Nguyen

Number of Division Employees: 202

Contact Person: Nick Saleh & Dina El-Tawansy

NEW “i-TEAM” BUSINESS MODEL FOR SANTA CLARA CO.

The California Department of Transportation (Caltrans) and the Valley Transportation Authority (VTA) established a collaborative decision-making structure called the Innovative Delivery Team (iTEAM) Demonstration Program to improve the project delivery and highway operations within Santa Clara County.

The i-TEAM is an innovative business model for the cooperative delivery of transportation projects, operation of State highways and local assistance within the county. It incorporates existing staff, new positions, new decision-making responsibilities, improved processes, the testing and use of new technologies, and training.

"Successful partnerships create successful public transportation projects," said Caltrans Director Malcolm Dougherty. "By increasing communication, sharing resources, and partnering closely with local agencies like VTA, we can overcome obstacles and deliver much-needed projects faster."

Three cooperative agreements were signed on September 9, 2013, between Caltrans and VTA authorizing the hiring of new staff members that are dedicated to the following three focus areas:

- Project Delivery
- Traffic Operations
- Local Assistance

The organizational structure of the iTEAM consists of three levels:

- Focus Teams
- Leadership Team
- Executive Steering Committee (ESC)

Goals of the iTEAM are as follows:

- Serve as an organization of combined Caltrans & VTA staff to address traffic operations' challenges.
- Improve the process by which State and federally funded projects are delivered in Santa Clara County.
- Improve communication and the timeliness of decision-making.
- Optimize current staff positions to improve efficiency



and effectiveness.

- Scope and test process improvements to utilize materials, funds, resources and/or services of both agency's members of the iTEAM.
- Enhance the VTA Quality Assurance/Quality Control (QA/QC) Program to incorporate Caltrans input requirements into this program.
- Streamline the collaborative decision-making structure to improve the project delivery, highway traffic operations, and local assistance services within Santa Clara County.

i-TEAM INITIATIVES:

In an effort to achieve the above listed goals, the staffs of both agencies have been engaged in providing a list of enhancement opportunities that were summarized on the basis of category, priority, start-up time, implementation time, and level of effort required. Categories included program-wide opportunities in traffic operations, local assistance, and project development. This list, in addition to the Capital Delivery Workplan, are live documents and will serve as the roadmap to iTEAM work.





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2014 INNOVATION FAIR

DIVISION OF PROGRAM/PROJECT MANAGEMENT

Deputy District Director: Doanh Nguyen

Number of Division Employees: 202

Contact Person: Shahradd Mahini (510) 286-5546

100% DELIVERY SUCCESS FOR 9 YEARS IN A ROW!

Always promoting mobility improvement across California, the Division of Program/Project Management (PPM) has and will continue to play an ever increasing role in the management and timely delivery of all projects in District 4.

As part of this PPM commitment, District 4 has attained 100% project delivery for the past nine (9) years in a row regarding all programmed Ready-To-List (RTL) milestones in the Contract-For-Delivery (CFD), an annual document signed by the Caltrans Director and the District Director.

9 Years—An Incredible Commitment!

Successful project delivery included overcoming many RTL challenges and obstacles in order to meet these CFD delivery commitments. Over this nine-year achievement period, a total of 406 CFD projects were successfully delivered with a combined construction capital value of over \$5 billion.

PPM business practices are the cornerstone for ensuring the delivery of CFD projects. Teamwork, communication, and innovation of CFD processes are critical to the District's continuous ability to deliver RTL projects effectively and efficiently. Some of these processes include: Weekly/Bi-Weekly CFD Risk Meetings with all stakeholders, Monthly CFD Meetings with all Project Managers and Functional Managers, and the District 4 Weekly CFD Report to Executives.



CONGRATULATIONS ON A JOB WELL DONE!—TOP PHOTO: District Director Bijan Sartipi is seen at a District 4 Diamond Delivery Celebration thanking the various Project Development Team (PDT) members who were responsible for the successful 100% delivery of RTL projects. **LEFT PHOTO:** Chief Deputy District Director Dan McElhinney (2nd FROM LEFT) is overseeing a Diamond Delivery tradition whereby a Project Manager (Ahmad Rahimi) acknowledges his “delivered” project on the “We Promise To Deliver!” Board with a Caltrans orange diamond sticker as Project Development Team (PDT) members look on as well.





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DIVISION OF PROGRAM/PROJECT MANAGEMENT

100% DELIVERY SUCCESS FOR 9 YEARS IN A ROW!

Contract for Delivery FY	RTL Delivery Results	Number of Programmed RTL Projects					Programmed Construction Capital Value (Millions)				
		1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total
2005-06	100%	2	7	7	20	36	\$34.3	\$124.0	\$229.3	\$236.8	\$624.4
2006-07	100%	12	4	8	22	46	\$10.0	\$24.4	\$204.6	\$304.0	\$543.0
2007-08	100%	5	10	20	18	53	\$60.3	\$83.7	\$213.9	\$334.2	\$692.1
2008-09	100%	4	21	8	13	46	\$282.0	\$77.5	\$371.3	\$133.0	\$863.8
2009-10	100%	13	10	25	9	57	\$189.8	\$137.0	\$646.5	\$31.7	\$1,005.0
2010-11	100%	15	11	16	18	60	\$165.0	\$13.4	\$35.4	\$174.3	\$388.1
2011-12	100%	5	12	9	18	44	\$32.1	\$133.1	\$58.5	\$100.6	\$324.3
2012-13	100%	4	2	10	14	30	\$52.0	\$5.7	\$61.4	\$142.8	\$261.9
2013-14	100%	1	3	9	21	34	\$88.4	\$66.0	\$41.8	\$153.1	\$349.3
9-Year TOTALS	100%	406 Projects					\$5,052 (Million)				



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DIVISION OF
PROGRAM/PROJECT MANAGEMENT



PRSM

PROJECT RESOURCE & SCHEDULE MANAGEMENT

**“PRSM ROLLOUT BRINGS
REAL-TIME METRICS TO DISTRICT 4”**



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2014 INNOVATION FAIR

DIVISION OF PROGRAM/PROJECT MANAGEMENT

Deputy District Director: Doanh Nguyen

Number of Division Employees: 202

Contact Persons: Ramsey Messieh (510) 286-5299 & Toufic Saleh (510) 622-5926

PROJECT RESOURCE & SCHEDULE MANAGEMENT (PRSM) ROLL-OUT BRINGS “REAL-TIME” METRICS TO DISTRICT 4

The “new” Project Resource & Schedule Management (PRSM) initiative was successfully rolled-out within District 4 by the Division of Program/Project Management in 2013 to enhance the way Capital Outlay Support (COS) projects are planned, resourced, managed and reported throughout each project’s lifecycle.

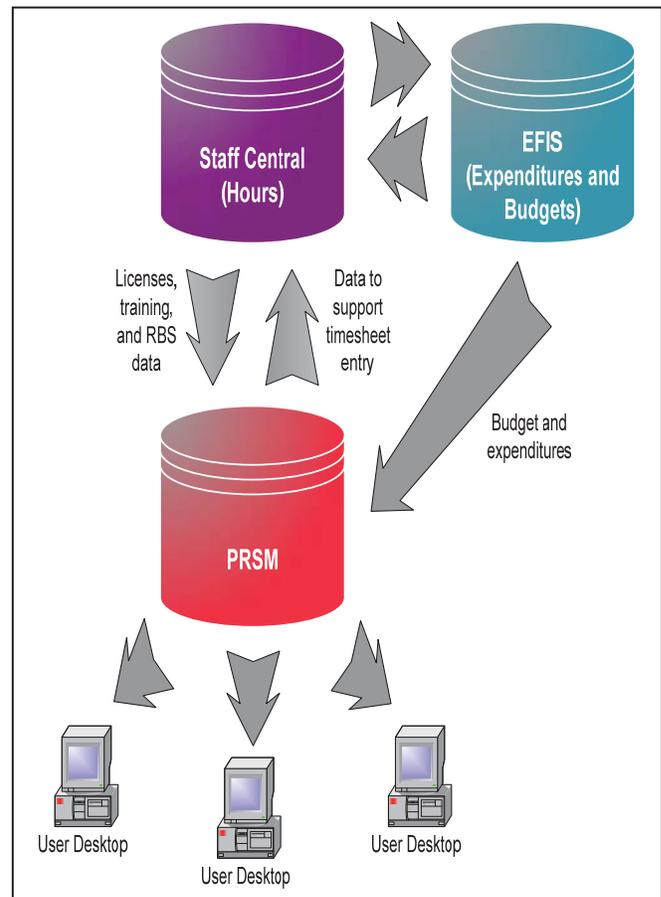
A key benefit of PRSM is the availability of all project data in “real time” through integration with Staff Central and EFIS in a single statewide project management tool. With “real time” data available, PRSM is able to calculate and present key project metrics to give Project Managers and Functional Task Managers the capability to quickly assess the health and status of a project.

Other PRSM benefits include:

- Ability to view current cost and schedule information using a web browser
- Control labor cost charging errors and inconsistencies
- Estimation of future workloads
- Creation of project plans based on similar projects
- Ability to view resource availability
- Comparison of Project Costs vs. Budget
- Ability to customize reports and project templates

As part of the roll-out, the data of over 600 COS projects was initially uploaded and validated in system. All Project Managers and Task Managers were provided PRSM training followed by daily drop-in sessions in the PRSM Training Room. All training was designed to provide end users with the information and skills necessary to perform their work using the new system.

In addition, a D4 PRSM Support Desk at 510-622-5757 was established to answer PRSM questions and address any issues, and District 4 Subject Matter Experts (SME’s) were identified to assist as needed.



PRSM “REAL-TIME” INTERFACES

To support Resource Management & Timekeeping, a bi-directional interface has been developed between PRSM and Staff Central. PRSM also receives budget/expenditures data from EFIS. Thus, PRSM interfaces with Staff Central and EFIS to allow Project Managers and Functional Task Managers the ability to view current cost, schedule information, and resource availability in “real time”.





DISTRICT 4

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2014 INNOVATION FAIR

DIVISION OF
PROGRAM/PROJECT MANAGEMENT



***“Promoting Small Business Involvement
in California’s Transportation Projects”***



EMPOWER | INNOVATION | CHAMPIONS

2014 INNOVATION FAIR

DIVISION OF PROGRAM/PROJECT MANAGEMENT

Deputy District Director: Doanh Nguyen

Number of Division Employees: 202

Contact Person: Romy Fuentes (510) 622-8803

CALMENTOR PROGRAM PROMOTES SMALL BUSINESS GROWTH

Under the leadership of the Division of Program/Project Management, the District 4 Calmentor Program has successfully promoted the growth of Small Business involvement in various transportation projects since January 2007.

Prior to the Calmentor Program, there had been very limited opportunities for Architectural and Engineering (A&E) Consultants who were Small Business Enterprise (SBE) firms, Disadvantaged Business Enterprise (DBE) firms and/or Disabled Veterans Business Enterprise (DVBE) firms.

The District 4 Calmentor Program is very innovative because it has provided the needed opportunities for SBE, DBE and DVBE sub-consultants to network, connect and establish working relationship with A&E Prime Consultants. This has been made possible through the sub-consultants participation as Protégés, who are either qualified firms to be, or already certified as SBE, DBE or DVBE. The Protégés are paired and mentored by Prime Consultants, who serve as Mentors in the Program.

The Program is also innovative because it has created a pool of qualified and certified SBE, DBE and DVBE firms who became available to the Primes for purposes of submitting highly qualified responses to Requests for Qualification (RFO) issued by Caltrans and other local transportation agencies.

As owners of transportation projects, Caltrans and other local agencies have benefited from the District 4 Calmentor Program when highly qualified consultants and sub-consultants from the Calmentor membership participate in their respective A&E contract procurement opportunities.



PROTÉGÉ GRANTED GRADUATE STATUS---One of the Calmentor Program's Protégés (CENTER) is seen receiving his firm's Graduation Certificate during the Calmentor Event on May 5, 2014.



MENTOR FIRMS RECOGNIZED---Several established A&E firms, who serve as Mentors to small "Protégé" firms seeking to grow their business in California transportation projects, were recognized by (FAR RIGHT, L-R) Caltrans Director Malcolm Dougherty and District 4 Director Bijan Sartipi during the Calmentor Event on May 5, 2014.



Right of Way/Land Surveys



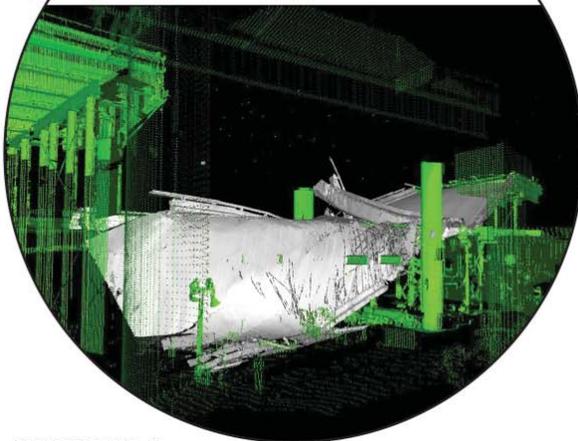
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DIVISION OF RIGHT OF WAY & LAND SURVEYS

The Promise and Future of LiDAR

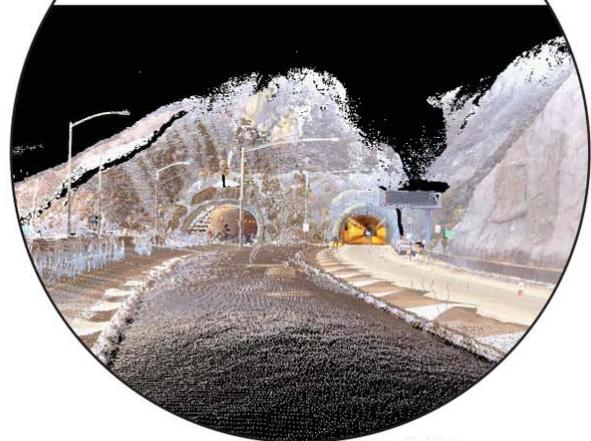
A key benefit of LiDAR technology is that a single dataset can be used for all of these applications and more.

Emergencies



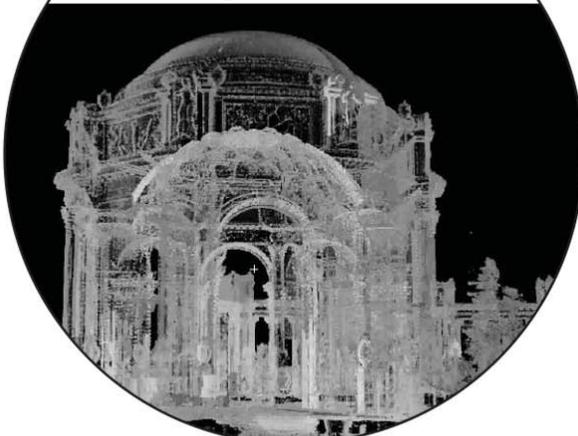
I-80/880/580 Collapse

Design & Construction



Devil's Slide

Historic Building Preservation



San Francisco Palace of Fine Arts

Maintenance & Operations



Contra Costa I-80



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DIVISION OF RIGHT OF WAY & LAND SURVEYS

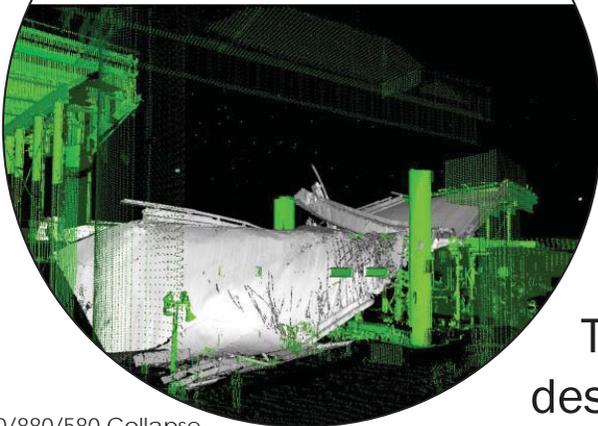
Deputy District Director: Mark L. Weaver

Number of Division Employees: 179

Contact Person: Nelson Aguilar

The Promise and Future of LiDAR

Emergencies



80/880/580 Collapse

The key benefits of collecting LiDAR data is that it can be used for a variety of applications . As seen here, a 3D model of the MacArthur maze provides a picture of the existing conditions that existed prior to construction. The data was used to expedite the design and construction of the repair.

The 3D model produced using LiDAR data for the Devil's Slide project provided an accurate post construction as-built of the tunnels. The model shows a unique perspective from the ground and gives a view inside the new tunnels.

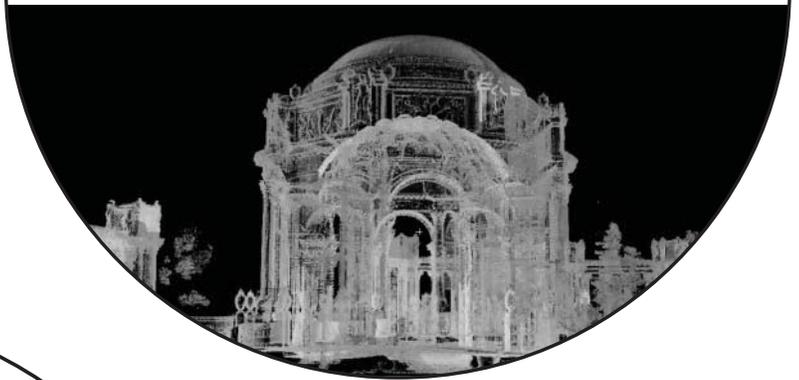
Design and Construction



Devil's Slide

LiDAR was used to scan the San Francisco Palace of Fine Arts as a baseline to monitor that the integrity of the building would not be affected during construction. The level of detail in the scan provides a real inside look at the Palace.

Historic Building Preservation



San Francisco Palace of Fine Arts

Maintenance and Operations



Contra Costa 80

Moving into the future of LiDAR, the possibilities are endless. This image shows the use of LiDAR data to collect overhead signs and extract sign size and vertical clearance to the roadway.



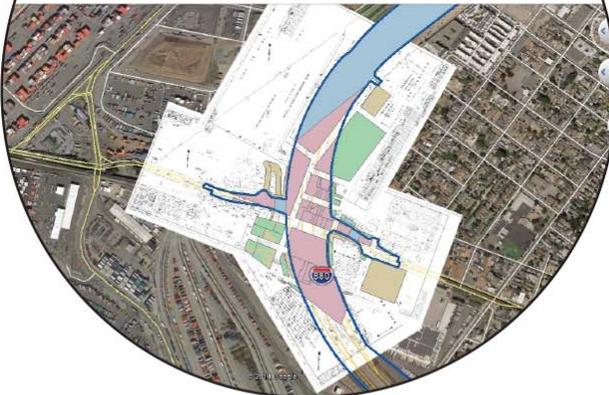
EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF RIGHT OF WAY & LAND SURVEYS

Geography is Becoming Everything

Nothing can equal Geographic Visualization as an instrument for understanding large, complex, and disparate data sets. Geospatial Information Systems (GIS) provide the ability to:

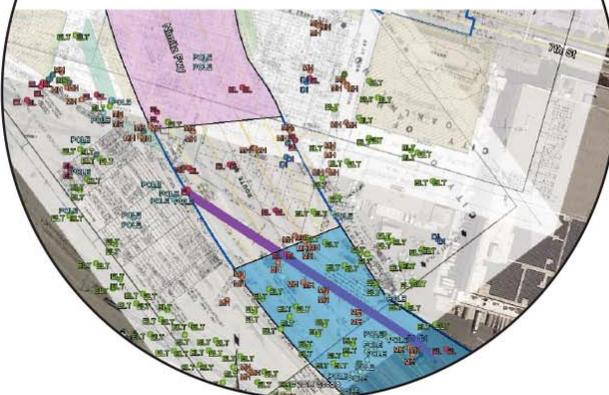
Understand Current and Historic Property Interests



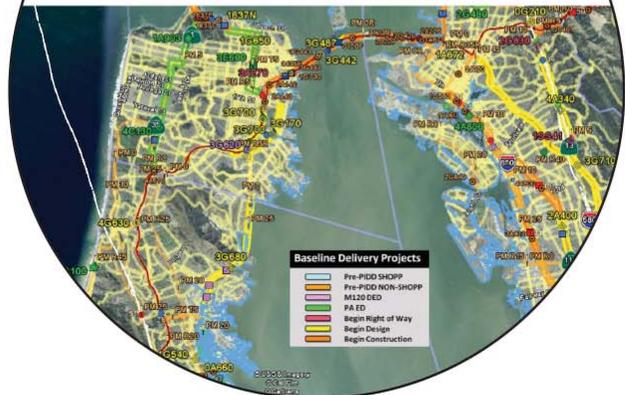
Efficiently Manage Property Assets



Accelerate Utility Location



Improve Project and Resource Management





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2014 INNOVATION FAIR

DIVISION OF RIGHT OF WAY & LAND SURVEYS

Deputy District Director: Mark L. Weaver

Number of Division Employees: 179

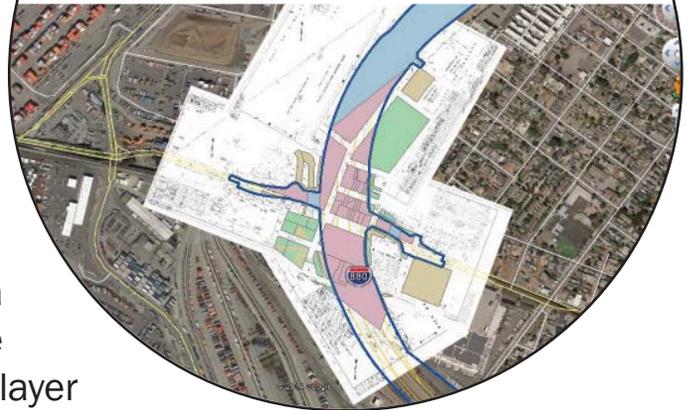
Contact Person: Tony Scorallo

DISTRICT 4

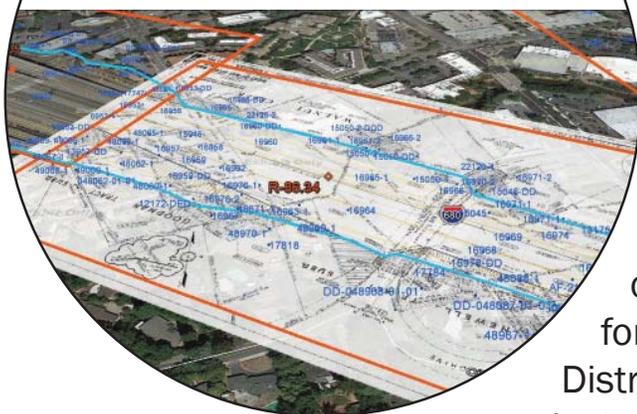
GEOGRAPHY IS BECOMING EVERYTHING

Presenting complex information in a way anyone can understand. Case in point; Combine scanned Right of Way map images with lines depicting the State's rights of way and shapes depicting parcels within or adjacent to the operating right of way and overlay it all upon aerial or satellite imagery and, what had been a puzzle becomes simple to see and communicate. In the past year, we've taken an important incremental

Understand Current and Historic Property Interests



Efficiently Manage Property Assets



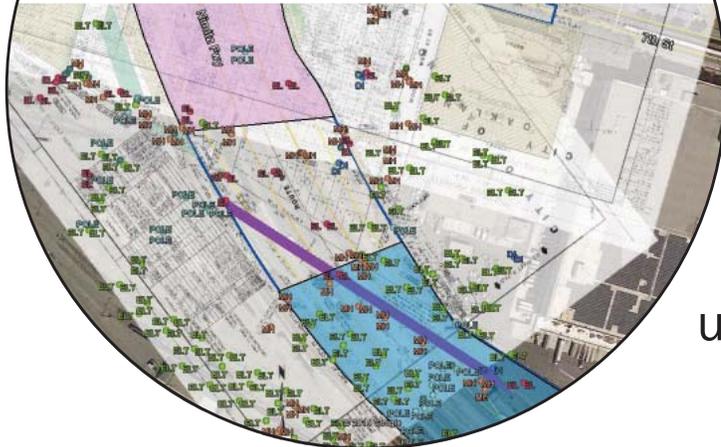
step towards the creation of a

complete

parcel layer

depicting all of the State's property acquisitions. Using the georeferenced R/W map images, we've created GIS points for all parcels in Alameda, Contra Costa, San Francisco, Santa Clara and San Mateo counties. Linking these points to R/W parcel databases, we've created searchable geospatial parcel data for the five central and southern counties in District 4. Work on the remaining four counties is projected to finish in Fall 2014.

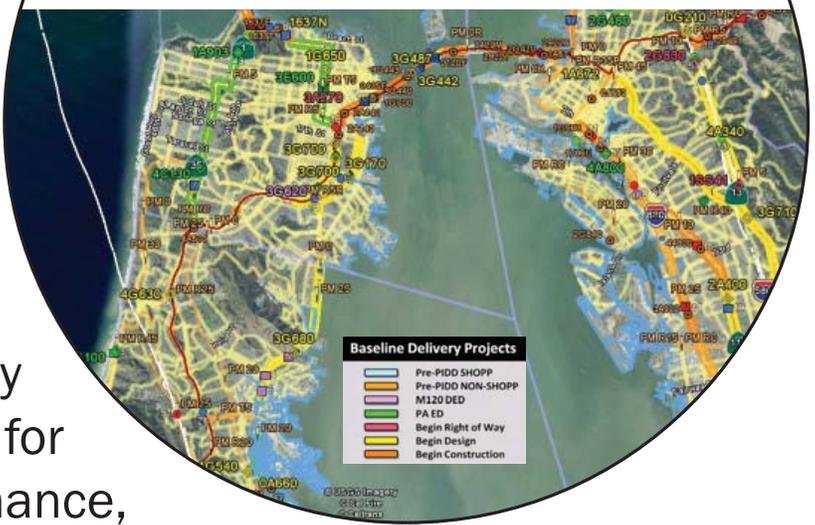
Accelerate Utility Location



Geo-rendering the Right of Way makes it easier to leverage business data such as executed joint use easements, permits and archived surveys to streamline business processes like underground utility location.

Managing a built system requires more efficient resource usage. Project planning that accounts for completed survey work, critical/life line routes, impacts of sea level rise and seismic activity makes it possible to simultaneously collect and utilize data for operations, maintenance, preservation and capital projects.

Improve Project and Resource Management



Transportation Planning/ Local Assistance



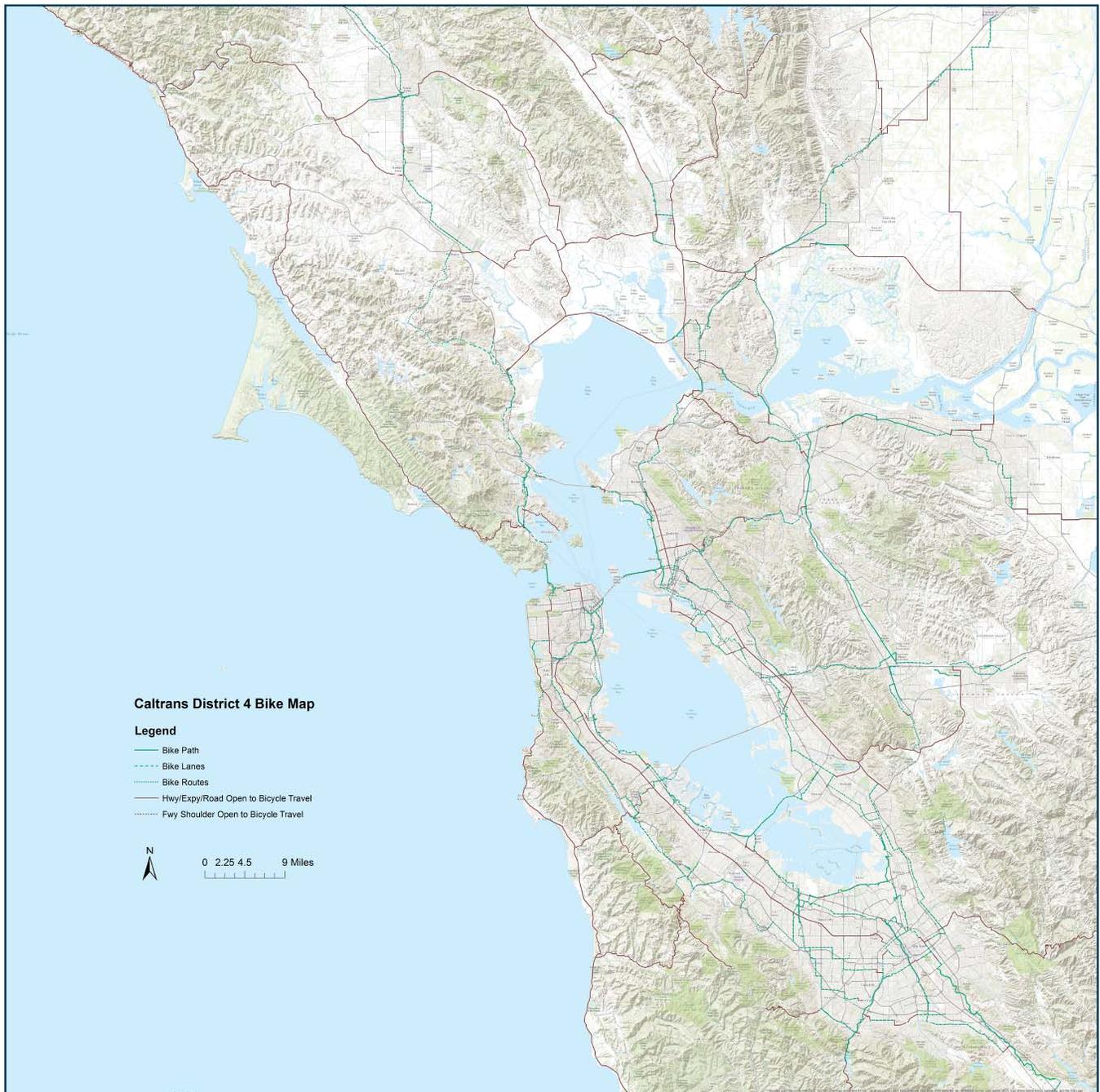
DISTRICT 4

EMPOWER | INNOVATION | CHAMPIONS 2014 INNOVATION FAIR

DIVISION OF TRANSPORTATION PLANNING & LOCAL ASSISTANCE

CALTRANS DISTRICT 4 BIKE MAP

Bicycle transportation is an integral element of the transportation system. The Caltrans District 4 Bike Map will provide information to the public on the extent bicycle travel is accommodated on the State Highway System and will show parallel bicycle routes where bicyclists are prohibited on a State Route. The goal is to produce an interactive, zoomable map that is practical and easy to use, with key features including bicycle facility classifications (class I, II, or III) and terrain. The Bike Map will also be used as a resource for System Planning and project development support to determine where improvements to the bicycle network can be made. This will further Caltrans' commitment to nonmotorized transportation.





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DIVISION OF TRANSPORTATION PLANNING & LOCAL ASSISTANCE

Deputy District Director: Jean Finney, Acting

Number of Division Employees: Approximately 100

Contact Person: Sergio Ruiz

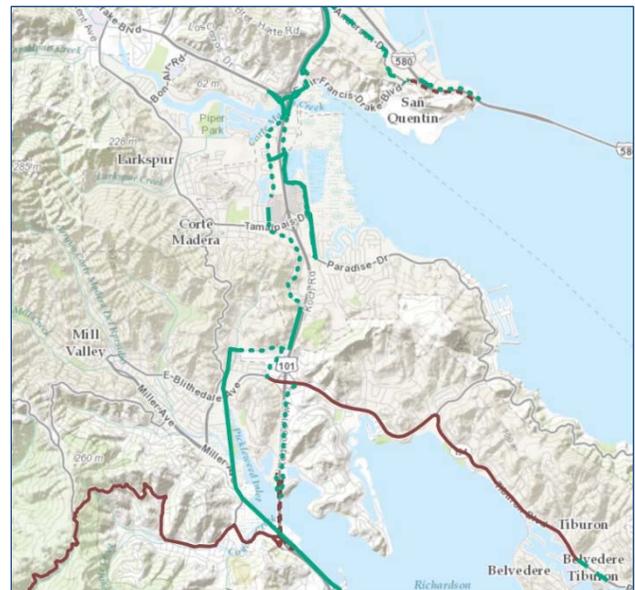
CALTRANS DISTRICT 4 BIKE MAP

The Caltrans District 4 Bike Map is being developed to inform the public on the extent bicycle transportation is accommodated on the State Highway System and to show parallel bicycle routes where bicyclists are prohibited on a freeway or expressway.

Bicyclists are legal roadway users on all conventional highways, most expressways, and some freeways. Where freeways sever a route previously open to bicyclists, a parallel bicycle route must be provided (California Streets & Highway Code, Section 888). In many freeway locations, the parallel route is provided via a network of local streets or pathways. Where parallel routes are not available, bicyclists are permitted to use freeway shoulders.

Caltrans often receives information requests from the public on the extent bicycling is accommodated on State Routes, but has no easily accessible resource available to provide this information to the public. While online mapping services, such as Google Maps, provide comprehensive bicycling information, they do not focus on State Routes or where bicyclists can access expressways or freeways.

The Caltrans District 4 Bike Map will be zoomable and interactive, showing bikeway classifications (class I, II, or III) on a terrain base map. Given the complexity of the SHS in District 4, Caltrans will seek input from internal functional units and local stakeholders to ensure that parallel routes are appropriate and accurate.



Marin County



Alameda County

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The Caltrans District 4 Bike Map can be used internally or by local partners as a resource for system planning and project development support. The map shows where there are network deficiencies and where there are opportunities to improve bicycle transportation, in support of Caltrans' Complete Streets policy. This map could also be used for a future District 4 Bicycle Plan.



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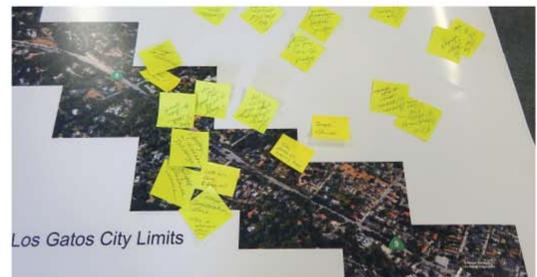
2014 INNOVATION FAIR

DIVISION OF TRANSPORTATION PLANNING & LOCAL ASSISTANCE

PLANNING PUBLIC ENGAGEMENT CONTRACT (PPEC)



Planning the Future
of State Route 9



The on-call consultant can help Caltrans

- ✓ Work with funding partners to enhance awareness of transportation options
- ✓ Facilitate planning meetings and workshops
- ✓ Market & promote public engagement events
- ✓ Develop stakeholder contact lists and strategies
- ✓ Provide technical assistance and technology (such as electronic voting)
- ✓ Translate complex planning issues in a way people understand
- ✓ Use visualization techniques to move from abstract to concrete
- ✓ Achieve measurable results



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DIVISION OF TRANSPORTATION PLANNING & LOCAL ASSISTANCE

Deputy District Director: Stephen Yokoi, Acting

Number of Division Employees: Approximately 100

Contact Persons: Becky Frank and Cameron Oakes

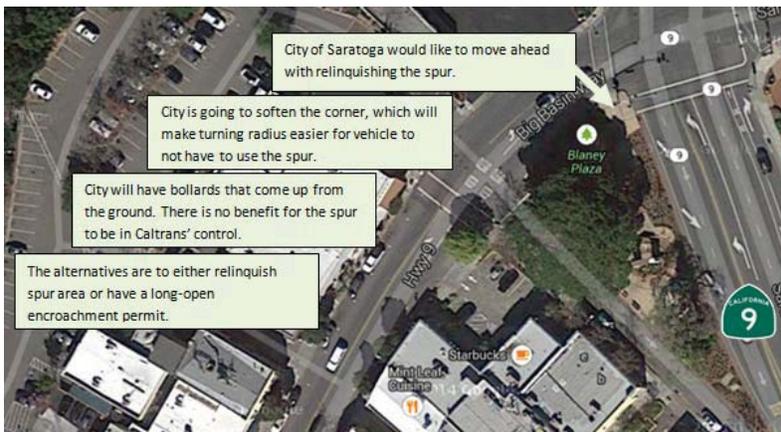
PLANNING PUBLIC ENGAGEMENT CONTRACT (PPEC)

The on-call consultant can help Caltrans:

- ✓ Work with our funding partners to enhance awareness of transportation options
- ✓ Facilitate planning meetings and workshops
- ✓ Market & promote public engagement events
- ✓ Develop stakeholder contact lists and strategies
- ✓ Provide technical assistance and technology
- ✓ Achieve measurable results



Logo created for the SR 9 PPEC



Example of Mapping Exercise

Benefits of the PPEC

- ▶ Enhances the effectiveness of partner and public outreach during Caltrans' initial transportation planning activities
- ▶ Federal law requires Caltrans to consult with the public, local officials and MPO during transportation planning studies
- ▶ Early and continuous public participation is key to gaining widespread support of planning and programming efforts

Notable PPEC activities in District 4

- ♠ *Alameda Estuary Crossing Study public outreach*
- ♠ *State Route 9 meetings to explore relinquishment*
- ♠ *State Route 12 corridor management plan*

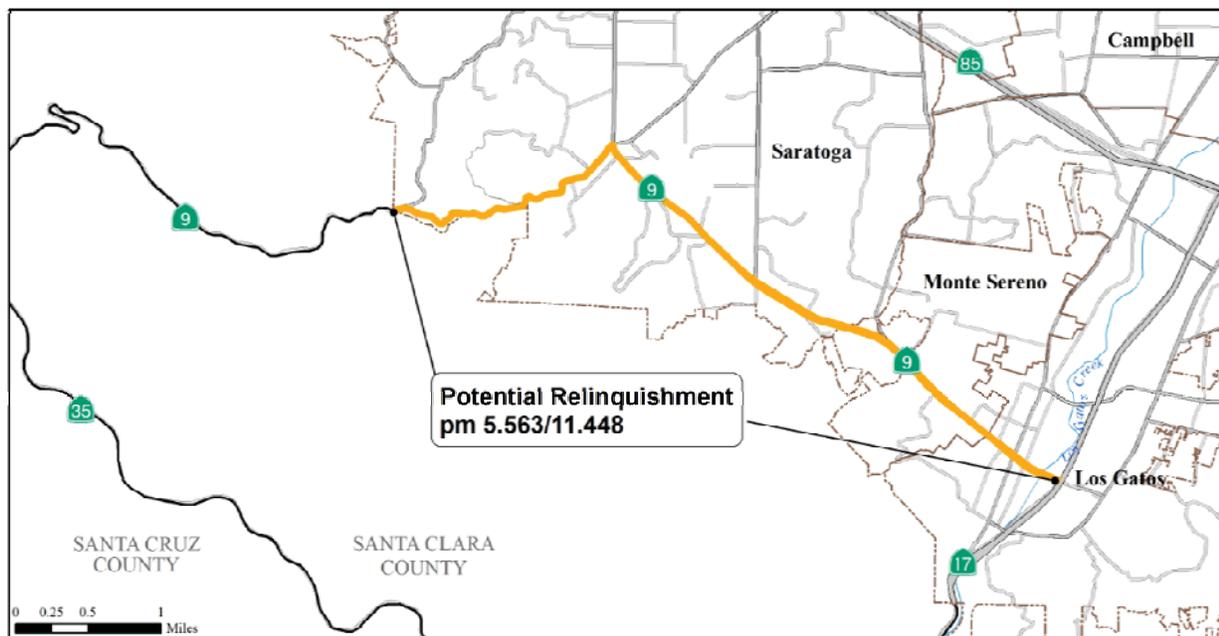
SR 9 Planning Public Engagement Contract

Consultant services from VRPA Technologies were used to help conduct early planning and coordination with partner agencies towards a shared vision of the future of State Route 9 in Santa Clara County. The work included assessments of existing conditions, presentation of our SR 9 Transportation Concept Report, exploration of alternatives, while working toward a consensus. Included was a special focus on the possibility of route relinquishment of SR 9 Saratoga City limits to SR 17 in Los Gatos and on the overall potential for road diet implementation to increase safety and mobility, transit operations, and pedestrian and bicycle use in the area.

Planning objectives of the outreach:

1. Presenting the SR 9 Transportation Concept Report to partner agencies.
2. Obtaining partner agency input on future options for SR 9, with special focus on matters related to possible route relinquishment of the highway from PM 5.653 (Saratoga City limits) to PM 11.448 (SR 17 in Los Gatos) and overall potential for road diet implementation.
3. Obtaining partner agency input and engaging the general public in early planning and coordination efforts regarding SR 9.
4. Making progress toward a shared vision for this segment of SR 9, which can then continue in future planning efforts.

Agency coordination and public engagement efforts provided opportunities for stakeholders to influence transportation decision making. These opportunities were deemed meaningful by all participants.



Contact Information:

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Office of Transit and Community Planning
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Cameron Oakes, Senior Transportation Planner
Office of System and Regional Planning
510-622-5758 – cameron.oakes@dot.ca.gov

I-Fair 2014
Innovative Projects



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INNOVATION FAIR 2014

DISTRICT 4

PRESENTATIONS OF INNOVATIVE PROJECTS

THURSDAY, AUGUST 14, 2014

10:00 AM – 3:00 PM

AGENDA

10:00 am

WELCOME *Deborah Y. Smith*

10:05 am

CALDECOTT TUNNEL 4TH BORE *Cristina Ferraz & Bill Bornman*

11:00 am – 1:00 pm

SFOBB ENVIRONMENTAL ACCOMPLISHMENTS *Steve Kadivar,
Michael Whiteside, Ric Maggenti, Mara Melandry,
Glenn Fleming & Stefan Galvez-Abadia*

1:00 pm

PRESIDIO PARKWAY – P3 PARTNERSHIP *Nidal Tuqan, Dave Pang &
Jonathan Ng*

2:00 pm

TOM LANTOS (DEVIL'S SLIDE) TUNNELS *Skip Sowko & Edsel Der*



CALDECOTT TUNNEL 4TH BORE



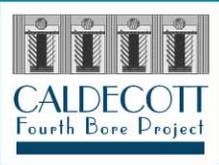
SFOBB ENVIRONMENTAL ACCOMPLISHMENTS



PRESIDIO PARKWAY P-3 PARTNERSHIP



TOM LANTOS (DEVIL'S SLIDE) TUNNELS



FOURTH BORE

PROJECT UPDATE SUMMER 2014



CONTRA COSTA
transportation
authority



PROJECT INTRODUCTION

The Caldecott Fourth Bore Project represents a partnership between the Federal Highway Administration, the California Department of Transportation, the Metropolitan Transportation Commission, the Contra Costa Transportation Authority, and the Alameda County Transportation Commission to build a two-lane fourth bore north of the existing three Caldecott tunnels. When it opened to traffic on November 16, 2013, it provided congestion relief along a heavily traveled portion of State Route 24 between Alameda and Contra Costa counties.



Ribbon cutting ceremony for the Caldecott Tunnel Fourth Bore opening.

TUNNEL SYSTEMS BRING FOURTH BORE TO LIFE

As the Caldecott Tunnel Fourth Bore was beginning to look close to completion, some of the most complicated work had actually just begun. During the following months, construction crews installed, integrated, and tested the extensive systems that now run the tunnel's fire safety, traffic, and communications functions. These systems are vital to ensuring the safety and efficiency of the tunnel since opening to traffic on November 16th, 2013.

FIRE PREVENTION AND RESPONSE

Most of the final systems installed in the Fourth Bore are referred to as Fire-Life-Safety Systems, which is the infrastructure needed to detect and suppress a fire and protect the travelling public. There are linear heat, carbon monoxide and nitrous oxide detectors that monitor fire and air quality. Video Image Detectors (VID) notify operators in case of an incident inside the tunnel. The tunnel is also equipped with 19 bi-directional jet fans and 17 Emergency Stations (Please see diagram on page 3.)

Both the Oakland and Moraga-Orinda Fire Departments have been trained in how to respond to tunnel fires. To shut down the tunnel, stop lights outside the tunnel entrances will be turned on. Crosspassages along the tunnel will allow access between Bores 3 and 4 for evacuation (both bores will be shut down if there is an incident in either one). These crosspassages have closed-circuit televisions and intercoms so operators can monitor and communicate with anyone inside. The passages also have a ventilation system that will create positive pressure inside, preventing smoke and flames from entering. Seventeen Emergency Stations in niches throughout the

FOR MORE INFORMATION

Community outreach to neighbors, community, and civic groups in Alameda and Contra Costa counties is important. For more information please visit:

WEBSITE: www.Caldecott-Tunnel.org

E-MAIL: Ivy_Morrison@dot.ca.gov

Photos clockwise from top left: Workers install ventilation and other systems in a cross-passage; the tunnel's facade design echoes the Art Deco style of the 1937 Caldecott tunnels; the lighting system will use high-pressure sodium lights that will brighten and dim throughout the day to match the lighting outside the tunnel; also shown: brackets for aluminum panel installation. All photographs by Karl Nielsen, Metropolitan Transportation Commission.

Continued on page 3

PROJECT OVERVIEW

The Caldecott Fourth Bore Project is composed of four separate contracts. In addition to the construction of the Fourth Bore itself, there are two smaller projects to enhance traffic flow in the vicinity of the tunnels, which have been completed.

In addition, the project includes the following elements:

- Construction of retaining walls and portals at the new tunnel openings
- Temporary and permanent soundwalls on the west side
- Seven emergency cross passages between the third and fourth bores
- Demolition of the existing maintenance building and construction of a new two-story operations and maintenance building
- Installation of operations, communications and emergency systems
- Various roadway improvements
- A project to re-landscape both sides of the tunnel will be implemented after the tunnel opens to traffic and will be completed by mid 2015

CONGESTION RELIEF

Before the Fourth Bore opened, State Route 24 carried about 160,000 vehicles a day through three existing tunnels. Traffic congestion occurred in the peak and off-peak directions.

The new Fourth Bore is relieving congestion in the off-peak direction by permanently dedicating two bores to westbound traffic and two to eastbound traffic. This eliminates the need to reverse traffic direction in the center bore twice a day to accommodate morning and evening commute traffic, and adds greater predictability on weekends.



Rendering of the eastern portal of the Fourth Bore, now open to the north of Bore #3.

FACTS

Groundbreaking: January 2010

Bore Opened to Traffic: November 16, 2013

Roadway Construction Completion: Fall 2014

Total Funding: \$417 million

Traffic Lanes: Two 12-foot traffic lanes with two shoulders – 10 feet on the northern wall and two feet on the southern wall

200 HORSEPOWER

The strength of one jet fan is equal to 200 horsepower.



200 HORSEPOWER

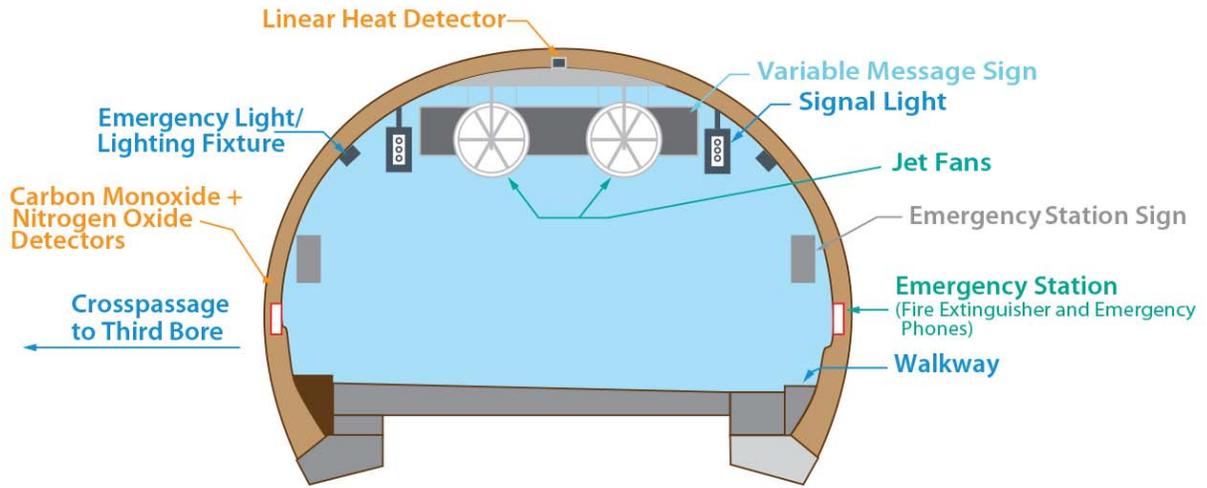
A mid-range sedan has around 200 horsepower



PROJECT TIMELINE



TUNNEL SYSTEMS CROSS SECTION



Incident Detection and Response



continued from front page

tunnel house fire extinguishers, manual fire alarms, and emergency phones. In the event of a fire, jet fans will be activated along with the ventilation system, and can redirect air flow. Even the tunnel lining was built with special fibers that shield the tunnel from heat and prevent a strong fire from damaging the tunnel structurally.

TRAFFIC EMERGENCY RESPONSE

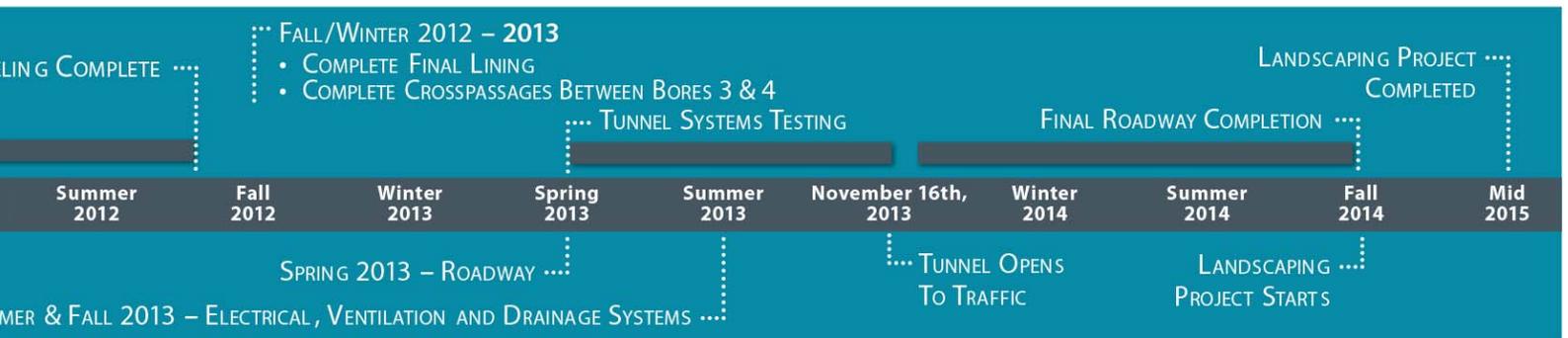
The Caldecott Fourth Bore is designated as an important structure, and is designed to reopen to emergency traffic within 72 hours of a major earthquake. Tunnel systems are designed to help with traffic management. The VID cameras are designed to monitor traffic patterns and alert an operator if there is a slow-down or accident. Variable Message Signs at the portal and within the tunnel can display pre-programmed messages triggered when there is an event. A tunnel radio system can to override other radio stations to give emergency messages to motorists.

OPERATING THE TUNNEL SYSTEMS

A state-of-the-art Operations and Maintenance Control (OMC) building was constructed and came online when the tunnel opened to traffic. The new facility serves as the “nerve center” for the four Caldecott tunnels, as well as the Webster-Posey Tubes in Alameda County. The OMC is now staffed 24 hours a day, seven days a week by specially-trained operators, who passed a rigorous test administered by the State Fire Marshal before the tunnel opened to traffic.

OTHER SYSTEMS

In addition to the systems mentioned above, the tunnel also features Strong Seismic Monitors to detect seismic activity. The information gathered will be sent to the California Geological Survey to process and help predict future earthquakes.



APRIL HORVATITS HAS THE FINAL SAY IN FIRE SAFETY



It is not every day that a tunnel is built in the State of California. In fact, Devil's Slide, which opened to traffic in late March of this year, was the first highway tunnel to be constructed in the entire state since the third Caldecott tunnel opened to traffic in 1964.

April Horvatits, Deputy State Fire Marshal, carries the responsibility of ensuring fire safety in Bay Area tunnels. In fact, Horvatits inspected Doyle Drive's Southbound Battery Tunnel, the new tunnels at Devil's Slide, and now the Caldecott Tunnel's Fourth Bore.

In preparation for the opening of the Fourth Bore November 16th, 2013, Horvatits worked with the California Highway Patrol, local law enforcement and fire departments and other safety and emergency-response agencies to confirm that the tunnel meets the National Fire Protection Association's standards for tunnels.

Horvatits also worked with an interagency team to develop a Fourth Bore Emergency Response Plan (ERP), which includes protocols and procedures for coordination between response agencies during an emergency.

The development of the Plan entailed intensive agency coordination, as well as extensive site inspections before the Plan could be finalized. "The Fourth Bore must maintain a 'tenable environment,'" said Horvatits. This means that motorists must be able to exit the tunnel safely in the event of an emergency – thereby permitting emergency responders unimpeded access to the tunnel.

Horvatits looked forward to her first drive through tunnel when it opens to traffic. That's a strong endorsement from the Bay Area's tunnel safety expert.

FOURTH BORE DIGS UP HISTORY

Caltrans has partnered with the University of California Museum of Paleontology (UCMP) at Berkeley to catalogue and analyze the many fossils discovered by an on-site paleontologist during the two-year Fourth Bore excavation process. The fossils are currently under close examination in a specially-dedicated lab on campus run by Mark Goodwin, Assistant Director of UCMP for Collections and Research.

This is not the first time fossils recovered from the Caldecott Tunnel have been catalogued by the UCMP, though today's effort is much more systematic. Excavations of the first three bores, as well as the Victorian-era Broadway Tunnel, yielded fossils that were catalogued by UCMP.

About one thousand specimens have been recovered from the three Miocene Epoch rock formations that comprise the Oakland-Berkeley hills: the Orinda, Claremont and Sobrante formations. Paleontologists have found remains of creatures once common in North America, dating to approximately twelve million years ago. Rhinoceros bones, a toe of a camel, and portions of a jaw of an oreodont – an extinct mammal distantly related to today's sheep – have been identified.



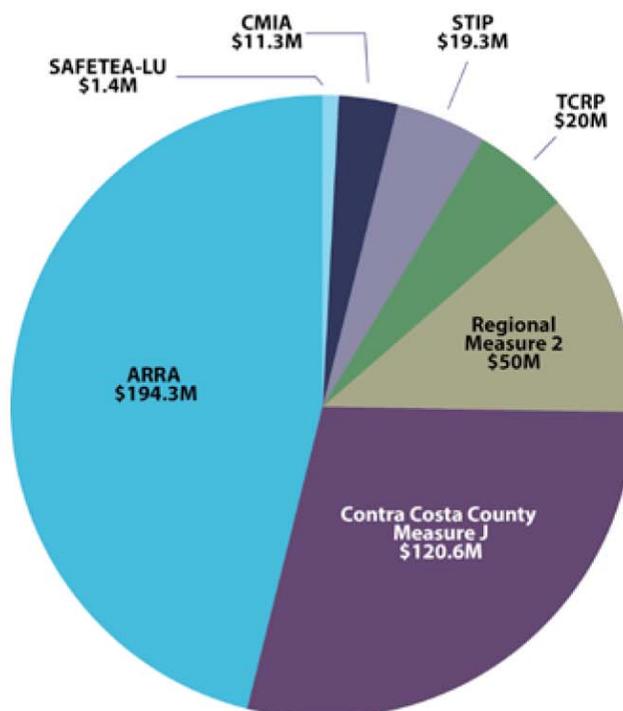
A portion of the jaw of an extinct mammal known as an oreodont.

According to Diane Erwin, plant paleontologist, many of the hundreds of fossilized leaves identified so far indicate an environment very different from today's. In the Orinda formation, she has found leaves that resemble those from laurel, willow and sycamore trees, which are types of plants commonly found by streams or rivers. Shell-bearing marine organisms – tiny but visible using a common stereo microscope – are also found in great quantities in the excavated dirt and rock from the Sobrante and Claremont formations.

Once fully identified and catalogued, the fossils will be part of UCMP's permanent collection, used in classrooms, displayed to the public, and available to researchers. Find photographs of fossils, and more information about how to access the collection, on our website, Caldecott-Tunnel.org/Paleontology

FUNDING

The total programmed budget for the Caldecott Tunnel Fourth Bore is \$417 million.



For more information on these funding sources please visit caldecott-tunnel.org



THE AMERICAN ACADEMY OF ENVIRONMENTAL ENGINEERS AND SCIENTISTS: ENVIRONMENTALLY SUSTAINABLE ATTRIBUTES OF THE SAN FRANCISCO-OAKLAND BAY BRIDGE PROJECT

Steve Kadivar, Ph.D., Eng., BCEE¹, and Lindsey Baker²

The San Francisco Bay is home to one of the most diverse communities of flora and fauna in the world, one that must coexist with the millions of people that live and work in the Bay Area. To protect these natural treasures, The California Department of Transportation (Caltrans) implemented a comprehensive program to safeguard the Bay's environment during construction of the new East Span of the San Francisco-Oakland Bay Bridge.

On Tuesday, October 24, 2013, experts gathered for a seminar at the San Francisco-based office of T.Y. Lin International Group to discuss the strategies used by the Bay Bridge project to protect the fragile ecosystem while undertaking this monumental construction endeavor.

Co-presented by the Academy and Caltrans, this event brought together a curated community of dynamic environmental leaders to share best practices, reflect upon challenges, and exchange innovative ideas.

Mr. Jeffrey L. Hahn, P.E., BCEE, QEP, an Environmental Consultant and representative of the Academy, began the event with an overview of the Academy, and then introduced Dr. Steve Kadivar, the program coordinator and event moderator. Dr. Kadivar received his Ph.D. in Civil Engineering from Stanford. He is a Board Certified Environmental Engineer (BCEE) by the Academy; He has been involved with infrastructure projects as an engineer, planner, scholar and project manager.

Dr. Steve Kadivar provided a brief overview of motivation for this seminar. He had the initial idea to host a Bay Bridge event while he was attending the Academy's Board of Trustees meeting in late 2012. He shared the concept with the AAEES management and Dr. Hugh Thompson, the AAEES California representative. After the

Academy extended an invitation to Caltrans District 4, Dr. Kadivar, with the support of District 4 management, organized a roster of presenters that included a Structures Manager, a Materials Engineer, and Environmental Scientists and Managers.

Dr. Kadivar then outlined the program, and introduced the first



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Dr. Steve Kadivar stands with Jeffery Hanhn, panelists Mara Melandry, Ric Maggenti, Glenn Fleming, Stefan Galvez – Abadia, and Michael Whiteside.

1. District Office Engineer, Division of Construction, California Department of Transportation
2. Public Information Specialist for the San Francisco-Oakland Bay Bridge Public Information Office

presenter, Caltrans Structure Specifications Manager, Mike Whiteside.

Since 2002, Mike has served as the Structure Specifications Manager for Caltrans' Toll Bridge Program. As Manager, Mike oversees the production of construction specifications for the seismic retrofit and replacement of California's toll bridges. In addition to supervising a diverse team of state engineers and consultants, Mike also acts as project manager for the design, testing and acceptance of new structural components.

Mr. Whiteside opened the discussion with a comprehensive overview of the San Francisco-Oakland Bay Bridge Seismic Safety Project. This included the past, present and future of the Bay Bridge and its new East Span, which opened to traffic on Sept. 2, 2013, and has a design life of 150 years.

In the early 1930s, President Herbert Hoover approved funding for a bridge across the San Francisco Bay in response to growing public demand. The California Department of Public Works broke ground on what was then the world's largest steel structure on July 9, 1933. Engineers and designers selected a cantilever bridge to span Oakland to Yerba Buena Island and a suspension bridge from the Island to San Francisco, with a bore tunnel connecting the two. After three and half years of construction and a total cost of \$77 million, the Bay Bridge opened to traffic on November 12, 1936.

The San Francisco-Oakland Bay Bridge is the busiest span in California with more than 280,000 vehicles crossings each day. For 77 years this structure has bound the region together, influencing the flow of people, goods and services. However, the bridge is situated between two of the most active faults in the United States - the Hayward fault to the east, and the San Andreas Fault to the west. Mr. Whiteside explained that the collapse of a 250-ton section of the East Span's upper deck in the 1989 Loma Prieta earthquake was a wake-up call for the entire Bay Area. In the aftermath of this event, Caltrans officials decided the time had come to replace the span with a new bridge designed to withstand the strongest seismic forces imaginable.

Discussion about the new bridge design began in 1997, and a single-

tower self-anchored suspension bridge with a pedestrian and bike path on the south side was selected in 1998. Mr. Whiteside then reviewed some of the groundbreaking seismic innovations that have transformed the new East Span into a state-of-the-art engineering marvel, and a lifeline structure for the region.

Numerous innovations help make the bridge secure, yet flexible enough, to withstand the greatest seismic forces expected in a 1,500-year period. The Skyway's concrete deck sections sit on 160 rebar and concrete steel piles driven at an angle up to 300 feet below the water's surface, through a process called "battering." While this method has been used to secure foundations for oil rigs, this is the first time it has been used for bridge construction. The hinge pipe beams that sit between the roadway sections act like giant shock absorbers, designed to move within their sleeves during expansion or contraction of the road decks during minor events. They are also designed to absorb the energy of an earthquake by deforming in their middle or "fuse" section, which will minimize damage to the bridge's main structure. The single, 525-foot tall tower is made up of four separate pentagonal legs connected by shear link beams. These beams allow the legs to move independently, and are designed to protect the tower from catastrophic damage by absorbing seismic energy during an earthquake.

Mr. Whiteside closed his presentation with a look at some of the challenges faced during the project. Construction of the new East Span was delayed by political battles, cost increases due to schedule changes, material cost increases, and unforeseen construction challenges. The project has overcome adversity by focusing on the major objective - building a structure that carries Bay Area traffic safely. After 32 bolts broke due to hydrogen embrittlement on one of the bridge piers in 2012, Caltrans responded to the challenge by bringing the best and brightest engineers and designers together with an outside panel of experts and the Federal Highway Administration. This combination of internal and external collaboration ensured that the retrofit solution was the best possible.

The seminar continued with speaker, Ric Maggenti. As Senior Materials, Research and Bridge Engineer, Mr. Maggenti has worked with Caltrans for over 30 years. He received his BS in Civil Engineering from the California State University, Sacramento. Throughout his 30-year tenure, Mr. Maggenti has worked as a Concrete Materials Engineer for major bridge and infrastructure projects around the Bay Area, including the new Benicia/Martinez Bridge, Doyle Drive, the Dumbarton Bridge., the new Carquinez Bridge, the San Mateo/Hayward Bridge widening and the Richmond/San Rafael Bridge retrofits. He is also a statewide expert on bridge concrete, and a co-author of the Caltrans Offices of Structure Construction's new Concrete Technology Manual.

Mr. Maggenti discussed the use of green concrete on the new East Span of the San Francisco-Oakland Bay Bridge. "Green" concrete mixes contain substantial amounts of recycled materials, leading to sizeable reductions in greenhouse gas emissions, energy use and construction costs. They are a durable alternative to traditional Portland cement, which is responsible for about 7 percent of global carbon dioxide emissions. Green concrete was chosen to meet the stringent structural design criteria of the new east span, which included thousands of cubic yards (cy) of concrete with strength above 8,000 psi as well as tight shrinkage, creep and Modulus of Elasticity (MOE) requirements. The highly durable mix achieved the 150-year design life, controlling curing temperatures, ion mitigation, and sea-water attack.

Mr. Maggenti explained that the use of naturally occurring pozzolan cements from volcanic ash dates back to the Roman Empire, as documented by the Roman architect Vitruvius. Modern pozzolan cement, known as supplementary cementitious materials (SCM), is typically comprised of industrial by-products that increase the strength of the concrete.

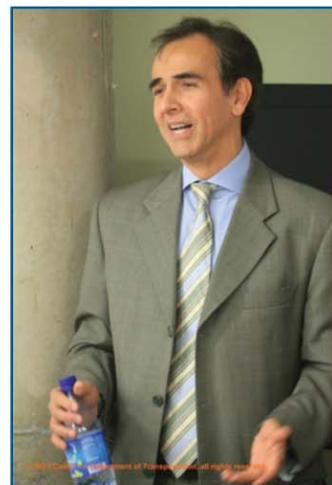
More than 40 different mixes were used for each of the four distinct construction contracts that make up the new East Span of the Bay Bridge. Each mix contained 25-50 percent recycled materials, like fly



Dr. Steve Kadivar introduces the presenters.



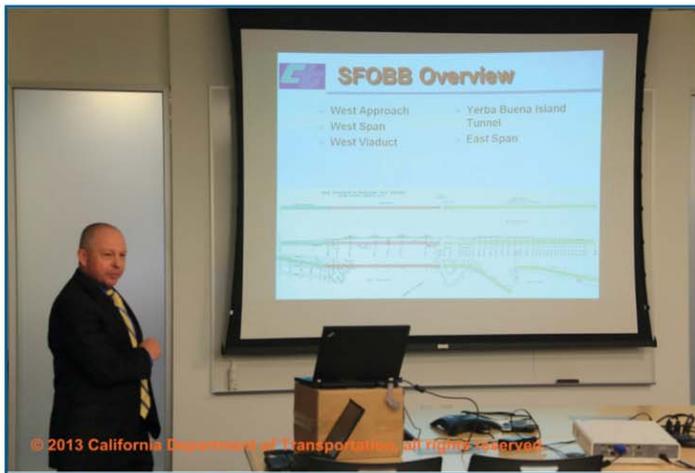
Glenn Fleming describes the design of the Bubble Curtain used on the Bay Bridge project.



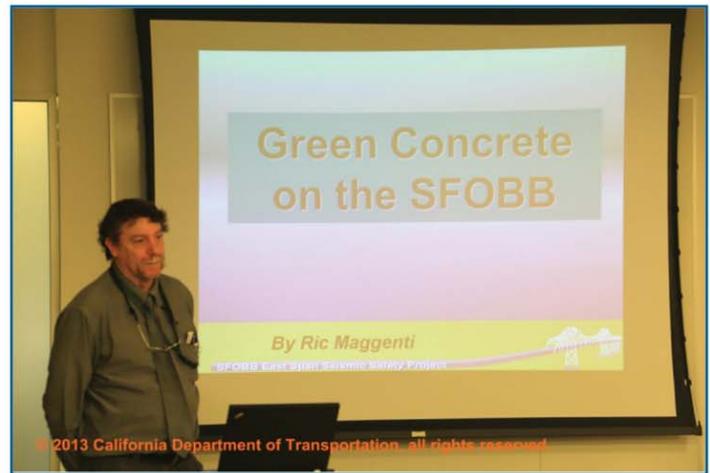
Stefan Galvez-Abadia discusses biological monitoring programs.

ash, a waste product left over from burning coal in power plants, and slag, a by-product of iron production. By using cement that contained recycled materials, the project's carbon dioxide output was reduced by at least 60 million pounds.

The lecture continued with the third speaker, retired Caltrans



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Structure Specifications Manager Mike Whiteside presents to the group.



© 2013 California Department of Transportation, all rights reserved.
Ric Maggenti begins his presentation.



© 2013 California Department of Transportation, all rights reserved.
Mara Melandry discusses the challenges of environmental compliance.



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Audience members participate in the discussion.

Toll Program Environmental Manager, Mara Melandry. Mrs. Melandry received a BS in archaeology and historic preservation from U.C. Berkeley.

Mara Melandry served as the environmental manager for the new east span of the Bay Bridge from 1997 until her retirement in 2004. Throughout her eight-year tenure on the Bay Bridge project, Mrs. Melandry led the environmental process and secured the seven environmental permits that were required to begin construction. She used her expertise to assist the project's preservation of archaeological and historic resources. She began her presentation with an overview of the environmental process and regulatory context. Construction of the new East Span required an extensive environmental review process and coordination with a variety of state and federal regulatory agencies.

The preservation of cultural resources was another important goal

for the Bay Bridge project. Caltrans worked with the U.S. Navy, the cities of Oakland and San Francisco, the Advisory Council on Historic Preservation, and the State Office of Historic Preservation to protect the historic buildings and archeological sites on Yerba Buena Island (YBI) and to preserve the history of the original Bay Bridge. The Nimitz House, a classic revival-style naval commandant's house used in World War II, and Senior Officers' Quarters on YBI were declared Environmentally Sensitive Areas. Caltrans also worked closely with the Ohlone Indians to establish treatment of archaeological sites on YBI. The project also collaborated with the Oakland Museum of California to develop exhibits that preserve the history of the existing San Francisco-Oakland Bay Bridge. The environmental protection team took numerous steps to make sure that construction activities did not disrupt the Bay's fragile environ-

ment. Wetlands, eelgrass beds and sand flats were extensively surveyed, mapped and delineated. These areas were designated with fencing, buoys and signage as Environmentally Sensitive Areas in which construction and access are restricted. Teams also worked to protect marine mammal, bird and fish populations through behavioral monitoring.

The fourth speaker, Glenn Fleming, a Mechanical Engineer for Caltrans, elaborated on Mara Melandry's discussion of the project's environmental mitigation efforts. For the past 12 years, Mr. Fleming has been involved in the design, analysis, and hydro-acoustic monitoring of marine pile driving energy attenuation systems.

Some of his projects include the design of the bubble curtain for the new San Francisco-Oakland Bay Bridge East Span Replacement, the new Benicia Bridge, the three bridges that span the Humboldt Bay in Eureka California, and the Columbia

River Crossing Project in Vancouver, WA. In 2005 the San Francisco-Oakland Bay Bridge Seismic Safety Project won the "Excellence in Transportation Award" for the "Application of Bubble Curtain Technology and Monitoring to Protect Fishery Resources during Pile Driving."

The construction of the new East Span of the San Francisco-Oakland Bay Bridge (SFOBB) entailed driving 259 large diameters Cast in Steel Shell (CISS) piles in San Francisco Bay to support the Skyway and Self Anchored Suspension (SAS) components of the bridge. To reduce the impacts to endangered and threatened species in San Francisco Bay, construction plans specified the use of a Marine Pile Driving Energy Attenuation System, or "Bubble Curtain," to surround the large diameter piles during pile driving in order to attenuate peak underwater sound pressure levels (SPLs).

The 1700 Kjoule hydraulic impact hammer required to drive these

large diameter piles is known to produce peak underwater sound pressure levels that are strong enough to result in severe barotraumas to aquatic organisms close to the pile driving operation. Barotraumas are pathologies associated with exposure to large pressure gradients. Barotraumas include hemorrhaging and rupture of the internal organs such as the swim bladder and kidneys of fish.

The goal of the attenuation system is to reduce the potential adverse impact of pile driving using impact style hammers during construction to listed and endangered species. A properly designed, constructed and deployed energy attenuation system, which provides complete coverage of the pile have proven to reduce sound pressure levels by as much as 98%.

The system designed for use on the new East Span of the San Francisco-Oakland Bay Bridge, reduced the sound pressure levels by as much as 18 db. The Bubble Curtains attenuation is achieved by “de-coupling” the vibrating pile (source) from the water column in addition to the dispersion of air bubbles in the water. The air bubbles increase the compressibility of the water by several orders of magnitude above that of bubble-free water, thereby greatly reducing the velocity and increas-

ing the rise-time of the shockwave. These small manifold bubble curtain systems are cost effective marine protection mitigation methods.

Caltrans District 4 Environmental Manager Stefan Galvez-Abadia concluded the program with an overview of the project’s biological monitoring and mitigation programs. Mr. Galvez-Abadia has 26 years of experience in the environmental and transportation fields, this includes the planning permitting and construction of significant projects such as the Caldecott Tunnel, Devil’s Slide, and most Toll Bridge retrofits.

Stefan Galvez-Abadia currently serves as the Environmental Manager for Toll Bridge projects and as an Office Chief in the Division of Environmental Analysis where he oversees the preparation of environmental documents for District 4. Stefan has also been an effective statewide liaison with the California Coastal Commission.

The Bay Bridge Seismic Retrofit Project has taken extensive measures to ensure that construction activities do not affect the environment around the bridge. By establishing Environmentally Sensitive Areas, Caltrans ensured the protection of these habitats. In support of overall fish protection efforts in the area,

the project also has helped fund more than 15 fish research and habitat restoration projects in the San Francisco Bay.

In addition to establishing these habitat areas, the team worked to protect marine mammals, birds and fish that live in and around the Bay. To protect marine mammals, such as harbor seals, sea lions, harbor porpoises and gray whales, the team monitored their populations to ensure they were not in the work area prior to the start of any pile driving of the bridge’s more than 2,000 temporary and permanent piles.

Since birds have been roosting on the original Bay Bridge for years, the environmental team designed special platforms (a.k.a., “Cormorant Condos”) under the Skyway to provide nesting replacement habitat. The project will provide opportunities for the creation and/or enhancement of shorebird roosting habitat in the East Bay. Furthermore, the team regularly monitored birds in the area, such as the American peregrine falcon, California least tern, California brown pelican, double-crested cormorant and western gull, to ensure they were not disturbed by construction activities.

Mr. Galvez-Abadia also described the establishment of an off-site construction stormwater treatment proj-

ect that allowed Caltrans to capture, store and treat stormwater runoff. The Bay Bridge project created a rainwater garden designed to collect and treat storm water runoff from 155 acres of the Bay Bridge approach.

Though the new East Span is now open to the public, Mr. Galvez-Abadia explained that the stringent environmental monitoring and biological mitigation efforts will continue well into the future, as team work with demolition contractors to ensure the safe dismantling of the original east span.

Dr Kadivar then thanked and invited all of the speakers to the head table for a Questions and Answers session. This led to interesting discussions amongst the audience and the presenters.

The Academy recognizes excellence in the field of environmental engineering and science, and the Bay Bridge and other Toll Bridge projects have demonstrated an outstanding commitment to environmental protection. The AAEEES San Francisco-Oakland Bay Bridge lecture provided the opportunity for professionals to learn first-hand about the practical application and the challenges of environmental aspects of major infrastructure projects. **A**



The *American Academy of Environmental Engineers and Scientists* was founded in 1955 for the principal purpose of serving the public by improving the practice, elevating the standards, and advancing public recognition of environmental engineering and science through a program of specialty certification of qualified engineers and scientists.

The American Academy of Environmental Engineers and Scientists is sponsoring this October 24, 2013 seminar to acknowledge the outstanding work of the *California Department of Transportation* on this newly-completed San Francisco Oakland Bay Bridge. This major, decade-long public works project has been implemented without significant or long standing environmental issues. The CALTRANS engineers and other specialists will speak on several innovative aspects of planning, designing, and building this major public works project which has been noted as meeting or exceeding environmental requirements. The Academy is presenting this free program to educate community leaders, engineers, and scientists and to recognize the accomplishments of CALTRANS in completing a project of this magnitude in an environmentally acceptable manner. Participants for this seminar are anticipated to be drawn from people interested in today's building of large, complex projects in highly regulated and urban environments such as San Francisco Bay.

SFOBB ENVIRONMENTAL ACCOMPLISHMENTS

Presenters

Dr. Steve Kadivar

Dr. Steve Kadivar, Division of Construction, will serve as the program coordinator and moderator. Steve received his PhD in Civil Engineering from Stanford University. Prior to joining Caltrans, he had been involved with infrastructure projects as an engineer, planner, scholar and project manager. His simulation gaming model – A Critique of the Public Planning Process involving large scale infrastructure projects, developed at Stanford University, has been used in educational institutions. Dr. Kadivar is a Board Certified Environmental Engineer by the American Academy of Environmental Engineers. He is a registered engineer—Professional Engineers of Quebec, and received the Caltrans Project Management Certificate Program.

Michael Whiteside

Since 2002, Mike has been the Structure Specifications Manager for the Caltrans Toll Bridge Program. As such, he manages the production of construction specifications for the seismic retrofit or replacement of California's toll bridges. This includes supervising a diverse team of state and consultant engineers; project managing the design, testing and acceptance of new structural components; and working with designers, fabricators, and federal and state regulators to bring new technologies to the state. In addition, he oversaw the design of two very challenging detour structures. These were built adjacent to the final alignments then moved into their final positions, the first in 2007 and the second in 2009.

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Ric Maggenti

Ric Maggenti, Caltrans Senior Materials & Research Engineer / Senior Bridge Engineer, has 30 years experience in Caltrans. A California State University Sacramento graduate with a BA degree in History and a BS degree Civil Engineering with a minor in Economics. He is currently assigned to the new East Spans Replacement Project of the San Francisco Oakland Bay Bridge. Ric spent 15 of his first 17 years in the Caltrans Concrete Laboratory in Sacramento. In addition to other duties since transferring to the District 4 Toll Bridge Program's Office of Structures Specifications % Estimates, he has been involved as the concrete materials engineer in many of the major bridge projects around the Bay Area which includes the new Benicia/ Martinez Bridge and approach structures, the San Mateo/ Hayward Bridge new parallel structure widening project, Doyle Drive, Devils Slide, the new Carquinez Bridge and the seismic retrofits of the Richmond /San Rafael Bridge and the Dumbarton Bridge. He was also an instructor for statewide training regarding bridge concrete in 2011, and is a co-author of the Caltrans Offices of Structure Construction's new "Concrete Technology Manual."

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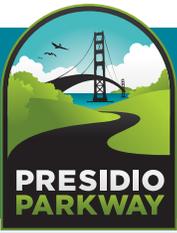
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Caltrans District 04 Innovation Fair 2014 Public Private Partnership Project Delivery



Reference August 11, 2014

ABOUT THE PROJECT

Doyle Drive is structurally and seismically deficient and must be replaced. The facility serves 120,000 trips per day and is the primary regional roadway link between North Bay Area counties and the San Francisco Peninsula. Doyle Drive is facing the same problem that threatens other crucial components of the nation's infrastructure – the ravages of time and continual use. The roadway was also originally built with narrow lanes, no shoulders and no median to separate on-coming traffic.

The Doyle Drive Replacement Project, the Presidio Parkway, is expected to cost \$1.04 billion. The Presidio Parkway is based on a world class design that will improve the seismic, structural and traffic safety of the roadway. It also will be more sensitive to community needs and the national park setting, reducing impacts on biological, cultural, historical and natural resources and the surrounding neighborhoods. The replacement project was environmentally cleared in December 2008 under both the National Environmental

Policy Act and the California Environmental Quality Act. Because of concerns about the need to ensure seismic safety for the traveling public, the California Department of Transportation (Caltrans) accelerated the beginning of the construction phase.



CONSTRUCTION PHASES

In an effort to reduce impacts to the traveling public and achieve seismic safety sooner, the project was split into two major construction phases.

Phase I, which includes the new Ruckman Bridge, southbound high viaduct bridge and Battery Tunnel and temporary bypass, will ensure that seismic safety is achieved as soon as possible. By the time Phase 1 is complete in late 2011, all traffic will be circulating on new, seismically sound structures and a temporary bypass. This phase is being

delivered through the traditional design-bid-build financial model typically used in California.

Phase II, which includes the northwest section, new northbound Battery Tunnel, Main Post Tunnels and east end of the corridor and amounts to \$474 million, will be delivered through a public-private partnership (P3). With the completion of Phase II, expected in 2014, all traffic will be on the permanent replacement facility. The phase will finish with project landscaping in 2015.

PROJECT FEATURES

Phase I (DBB) Phase II (P3)



PROJECT DELIVERY OPTIONS

Three project delivery options were considered for the replacement of Doyle Drive. In all cases and at all times, ownership of the assets, oversight, and performance setting continue to be retained by the public sector.

1. **Design-Bid-Build (DBB)** is the conventional highway project delivery method in California and is the baseline against which other options were evaluated. Project financing, in this option, is provided solely by public agencies.
2. **Design-Build-Finance (DBF)** shifts responsibility for completing design and construction to a private contractor and makes use of short-term private financing.
3. **Design-Build-Finance-Operate-Maintain (DBFOM)** shifts responsibility for completing design and construction to a private concessionaire and makes use of long-term financing. Additionally, this option also includes long-term responsibility for operating and maintaining the facility. This is the option most usually referred to as a public-private partnership or P3.

WHAT IS A PUBLIC-PRIVATE PARTNERSHIP?

Phase II of construction of the Presidio Parkway project will be delivered through a public-private partnership (P3). This will be the first project in California to operate under this financial model. The selected bidder (Golden Link Partners) will design, build, finance, operate and maintain the project for 30 years. The P3 method of delivery will reduce costs, free up state funding for other uses, transfer cost-overrun risks to the private developer, and ensure a high maintenance standard during the 30-year contract. Phase II will begin in late 2011 and continue through early 2015.

ANALYSIS OF A PUBLIC-PRIVATE PARTNERSHIP FOR DOYLE DRIVE

The replacement project poses some very significant challenges: Doyle Drive must remain open throughout the construction phase; four different federal agencies either have jurisdiction over portions of the right of way or must be consulted for other reasons; a number of different contractors depend on the timeliness of implementation of separate construction contracts in order to be able to access the site and deliver their portion of the project on time and on budget. The risks to timeline and budget are significant. Because of these risks, and even though construction has begun on Phase I, the San Francisco County Transportation Authority (Authority) and Caltrans decided to explore the potential for alternative project delivery methods for Phase II.

EVALUATION CRITERIA AND METHODOLOGY

The DBB option is the baseline case and is used as the Public Sector Comparator in assessing the DBF and DBFOM options. Options are evaluated qualitatively relative to Caltrans and the Authority's project objectives, and quantitatively based on international best practice for value for money analysis comparing the P3 options (DBF and DBFOM) with the Public Sector comparator (DBB option). The value for money approach examines the values delivered to project sponsors for funds expended to achieve those values.

SUMMARY OF OBJECTIVES FOR THE P3 ANALYSIS

Objective	DBB	DBF	DBFOM
Maximize certainty of construction cost & schedule outcomes	●	●	●
Transfer interface risks of multiple construction stages	●	●	●
Improve cash-flow management at a fiscally constrained time	●	●	●
Maintain a fundable project	●	●	●
Minimize execution risk with respect to established project delivery models and current market conditions	●	●	●
Maintain appropriate quality of the facility (safety, pavement ride, etc.) for the public & key stakeholders during operation	●	●	●
Minimize execution risk with respect to established project delivery models and current market conditions	●	●	●

CONCLUSION – SELECTION OF DBFOM

The thorough analyses of both qualitative and quantitative characteristics of the three project delivery options (DBB, DBF, DBFOM) concluded that the DBFOM option is optimal because it:

- Frees up more than \$250 million in capital funding for other uses or investment
- Provides the lowest total life-cycle cost among the options studied
- Makes the best use of public funds and resolves cash flow risks associated with the traditional pay-as-you-go approach
- Provides the greatest possible certainty of the construction cost and schedule outcomes compared to either of the other two options
- Achieves a high level of operations and maintenance service

The Design-Build-Finance-Operate-Maintain (DBFOM) option best meets project and sponsoring agencies' (Caltrans and the Authority) needs for Phase II of the Presidio Parkway/Doyle Drive Replacement Project.

california "open for business"



On February 20, 2009, Governor Arnold Schwarzenegger signed legislation authorizing a broad range of public-private partnerships (P3) for transportation projects. This legislation enables P3s as a tool in fulfilling California's enormous transportation needs. California represents a major market (8th largest economy in the world) for infrastructure. It has significant pent-up demand, as well as the need to accommodate expected population and economic growth over the next several decades.

This document includes a brief summary of the new law and a non-exclusive list of representative, potential projects that are being considered by public agencies for P3 treatment.

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Legislation (Senate Bill X2 4)

info.ca.gov/pub/09-10/bill/sen/sb_0001-0050/sbx2_4_bill_20090220_chaptered.pdf

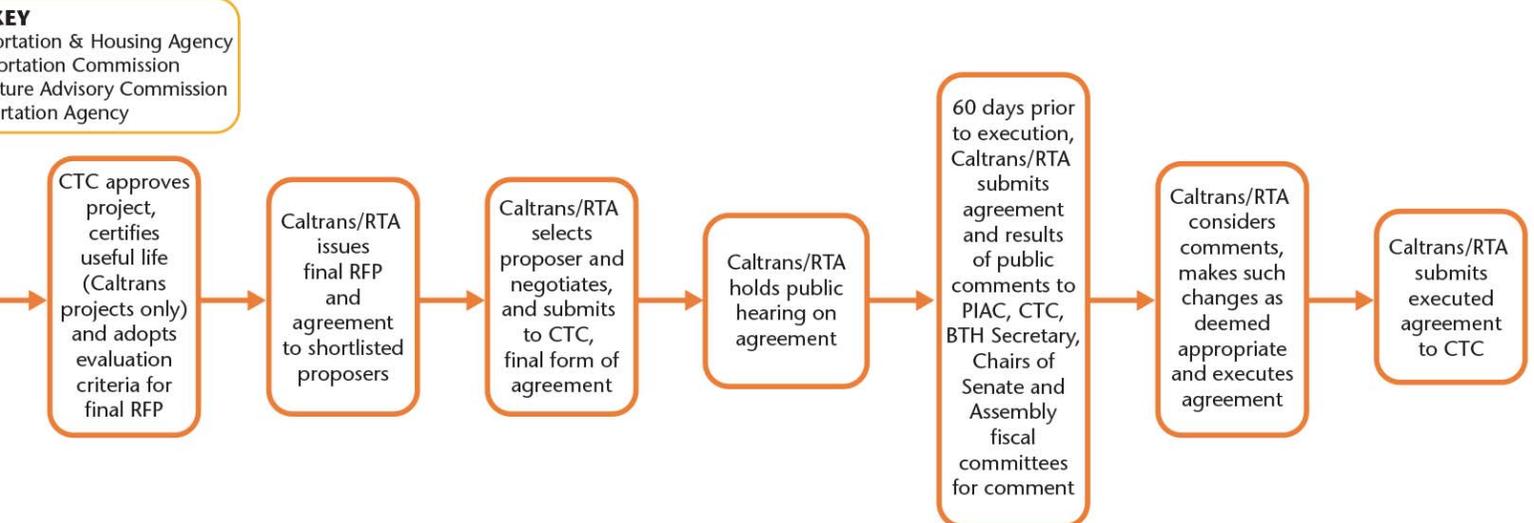
procurement methods

- Caltrans/RTAs may use one or more of the following procurement approaches:
 - > Solicitations for defined projects and calls for proposals within defined parameters
 - > Prequalification and short-listing prior to final evaluation of proposals
 - > Final evaluation of proposals based on qualifications and best value
 - > Negotiations with proposers prior to award
 - > Acceptance of unsolicited proposals, provided that Caltrans/RTAs issue a request for competing proposals. Award to the unsolicited bidder is not permitted unless there is at least one other responsible bid.
- Low Bid or Best Value Selection: Caltrans/RTAs may award a contract on the basis of either low bid or best value
- Public Hearing: Caltrans/RTAs must hold at least one public hearing at a location near the proposed facility to receive public comment on the agreement
- Legislature/PIAC/California Transportation Commission (CTC) review of agreement and public comments: At least 60 days prior to executing the agreement, Caltrans/RTAs submit the draft agreement and any comments from the public hearing(s) to the Legislature, PIAC and CTC for review. Caltrans/RTAs shall consider those comments prior to executing the agreement. No approval is required from the Legislature or PIAC to execute the agreement

For more information please go to: www.publicinfrastructure.ca.gov

(P3) Procurement Flowchart

Streets and Highways Code Section 143 (SBX2 4)



Potential P3 Projects

The projects represent a sample of those under discussion for P3 treatment, but no commitments have been made. They are shown for illustrative purposes only. Actual project list is subject to further discussion.



interstate 710 freight corridor

It is projected that the cargo traffic from the Ports of Los Angeles and Long Beach will more than double in the next 10 years. This project will separate truck traffic from automobile traffic to reduce congestion and improve safety over the 18-mile project length within Los Angeles County. The project cost is estimated at \$6.7 billion. Completion of the environmental document is scheduled for 2011. www.metro.net/projects_studies/I710/default.htm



gerald desmond bridge replacement

This project would replace the existing 4-lane bridge with a 6-lane bridge in Los Angeles County. The new bridge will increase the vertical clearance to allow larger container ships to enter the Port of Long Beach. Goods movement will be enhanced due to the additional capacity on I-710. The project cost is estimated at \$1.1 billion. Completion of the environmental document is scheduled for December 2009. <http://10.56.3.8/PIRS/FS/external.cfm?EA=22830>



doyle drive

This project would reconstruct 1.6 miles of existing Route 101 with a new 6-lane facility south of the Golden Gate Bridge in San Francisco. The highway serves over 100,000 vehicles daily. The project cost is estimated at \$955 million. The environmental process was completed in January 2009. www.doyledrive.com



bay area hot lanes

The Metropolitan Transportation Commission in the San Francisco Bay Area has adopted a plan to establish an 800 lane-mile regional network of high-occupancy toll, express lanes. The network will include conversion of existing high-occupancy-vehicle lanes and construction of approximately 300 miles of new lanes. The estimated cost of the system build-out is \$6 billion capital and \$7.6 billion including operation and maintenance over 30 years. Several segments have already completed the environmental process. www.mtc.ca.gov/planning



riverside county route 91 corridor improvements

This project would add express toll lanes to a 14-mile segment of State Route 91 and a 6-mile segment of Interstate 15 in Riverside County. This route is one of the most congested routes in Southern California with a current traffic volume of 280,000 vehicles and is expected to increase 50-70 percent by 2030. Project cost is estimated at \$1.5 billion. The environmental process is scheduled for completion in 2011. www.sr91project.info

www.publicinfrastructure.ca.gov



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DEVILS SLIDE TUNNEL PROJECT

PRIME CONTRACTOR:
Kiewit Infrastructure West Co.



CONTRACT SUMMARY:

- Funding Type: Federal Emergency Relief (ER)
- Construction Cost : \$417,137,019.00
- Project Allotment : \$439,400,475.00

CONTRACT DATES:

- Construction Start Date : January 18, 2007
- Construction Completion Date : August 27, 2013

TUNNEL DATA:

- Two (2) Tunnels, South Bound & North Bound
- Typical Tunnel Geometry : 9.0 m(30.0 ft) wide, 4.75 (15.5 ft) in height (from top of roadway to clearance envelope), and 4.90 m(16.0 ft) Radius (finish)
- Typical Section of SB & NB Tunnel: 1.20 m (4.0 ft) walkway + 2.4 m(8.0 ft) shoulder + 3.6 m (12.0 ft) lane + 0.60 m (2.0 ft) shoulder + 1.20 m (4.0 ft) walkway.
Total width of tunnel = 9.0 m (30.0 ft)(typical)
- Total Length of Tunnel (Mined Section): NB = 1,265.0 m (4,150 ft) SB = 1,234.0 m (4,048 ft)
- 10 Cross Passages at 120 meters (400.0 ft) apart (CP # 6 allows for vehicular turnaround)
- Excavated Material : 320,000 cubic meter (418,528 cu yd) from tunnels went to Disposal Site.
- Final Lining: NB: 117 pours SB: 113 pours Total of 34,298 cubic meters (44,858 cu yd) of final lining concrete. Final Lining Thickness: 0.375 m (15 inches) thick (minimum)

Final Lining (Smooth Finish w/ Form Gantry): NB = 1183.2 meters or 3,882.0 ft SB = 1,171.2 meters or 3,843 ft

Final Lining (Texture Finish w/ Stay Form):

South Portal: SB = 50.6 meters (166.0 ft) NB = 80.8 meters (265.0 ft) North Portal: SB = 14.2 meters (46.6 ft)

NB = 52.0 meters (170.6 ft)

Cut and Cover Structures:

South Portal: SB = 19.0 meters (62.0 ft) avg. NB = 20.0 meters (65.6 ft) avg.
SB = 456.0 m³ (597.0 cu yd) concrete NB = 480.0 m³ concrete (628.0 cu yd) Structural Backfill: 3,060 cubic meters (4,000 cu yd) Backfill (per Plan Qty)

North Portal: SB = 34.5 meters (113.2 ft) avg. NB = 26.5 meters (86.8 ft) avg.
SB = 1,136.0 m³ concrete (1,486.0 cu yd) NB = 911.0 m³ concrete (1192.0 cu yd) Structural Backfill: 30,000 cubic meters (39,237 cu yd) Backfill (Actual Qty)



DEVILS SLIDE TUNNEL PROJECT

TUNNEL DATA:

- Tunnel Lights (Type: High Pressure Sodium Lamps): 1197 Tunnel Lights. 598 NB Lights (297 Lt & 301Rt side) & 599 SB Lights (305 Lt + 294 Rt side)
- Tunnel Fire Protection System: consist of 42 niches (21 niches per tunnel). Each niche contains wet standpipe hose connection, fire extinguisher, and emergency call box. CO & NO gas monitors are installed every other niche. Niches are spaced every 60 meters (196.9 ft) apart
- Tunnel Fire Alarm System: 32 Jet Fans total (8 pairs of jet fans per tunnel), Heat Detectors, CCTV, Intrusion Detectors, & Radio Re-broadcast System
- Traffic Control System: CMS, VMS & Traffic Control Signals
- NB & SB Tunnel are equipped with Seismic Recording System located at cross passages.
- Tunnel Electrical System : 15 KV provided by PG&E from Pacifica
- Bus Stop at North and South Portal
- A 1013.68 sq meter (10,911 sq. ft) one story Operations, Maintenance, and Control (OMC) building controls and supports both tunnels. The building has a vegetative roof covering, crew lockers and bathrooms, equipment storage bays and workshops
- South/Central/North Equipment Chambers : Each equipment chamber include a 15 KV switchgear, controls for SCADA communications, lighting, traffic signal, and jet fans.
- Tunnel Roadway Structural Section : 600-mm (2.0 ft)(minimum) of Aggregate Base, 120-mm (4.8 inches) of Lean Concrete Base, 30-mm (1.2 inches) of Asphalt Concrete, & 230-mm (9.2 inches) of Portland Cement Concrete Pavement. Total Roadway Structural Section: 980-mm (39.2 inches)
- Tunnel Waterproofing: Waterproofing Membrane is used to create a jacket for the tunnel preventing ground water having direct contact with the final lining concrete. This will prevent water seeping at the crown or the rib.
- Tunnel Drainage (DI/Formation Drains/Base Drains/Under Drains): Each tunnel roadway drains to a slotted drain located at the shoulder which capture roadway water where it flows toward the south portal. Water around and below the tunnel is captured by the formation drain located at the each side of the tunnel while a base drain below the pavement section capture any water coming from below. The road drains will convey the water used to clean tunnel surfaces to an oil water separator and then go to a tank for collection prior to offhaul or disposal.
- Waterline in Tunnels & Pump Station. There is a waterline located in each tunnel that creates a loop at the OMC. The water is supplied by North Coast County Water District (NCCWD) from the Pacifica side.



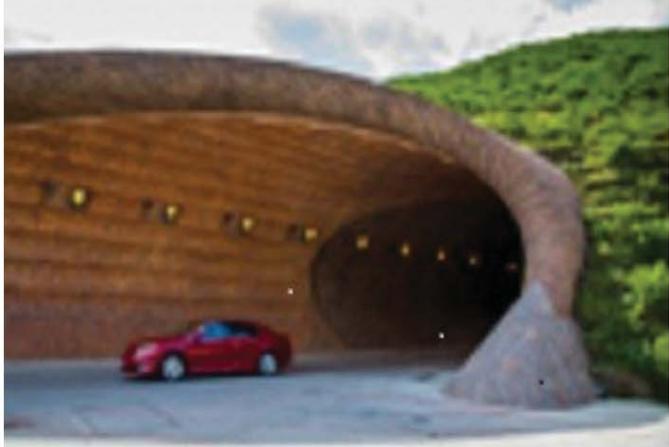
DEVILS SLIDE TUNNEL PROJECT



Cast-In-Place Segmental Bridge



South Portal



North Portal



OMC Bldg



DEVILS SLIDE TUNNEL PROJECT



DEVILS SLIDE TUNNEL

The Problem

- **Traffic jams:** The amount of traffic exceeds the existing capacity of the freeway during long peak periods, which causes unreliable travel times, abrupt stop-and-go conditions, and severe congestion during commute hours. This also results in cars avoiding or diverting from the freeway and using local streets, adding to congestion in surrounding communities.
- **Accidents:** Traffic congestion contributes to accidents on the freeway.
- **Delays in emergency response:** The combined effect of incidents and congestion hinders the ability of emergency service personnel to reach accidents quickly.
- **Less reliable travel time:** Congestion and incidents impact the reliability of travel times through the corridor. Inadequate traveler information further affect drivers' ability to predict travel time.

The Solution

Intelligent Transportation System Technologies

The I-80 SMART Corridor Project represents one of the most extensive Intelligent Transportation Systems in the state, with technological solutions to:

- Improve travel times
- Enhance motorist safety
- Improve travel time reliability
- Reduce congestion

Real-time traffic information, such as variable speed signs and blocked lane signs, will allow drivers to make informed decisions in the event of an incident. Additional improvements include real-time ramp metering on 44 on-ramps to reduce merging conflicts and manage traffic volumes on I-80 and its arterials. Once activated in 2015, these Adaptive Ramp Meters and real-time message signs along the corridor will contribute to optimized roadway operations and will be integrated with, and managed from, the Traffic Management Center at the Caltrans Bay Area headquarters in Oakland.

Improving Safety and Mobility along the I-80 Corridor

Interstate 80 (I-80) is an integral part of the San Francisco Bay Area transportation network. The freeway is a major route for commuters and transit services and is crucial for the transport of goods into and out of the region. The I-80 corridor is one of the most congested corridors in the San Francisco Bay Area, with traffic volumes reaching about 290,000 vehicles per day. This project focuses on the I-80 Corridor from San Francisco-Oakland Bay Bridge Toll Plaza to the Carquinez Bridge.

The California Department of Transportation (Caltrans), Alameda County Transportation Commission (Alameda CTC) and Contra Costa County Transportation Authority (CCTA), in cooperation with 9 cities

and two transit agencies, are reducing congestion and improving safety through the use of Intelligent Transportation System (ITS) technologies. ITS is a combination of hardware and communication technologies that make transportation systems operate more efficiently and safely. By giving drivers accurate, real-time information, along with managing traffic entering the freeway, the existing transportation system can be improved to move vehicles and people in a safer and more efficient manner, without requiring construction of new roads or the widening of existing ones.

For more information on how these ITS technologies work in unison, view a project video at www.alamedactc.org/Gol80



For additional information:
www.80SMARTcorridor.org
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 Twitter: #80SMART
 800-747-5031



PROJECT SCHEDULE

SAN PABLO AVE.
CONSTRUCTION

SEPTEMBER
2012

BEGIN
CONSTRUCTION

SEPTEMBER
2014

COMPLETE
CONSTRUCTION

INTERSTATE 80
CONSTRUCTION

LATE
2012

BEGIN
CONSTRUCTION

EARLY
2015

COMPLETE
CONSTRUCTION

PROJECT
OPERATIONAL
EARLY
2015

FOR MORE INFORMATION

www.80SMARTcorridor.org

www.alamedactc.org/Gol80

www.ccta.net

Project Components

Once the project is implemented, Caltrans will have the ability to maximize the effectiveness of the existing transportation network, which would lead to improved safety and reduced travel times. For example, when there is an accident on I-80, drivers may be directed to change lanes to avoid accident-related congestion.

The project includes the following components and associated intelligent transportation technologies:

Components	ITS technologies
 <p>Incident management</p> <ul style="list-style-type: none"> • Provides advance warning of accidents, construction zones, or other incidents • Improves access for emergency vehicles • Decreases traffic accidents and improves safety 	<ul style="list-style-type: none"> • Overhead sign frames (gantries) • Variable advisory speed signs • Lane use signals • Variable message signs • Closed circuit TV cameras • Trailblazer Signs
 <p>Adaptive ramp metering</p> <ul style="list-style-type: none"> • Reduces congestion and congestion-related accidents on freeway • Manages queues on freeway on-ramps • Encourages high-occupancy vehicle use by reducing delay for carpools and transit 	<ul style="list-style-type: none"> • Ramp meters adapt to actual traffic conditions over the entire freeway corridor • Sensors to collect traffic information • Ramp meters provide preferential signal green time for vehicles in HOV lane
 <p>Traffic and transit information</p> <ul style="list-style-type: none"> • Provides drivers with information to plan or adjust travel routes (alternate freeway routes) and/or use of transit • Improves travel time reliability 	<ul style="list-style-type: none"> • Information display boards showing transit/traffic traveler information
 <p>System integration</p> <ul style="list-style-type: none"> • Automates the system operations • Proactively coordinates management of traffic along the corridor • Shares information among local and regional agencies 	<ul style="list-style-type: none"> • Communications network interfaces with each project component • Central system to operate all technologies from a single location (Caltrans Traffic Management Center)



Project visual simulation with proposed sign bridge structure (gantry)

Project Partners and Funding

This \$80 million project is sponsored by Alameda CTC, Caltrans and CCTA. It is funded by the Corridor Mobility Improvement Account (CMIA) created by State Proposition 1B, approved by Californians in 2006 for transportation needs, the Contra Costa Transportation Authority's Measure J half-cent sales tax and the Alameda County Transportation Commission's Measure B half-cent sales tax.



INNOVATION FAIR 2014



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AUGUST 13-14, 2014

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DISTRICT 4