

# Memorandum

To: CHAIR AND COMMISSIONERS

CTC Meeting: September 19-20, 2007

Reference No.: 3.8  
Information Item

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Chief Financial Officer

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Subject: **QUARTERLY NON-TOLL SEISMIC SAFETY RETROFIT REPORT**

Attached is the Department of Transportation's 2<sup>nd</sup> Quarter Non-Toll Seismic Safety Retrofit Report for 2007. This version is consistent with the version sent to the Commissioners on August 16, 2007.

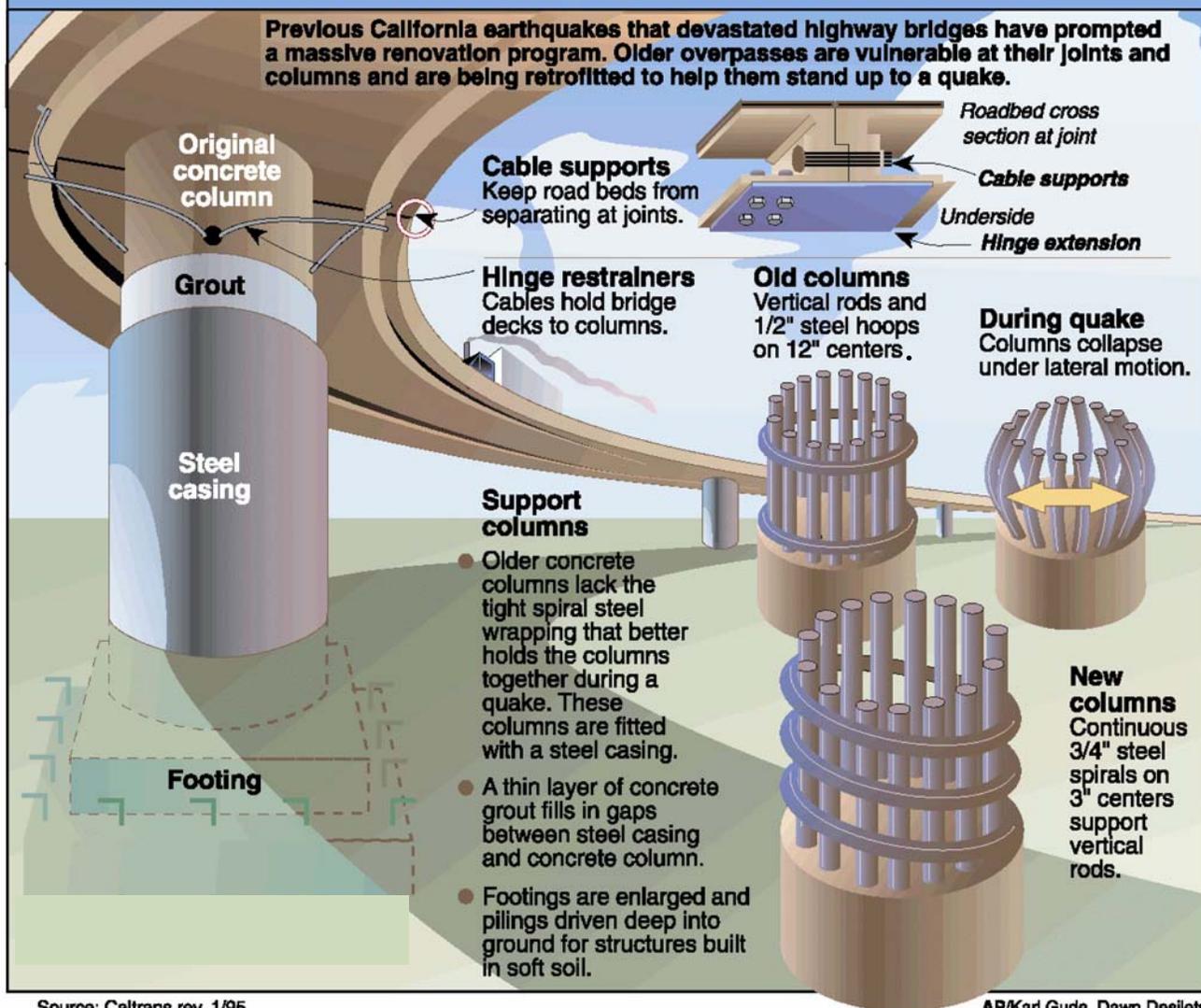
Attachment

# CALIFORNIA DEPARTMENT OF TRANSPORTATION

## SECOND QUARTER 2007 NON-TOLL SEISMIC RETROFIT PROGRAM QUARTERLY REPORT

### Seismic Retrofitting of Freeway Structures

Previous California earthquakes that devastated highway bridges have prompted a massive renovation program. Older overpasses are vulnerable at their joints and columns and are being retrofitted to help them stand up to a quake.



Source: Caltrans rev. 1/95

AP/Karl Gude, Dawn Desilets

Reporting Period Ending June 30, 2007

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# Executive Summary

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The purpose of this report is to provide information on the status and progress in delivering the California Department of Transportation's (Department) non-toll seismic retrofit programs. The Phase 1 Seismic Retrofit Program is complete and is no longer being reported on. The Toll Bridge Seismic Retrofit Program Report is prepared and submitted separately by the Toll Bridge Program Oversight Committee as outlined in Section 30952.2 (b) (1) of the Streets and Highways Code.

This report fulfills the Department's statutory reporting requirement outlined in Assembly Bill (AB) 144 (Chapter 71, Statutes of 2005), which amended Section 188.5 (g) of the Streets and Highways Code as follows:

*“(1) Commencing on January 1, 2004, and quarterly thereafter until completion of all applicable projects, the Department shall provide quarterly seismic reports to the transportation committees of both houses of the Legislature and to the commission for other seismic retrofit programs.*

*(2) The reports shall include all of the following:*

- (A) A progress report for each program.*
- (B) The program baseline budget for support and capital outlay construction costs.*
- (C) The current or projected program budget for support and capital outlay construction costs.*
- (D) Expenditures to date for support and capital outlay construction costs.*
- (E) A comparison of the current or projected schedule and the baseline schedule.*

*(F) A summary of milestones achieved during the quarterly period and any issues identified and actions taken to address those issues.”*

The Department currently has two active non-toll seismic retrofit programs as outlined below.

## **Phase 2 Seismic Retrofit Program:**

The program consists of additional (beyond Phase 1) State-owned bridges that were determined to need seismic retrofit based on additional screening.

## **Local Bridge Seismic Retrofit Program:**

The program consists of seismic retrofit of locally-owned and Department of Water Resources (DWR) bridges. This program is funded and implemented by the agencies having jurisdiction over the bridges.

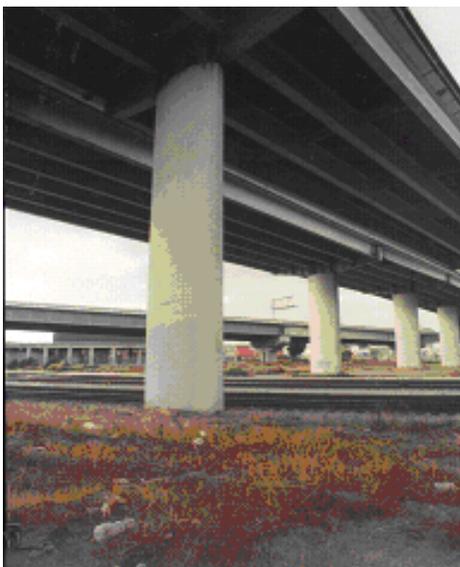
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## Seismic Retrofit Program Overview

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In California, there are more than 12,000 State-owned bridges on the State Highway System, plus an additional 11,500 city and county-owned bridges not on the State Highway System. Each bridge is inspected at least once every two years. Since the 1971 Sylmar earthquake struck the Los Angeles area, the Department has been engaged in an ongoing bridge Seismic Retrofit Program. Following the 1989 Loma Prieta earthquake, the Department's current Seismic Retrofit Program was established to identify and strengthen bridges that needed to be brought up to seismic safety standards.

Using research developed following the 1971 Sylmar earthquake, the Department initially identified 1,039 State-owned bridges in need of being retrofitted to meet seismic safety standards, called Phase 1. The Phase 1 program consisted of mostly single-column bridges that were considered the most vulnerable during an earthquake. The work was funded by State gas taxes.



After the 1994 Northridge earthquake, the Department identified another 1,155 State-owned bridges that became the Phase 2 program consisting of mostly multi-column bridges. Funding for this \$1.35 billion program came from a \$2 billion bond (Proposition 192), which was passed in 1996.



When the Seismic Retrofit Program was established, there were also seven State-owned toll bridges that required retrofit work. The status and progress of the Toll Bridge Seismic Retrofit Program is reported separately in the quarterly Toll Bridge Seismic Retrofit Program Report.

There are a total of 1,235 locally-owned and DWR bridges statewide in the Local Bridge Program. Lead agencies are responsible for assessing the need for seismic retrofit work on locally-owned bridges. The majority of funding comes from gas tax revenues utilizing subvention funds through the Department's Local Assistance Program and may use additional local funds.

## Seismic Evaluation

Based on the 1971 Sylmar earthquake research, the Department implemented new bridge design criteria. From 1986 to 1989, a retrofit program developed by the Department identified single-column bridges as being potentially the most vulnerable to earthquake damage. Research sponsored by the Department at the University of California, San Diego, led to a retrofit procedure that uses steel jackets to increase the strength of columns. Following the 1989 Loma Prieta earthquake, the Department sponsored accelerated retrofit research primarily conducted at the University of California, Berkeley, and the University of California, San Diego.

The Seismic Retrofit Program now involves strengthening the columns of existing bridges by encircling certain columns with a steel casing or, in a few instances, an advanced woven fiber casing. In addition to the column casing, some of the bridge footings are made bigger and given more support by placing additional pilings in the ground, or by using steel tie-down rods to better anchor the footings to the ground. In a few projects, bridge abutments are made larger and the existing restrainer units are made stronger because encasing the columns makes them stiffer and can change the way forces are transmitted within the bridge. Many seismic retrofits involve "hinge seat extensions" which enlarge the size of the hinges that connect sections of bridge decks and help prevent them from separating during severe ground movement. The design of each bridge to be retrofitted is "site specific" based on the

maximum credible earth movement expected at that location. The design details depend on many factors, including the nearest active earthquake fault, type of geology beneath the bridge and the original bridge design.

# Phase 2 Seismic Retrofit Program

## Progress Report

The Phase 2 Seismic Retrofit Program is currently 99 percent complete. To date 1,148 State-owned bridges, out of a total of 1,155 planned bridges, have been retrofitted under the Phase 2 program. Of the remaining seven bridges, three are under construction, one is to be advertised and three bridges are in design.

## Milestones Achieved This Quarter

One bridge was completed this quarter and another bridge met the ready to list milestone and is to be advertised.

- 5<sup>th</sup> Avenue Overhead on Interstate 880 in Oakland (Alameda County) is ready to list.
- Hollister Overcrossing on Route 101 in Goleta (Santa Barbara County) was completed.

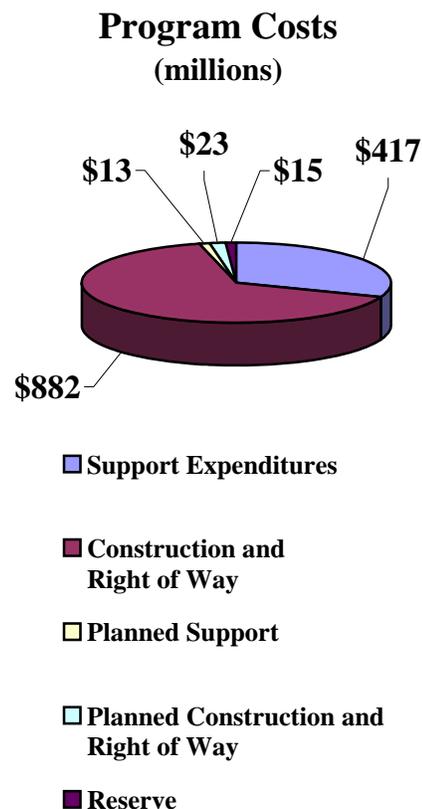
## Program Budget and Expenditures

The total budget for Phase 2 is \$1.35 billion. A total of \$882 million has been allocated for construction and right-of-way, and an additional \$417 million has been expended for support. The total of \$1,299 billion committed to date utilizes approximately 96 percent of the available program funds.

Updated program costs reflect two updates to the current program budget. The recent bid results for the Mojave River Bridge project resulted in savings of four million dollars. Supplemental funds approved for the Interstate 580 Distribution Structure in Alameda County were one million dollars higher than previously budgeted for in the program budget.

Of the remaining balance of \$51 million, \$23 million is to be allocated for construction and right-of-way, and \$13 million is planned for support, leaving a reserve of \$15 million. This reserve is intended to cover cost changes, higher than anticipated bid results, any potential supplemental funds that may be needed, and arbitration settlements.

No program cost overruns are anticipated. All remaining funds will be utilized to complete the Phase 2 program.



**Program Funds**

The funding for the Phase 2 program for seismic retrofit comes from three sources. Proposition 192, which the voters approved in March of 1996, provides bonds for \$1.21 billion. As shown in the table below, an additional \$0.14 billion was expended from a combination of State (\$99.8 million) and Federal (\$40.2 million) funds prior to the passage of Proposition 192. The total budget for Phase 2 is \$1.35 billion.

**Seismic Retrofit Funds**

Funds (millions)	Budgeted	Allocated
State	\$99.8	\$99.8
Federal	\$40.2	\$40.2
Bond	\$1,210.0	\$1,159.0
<b>Total</b>	<b>\$1,350.0</b>	<b>\$1,299.0</b>
<b>Available</b>		<b>\$51.0</b>

As bridges were evaluated for seismic retrofit design strategies, it was determined that for some bridges it would be more cost effective to replace the bridge than to retrofit. This is particularly true when the existing bridge needed non-seismic improvements for bridge repair or rehabilitation.

The additional cost for replacement is beyond the scope of funds available for the retrofit program. Consequently, bridge replacement costs were programmed in the State Highway Operations and Protection Program (SHOPP).

**Additional Bridge Replacement Funds  
Funded from SHOPP**

Replacement Bridges	Program Year	Const \$	R/W \$
Ten Mile	2005-06	\$ 22.3	\$ 0.2
<b>Projects Allocated from SHOPP - \$22.5 million</b>			
5 <sup>th</sup> Avenue Overhead	2005-06	\$ 122.1	\$ 19.8
is tentative for a September vote with a cost increase.			
High Street Separation	2005-06	\$ 73.2	\$ 20.1
Schuyler Heim	2005-06	\$ 250.0	\$ 5.0
<b>Projects Programmed in SHOPP - \$490.2 million</b>			

**Program Delivery by Region / District**

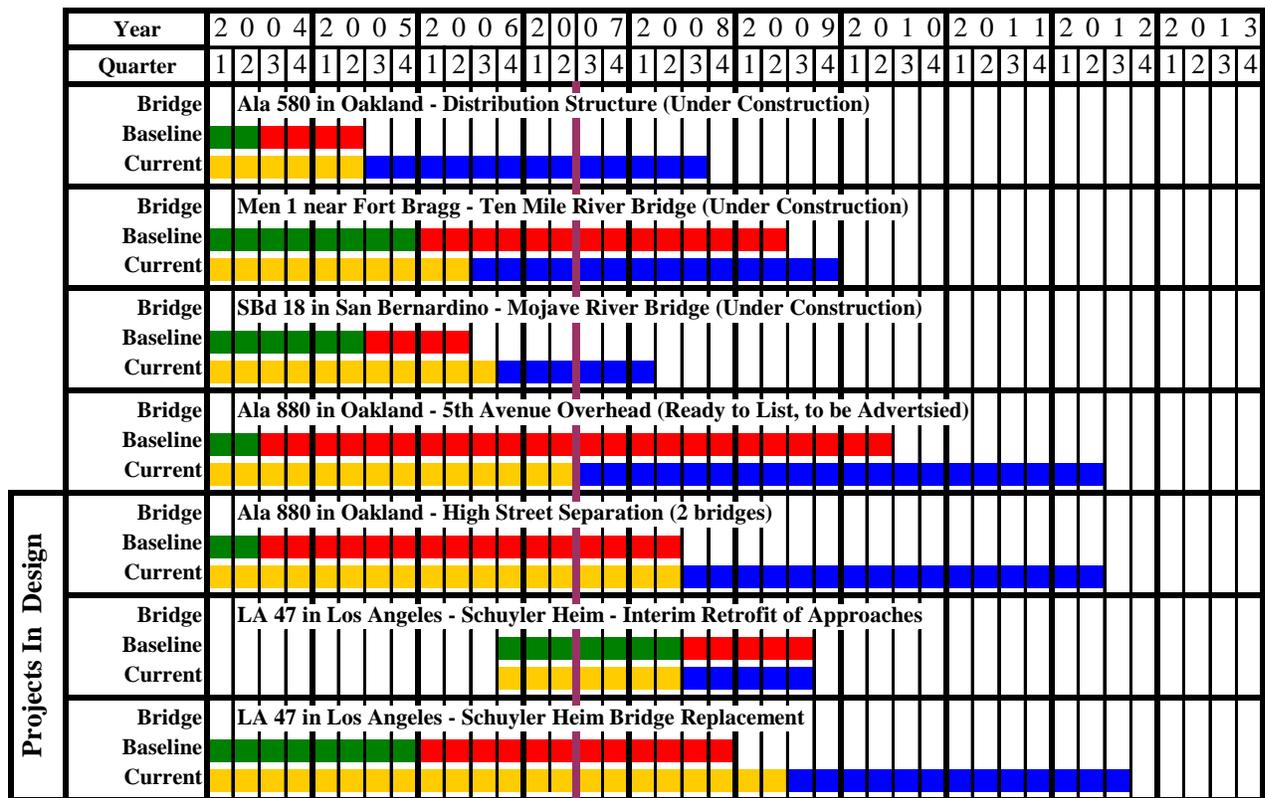
Bridges By Region	#	Percent of Total	\$ million	Percent of Total
North Coast	81	7	\$ 154	11
Bay Area	151	13	\$ 527	39
Central Valley	267	23	\$ 184	14
Southern California	656	57	\$ 485	36
<b>Total</b>	<b>1,155</b>	<b>100</b>	<b>\$ 1,350</b>	<b>100</b>

Bridges By District Office	#	Percent of Total	\$ million	Percent of Total
1 (Redding)	69	6	\$ 139	11
2 (Eureka)	12	1	\$ 15	1
3 (Marysville)	36	3	\$ 40	3
4 (Oakland)	151	13	\$ 527	39
5 (San Luis Obispo)	107	9	\$ 82	6
6 (Fresno)	77	7	\$ 18	1
7 (Los Angeles)	292	25	\$ 301	22
8 (San Bernardino)	131	11	\$ 86	6
9 (Bishop)	7	<1	\$ 2	<1
10 (Stockton)	40	4	\$ 42	3
11 (San Diego)	172	15	\$ 82	6
12 (Irvine)	61	6	\$ 16	1
<b>Total</b>	<b>1,155</b>	<b>100</b>	<b>\$ 1,350</b>	<b>100</b>

### Comparison of Current and Baseline Schedule

While the program is 99 percent complete, the few remaining bridges (1 percent) are taking substantially longer than originally planned because they are either total bridge replacement projects, or are follow-up contracts to earlier

contracts. The bridge replacement contracts face delivery challenges, including environmental protection, construction under heavy traffic conditions, and securing public and external agency input and acceptance for project approval.



Indicates Current Reporting Quarter

Baseline date is planned schedule as of November 2001 (AB1171 approved)

### Projects Under Construction

#### Distribution Structure – Project #3 / 3

In Alameda County at the junction of Interstates 80 and 580 in Oakland.

This project is the third project to retrofit a portion of the bridges at this location. There have been multiple projects due to right-of-way utility relocation and constructability issues.

**Retrofit Strategy:** Reinforce columns and expand footings.

	Construction		Budget (millions)
	Begins	Ends	
Baseline Schedule	Mid 04	Early 05	
Current Schedule	Mid 05	Late 08	
Construction			\$13.9
Right-of-Way			\$ 0.0
Support			\$ 5.3
<b>Total</b>			<b>\$19.2</b>

Number of Bridges to be Retrofitted – 1  
33 0061L EB 80 / EB 580



The construction contract is currently 74 percent complete. The Department has approved supplemental funds and initiated a change order to add to the current project additional work to complete the last column needed to retrofit this bridge.

#### Ten Mile River Bridge

In Mendocino County on Route 1 North of Fort Bragg and South of Westport.

**Retrofit Strategy:** Replace Bridge.

	Construction		Budget (millions)
	Begins	Ends	
Baseline Schedule	Late 05	Early 09	
Current Schedule	Late 06	Early 10	
<b>Funding:</b>	SHOPP	Seismic	Total
Construction	\$22.3	\$29.9	\$52.2
Right-of-Way	\$ 0.2	\$ 0.0	\$ 0.2
Support	\$10.0	\$10.0	\$20.0
<b>Total</b>	<b>\$32.5</b>	<b>\$39.9</b>	<b>\$72.4</b>

Number of Bridges to be Retrofitted – 1  
10-0161 Ten Mile



The construction contract is currently 26 percent complete.

**Mojave River Bridge** – Project #2 of 2  
In San Bernardino County on Route 18 in San Bernardino.

This project is the second project to retrofit a portion of the bridge at this location. The second project was initiated as a result of unforeseen subsurface conditions encountered during construction that did not allow the first project to be completed.

**Retrofit Strategy:** Construct seismic anchor slabs and install steel-braced frames.

	Construction		Budget
	Begins	Ends	(millions)
Baseline Schedule	Mid 05	Mid 06	
Current Schedule	Late 06	Early 08	

<b>Funding:</b>	Total
Construction	\$4.0
Right-of-Way	\$0.2
Support	\$1.5
<b>Total</b>	<b>\$5.7</b>

Number of Bridges to be Retrofitted – 1  
54 0307 Mojave River Bridge



The construction contract is currently 75 percent complete.

## Projects in Design

### High Street Separation

In Alameda County on Interstate 880 in Oakland.

**Retrofit Strategy:** Replace Bridges.

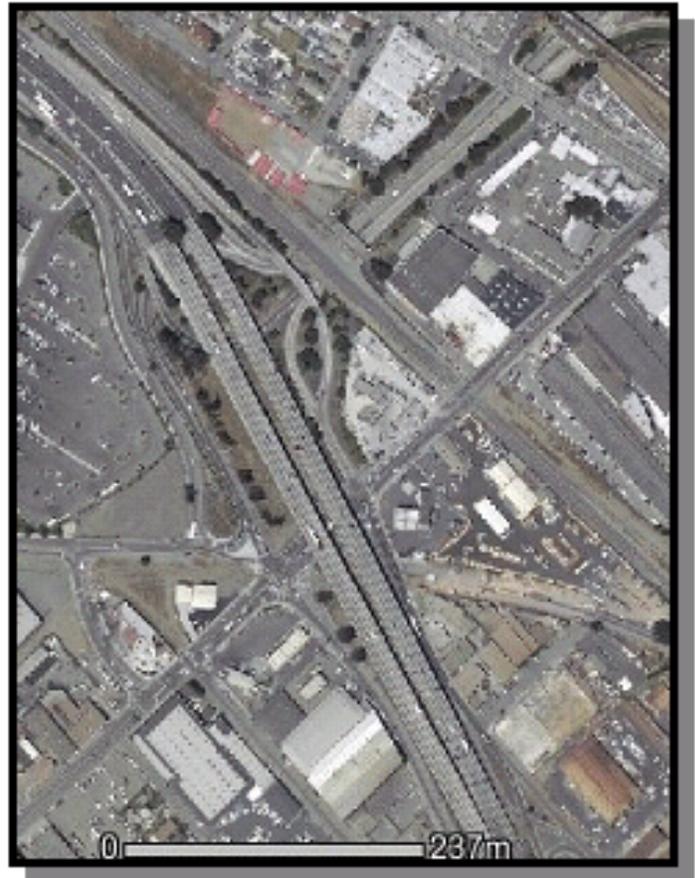
	Construction		Budget (millions)
	Begins	Ends	
Baseline Schedule	Mid 04	Mid 08	
Current Schedule	Mid 08	Mid 12	
<b>Funding:</b>	SHOPP	Seismic	Total
Construction	\$73.2	\$ 0.0	\$73.2
Right-of-Way	\$20.1	\$22.0	\$42.1
Support	\$32.4	\$13.0	\$45.4
Total	\$125.7	\$35.0	\$160.7

Number of Bridges to be Retrofitted – 2

33 0040L High Street Separation Overhead

33 0040R High Street Separation Overhead

The current schedule to deliver this project is the ready to list milestone in June 2008.



Final contract plans are scheduled for late this year.

The major issue delaying the implementation of this project has been the project's right-of-way requirements.

One parcel presents a difficult challenge to keeping a local business in operation while the building is cut and refaced. Another risk is securing one other parcel along with potential street modifications and approvals from the City.

<b>Fifth Avenue Overhead</b>			
In Alameda County on Interstate 880 in Oakland.			
<b>Retrofit Strategy:</b> Replace Bridge.			
	<b>Construction</b>		<b>Budget</b>
	<b>Begins</b>	<b>Ends</b>	<b>(millions)</b>
Baseline Schedule	Mid 04	Early 10	
Current Schedule	Mid 07	Mid 12	
<b>Funding:</b>	SHOPP	Seismic	Total
Construction	\$122.1	\$ 0.0	\$122.1
Right-of-Way	\$ 19.8	\$17.2	\$ 37.0
Mitigation	\$ 0.0	\$17.0	\$ 17.0
Support	\$ 15.3	\$ 7.0	\$ 22.3
Total	\$157.2	\$41.2	\$198.4
Number of Bridges to be Retrofitted – 1			
33 0027 Fifth Avenue Overhead			



Top management within the Department and Union Pacific Railroad has been involved in reaching final decisions on the railroad requirements. This has resulted in the project being delivered and meeting the ready to list milestone in June 2007.

<b>Schuyler Heim Bridge Interim Retrofit</b>			
In Los Angeles County on Route 47 in Long Beach.			
<b>Retrofit Strategy:</b> Reinforce bridge approaches.			
	<b>Construction</b>		<b>Budget</b>
	<b>Begins</b>	<b>Ends</b>	<b>(millions)</b>
Baseline Schedule	Late 08	Late 09	
Current Schedule	Mid 08	Early 09	
<b>Funding:</b>			<b>Total</b>
Construction			\$6.0
Right-of-Way			\$0.3
Support			\$2.0
Total			\$8.3
Number of Bridges to be Retrofitted – 0 – Interim Measure			
53 2618 Schuyler Heim Bridge			

The Department is initiating an interim retrofit project to enhance safety of the approach slabs to the bridge. This will provide an increased level of safety on an interim basis while the bridge replacement project is implemented.

<b>Schuyler Heim Bridge Replacement</b>			
In Los Angeles County on Route 47 in Long Beach.			
<b>Retrofit Strategy:</b> Replace Bridge.			
	<b>Construction</b>		<b>Budget</b>
	<b>Begins</b>	<b>Ends</b>	<b>(millions)</b>
Baseline Schedule	Late 05	Late 08	
Current Schedule	Mid 09	Late 12	
<b>Funding:</b>	<b>SHOPP</b>	<b>Seismic</b>	<b>Total</b>
Construction	\$250.0	\$0.0	\$250.0
Right-of-Way	\$ 5.0	\$0.0	\$ 5.0
Support	\$ 25.1	\$4.0	\$ 29.1
<b>Total</b>	<b>\$280.1</b>	<b>\$4.0</b>	<b>\$284.1</b>
Number of Bridges to be Retrofitted – 1			
53 2618 Schuyler Heim Bridge			

Note: Current schedule tied to local improvements schedule.

The Alameda Corridor Transportation Authority (ACTA) is the lead agency in preparation of the environmental document and has been evaluating an elevated Truck Corridor Expressway to tie into a replacement bridge.

The draft environmental document for the combined project was recently completed by ACTA and is now being reviewed by the Department and Federal Highway Administration (FHWA). The public hearing is now anticipated to be in August 2007.

Because of the scope and magnitude of the combined project, there is a substantial amount of risk in delivering this project on the proposed schedule. Project risks are outlined below:

- Environmental issues (noise, air quality and traffic impacts).
- Property impacts to pier operations.
- Residents may oppose the project.
- Time to address construction issues and complications due to maintaining and reconstructing, as needed, numerous utilities, railroad operations and pier and port operations.
- Hazardous waste studies and remedial action.

A presentation was made by District 7 (Los Angeles) Director Doug Failing to the California Transportation Commission at the June 2007, commission meeting regarding the status of this project.



**Seismic Retrofit Program Budget, Expenditures and Current Estimates**  
**(Phase 2 Funds Only)**

<b>Bridges</b>	<b>Projects</b>	<b>Baseline Budget*</b>	<b>Current Budget*</b>	<b>Expenditures To Date*</b>
<b>1,148</b>	<b>Completed Projects</b>			
	Capital Outlay Support		\$ 390.4	\$ 386.0
	Capital Outlay	\$ 824.0	\$ 790.8	\$ 778.7
	Total		\$ 1,181.2	\$ 1,164.7
	<b>Projects Being Advertised or In Construction</b>			
<b>1</b>	<b>580 Distribution Structure</b>			
	Capital Outlay Support		\$ 5.3	\$ 2.2
	Capital Outlay	\$ 15.0	\$ 13.9	\$ 6.9
	Total		\$ 19.2	\$ 9.1
<b>1</b>	<b>Ten Mile River Bridge</b>			
	Capital Outlay Support		\$ 10.0	\$ 4.5
	Capital Outlay	\$ 25.0	\$ 29.9	\$ 11.6
	Total		\$ 39.9	\$ 16.1
<b>1</b>	<b>Mojave River Bridge</b>			
	Capital Outlay Support		\$ 1.5	\$ 1.3
	Capital Outlay	\$ 1.0	\$ 4.2	\$ 2.0
	Total		\$ 5.7	\$ 3.3
	<b>Projects in Design</b>			
<b>1</b>	<b>5th Avenue Overhead</b>			
	Capital Outlay Support		\$ 7.0	\$ 5.9
	Capital Outlay (R/W Only)	\$ 0.0	\$ 34.2	\$ 16.2
	Total		\$ 41.2	\$ 22.1
<b>2</b>	<b>High Street Separations</b>			
	Capital Outlay Support		\$ 13.0	\$ 13.0
	Capital Outlay (R/W Only)	\$ 0.0	\$ 22.0	\$ 9.5
	Total		\$ 35.0	\$ 22.5
<b>Interim</b>	<b>Schuyler Heim Interim Retrofit Approaches</b>			
	Capital Outlay Support		\$ 2.0	\$ 0.0
	Capital Outlay	\$ 0.0	\$ 6.3	\$ 0.0
	Total		\$ 8.3	\$ 0.0
<b>1</b>	<b>Schuyler Heim Bridge replacement</b>			
	Capital Outlay Support		\$ 4.0	\$ 4.0
	Capital Outlay	\$ 66.0	\$ 0.0	\$ 0.0
	Total		\$ 4.0	\$ 4.0
<b>1,155</b>	<b>Program Totals</b>			
	Capital Outlay Support	\$ 419.0	\$ 433.2	\$ 416.9
	Capital Outlay	\$ 931.0	\$ 901.3	\$ 824.9
	Total	\$1,350.0	\$1,334.5	\$1,241.8

\* Note: All costs shown are in millions and include only the seismic retrofit program's portions of costs and expenditures.

# Local Bridge Seismic Retrofit Program

## Progress Report

The Local Bridge Seismic Retrofit Program (LBSRP) is currently 57 percent complete. To date, 704 local bridges, out of a total of 1,235 planned bridges, have been retrofitted under the LBSRP. Currently, there are 53 bridges under construction, 282 bridges under design, and 196 bridges in a pre-strategy phase.

This program was initially mandated by emergency legislation (SB 36X) after the October 17, 1989 Loma Prieta earthquake. A combination of Federal and State funding was used to fund these projects through the Department's Local Assistance Program.

## Milestones Achieved This Quarter

The status of local bridges by phase is as follows:

	2003	2004	2005*	2006	2007
<b>Complete</b>	559	589	692	699	704
<b>Construction</b>	121	128	46	45	53
<b>Design</b>	266	248	291	295	282
<b>Pre-Strategy</b>	288	269	206	196	196
<b>Total</b>	1,234	1,234	1,235	1,235	1,235

\*One bridge was added to the retrofit list in 2005.

The funding for the LBSRP comes from Federal, State, and local sources. Federal funds are provided through the Department's Local Assistance Program. State funds were provided through the annual budget process as a match for Federal funds until 2002.

The recent passage of the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006 will provide \$125 million of State matching funds to complete the LBSRP with bond funds. The funds in this account will be available upon appropriation by the legislature, to provide 11.47 percent required match for the Federal Highway Bridge Program (HBP) funds, for eligible bridges listed in the LBSRP.

## Program Budget and Expenditures

The estimated budget for the LBSRP is \$1.631 billion. A total of \$617.6 million has been encumbered (spent) to date.

Funds (millions)	Spent	Plan	Total
<b>State</b>	\$72.2	\$0.0	\$72.2
<b>Local</b>	\$0.0	\$7.7	\$7.7
<b>Bond</b>	\$0.0	\$108.1	\$108.1
<b>Federal</b>	\$545.4	\$897.4	\$1,442.8
<b>Total</b>	\$617.6	\$1,013.2	\$1,630.8

A list of bridges identified to receive proposition 1B funding was published at the April 2007, California Transportation Commission meeting. Letters have been sent to all local agencies having bridges on the list to inform them of importance of delivering. This information is also posted on the Local Assistance Program web site.

**Program Delivery by Agency Group**

<b>Bridges By Agency Group</b>	<b>Number Of Agencies</b>	<b>Pre Strategy</b>	<b>In Design</b>	<b>In Construction</b>	<b>Complete or No Retrofit</b>	<b>Total # Bridges</b>	<b>Percent Program</b>
<b>All Other Agencies</b>	193	16	147	36	598	797	65%
<b>Los Angeles Region (City and County)</b>	2	1	63	17	105	186	15%
<b>Department of Water Resources</b>	1	15	9	0	1	25	2%
<b>BART</b>	1	164	63	0	0	227	18%
<b>Total</b>	197	196	282	53	704	1,235	100%

Since the program is 57 percent complete, the program information has been sorted in the table above by the number of program projects per agency to better understand which bridges have been completed and those that are remaining.

Based on the information presented above, the following points are noted:

- One agency, Bay Area Rapid Transit (BART) is responsible for 84 percent of projects in the pre-strategy phase. They are also responsible for 227 bridges (18 percent of the entire program) that are not completed.
- Construction of nine Department of Water Resources (DWR) bridges is planned in 2008. The United States Bureau of Reclamation (USBR) owns the remaining 15 DWR bridges. USBR analysis is ninety percent complete and final design is underway on some bridges.

- BART's Seismic Retrofit Program consists of: Segment 1 - from the Montgomery Station in San Francisco to the Berkeley Hills tunnels, and Outside Segment 1. The environmental document approval for Segment 1 was completed on March 10, 2006. Construction is anticipated later this year.
- Excluding BART, DWR and Los Angeles region bridges, the other local agencies have completed 594 bridges out of a total of 797 bridges, which represents a 75 percent completion rate.
- Los Angeles area bridges are lagging slightly behind other agencies (excluding BART and DWR) for completion.