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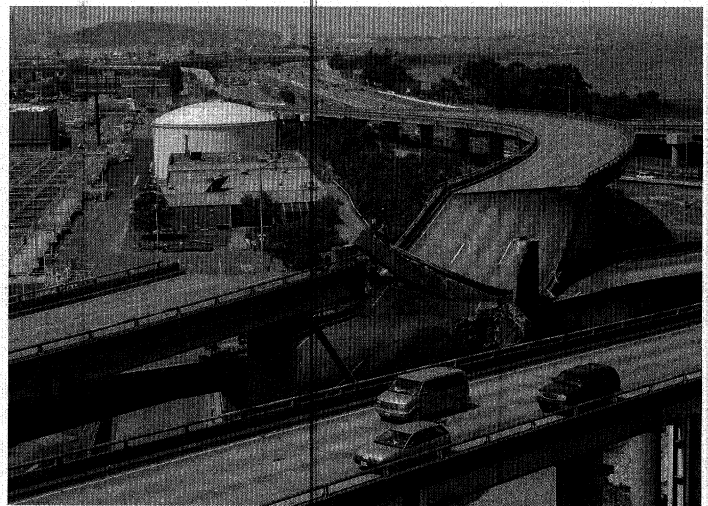
A Rapid Response to a Bay Area Meltdown

When a gasoline tanker truck crashed and exploded into flames on the San Francisco Bay Area's most heavily traveled freeway interchange in the early morning hours of Sunday, April 29, 2007, the outlook seemed bleak for area residents and commuters. A portion of the I-80 eastbound to I-580 eastbound connector road collapsed onto the connector road between westbound I-80 and southbound I-880, closing two integral parts of the interchange known as "The Maze," which carried some 80,000 vehicles a day. The local media predicted months of gridlock, detours, and misery for drivers. Instead, in just over 1 week the roadway's damaged lower deck was reopened to traffic. And in less than a month, the upper deck was also back in business. How did the California Department of Transportation (Caltrans) and its contractors beat expectations and get traffic flowing again on this vital interchange? "The rapid repair was a combination of ingenuity, teamwork, and old-fashioned hard work," says Randell Iwasaki, Chief Deputy Director of Caltrans.

Within minutes of the accident, Caltrans and the California Highway Patrol had closed the damaged sections. Temporary detour signs were set up, and Caltrans activated its Emergency Operations Center. A proclamation issued by Governor Arnold Schwarzenegger permitted Caltrans to award emergency contracts. One of Caltrans' first steps in accelerating the repair process was to hire a demolition contractor, Cleveland Wrecking Company, which was at work on the day of the accident on a project just across the bay in San Francisco. Within minutes of Caltrans awarding a contract on April 29, Cleveland Wrecking took crews and equipment from its San Francisco project and sent them over to the Maze to begin removing the collapsed section of the roadway.

Meanwhile, staff from across Caltrans worked to expedite the design and reconstruction of the I-880 and I-580 connectors

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A gasoline tanker truck explosion on April 29, 2007, closed two integral parts of the San Francisco, CA, interchange known as "The Maze."



U.S. Department
of Transportation
**Federal Highway
Administration**

John Huseby, California Department of Transportation

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John Huseby, California Department of Transportation

A portion of the I-80 eastbound to I-580 eastbound connector road collapsed onto the connector road between westbound I-80 and southbound I-880.

and coordinated with representatives from the City of Oakland to organize traffic control and plan detours on city streets. To encourage the use of public transportation, the State declared a "free transit day" on Monday, April 30. Buses, trains, and ferries ran at full capacity on the 30th, while commuters who did not use public transit altered their regular routes and stayed away from the Maze. Despite the dire predictions, the expected gridlock failed to materialize.

Once the debris was cleared, steel and concrete samples were taken from the I-880 connector ramp for testing and evaluation. The tests showed that while the fire had warped and twisted the I-880 girders, the structural integrity had not been compromised and the girders could be straightened. The concrete deck was also repairable. After installing falsework to support the freeway, Caltrans and its contractor, American Civil Constructors, used hydraulic jacks to lift the entire structure 23 cm (9 in) and bring the roadway back into alignment, as the warped girders had resulted in a dropoff between sections. Once the deck was realigned, the damaged concrete, barriers, and electrical components were replaced. Mean-

while, work began on fixing the girders by using a heat straightening process. The falsework assumed most of the structural load, allowing the ramp to be reopened to traffic on May 8 while workers continued the heat straightening. On the same day, Caltrans awarded the contract to rebuild the I-580 connector ramp to C.C. Myers, Inc., of Rancho Cordova, California. Nine contractors had been invited to place bids on this emergency project, with seven ultimately submitting bids. C.C. Myers had the lowest bid of the seven. Myers' extensive experience with accelerated projects included the reconstruction of I-10 following the 1994 Northridge earthquake in Los Angeles.

The Caltrans contract called for a milestone of opening the roadway in 50 days. While the contract was bid at just \$867,075, for every day the project finished earlier than 50 days, the contractor would earn a bonus of \$200,000, with a cap of \$5 million. A \$200,000 daily penalty



John Huseby, California Department of Transportation

New girders are installed on the I-580 ramp.

"This was a team effort. Our subcontractors did a fantastic job. When the owner, the contractor, and the subcontractors all work off the same page, it shows what you can accomplish."

would be assessed if the milestone was not met.

Less than an hour after the contract was signed on May 8, Myers' staff was on site and ready to start work. Myers also quickly hired Con-Fab of Lathrop, California, to build a new bent cap and Stinger Welding of Coolidge, Arizona, to build the new girders. Stinger contacted specialty steel mills in Sewickley, Pennsylvania, and Houston, Texas, and within just a few days the steel was on its way to Arizona for fabrication. To drastically cut the delivery time, Myers had Stinger hire two truck drivers for each rig hauling the steel. Caltrans helped to speed up the fabrication process by sending engineers and inspectors to Arizona to assist with and monitor the fabrication and be available to answer any questions immediately. Caltrans also provided the shop drawings to both Con-Fab and Stinger within 24 hours of the contract award.

"This project was all about partnerships and also minute by minute, hour by



Concrete is poured for the new I-580 connector ramp.

hour daily planning," says Dan Himick, President of C.C. Myers.

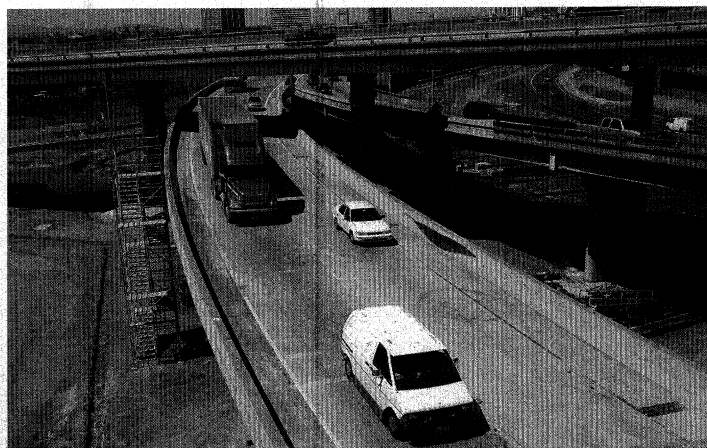
"When we all focus and come to the table with the same goal, we can get things done quickly," adds Gene Fong, Division Administrator for the Federal Highway Administration's (FHWA) California Division office. "The results far exceeded expectations." FHWA's Division office held daily meetings during the reconstruction to talk about the status of the project and help coordinate its partnering role with Caltrans. The work contracted met all Federal and State contract requirements.

The 17-m (55-ft) long, 120-ton bent cap was ready for delivery on May 15. A 30-axle tractor trailer rig hauled it from Lathrop to Oakland, closely followed by the local news media. As news helicopters hovered overhead, cranes lifted the bent cap off the truck and set it atop the columns. It was a perfect fit. On May 16, the first two new girders were smoothly lifted into place. Over the next several nights, the rest of the girders were trucked to Oakland, with the last two girders installed in the early morning hours of May 20. With two crews working 12-hour shifts, the diaphragms and wood deck forms were added as soon as the first gird-

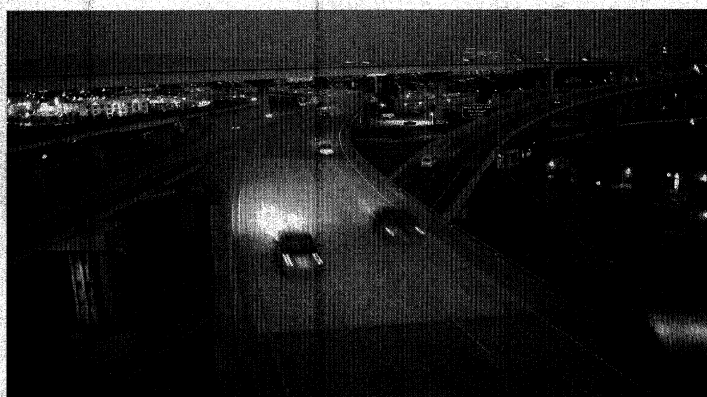
ers were installed.

Once the wood forms were ready, additional workers were brought in to start assembling the rebar. This process continued as the rest of the new girders were brought in. Once the last of the new girders were installed on May 20, it took only a short time to add the additional forms and remaining rebar. That afternoon, the new deck was ready to pour.

Myers and Caltrans used high early strength concrete for the new deck. After placing the concrete, water hoses were used to regularly moisten the curing blanket to keep the concrete from drying too quickly. Assuring a moist cure increased the concrete's strength. While the concrete cured, workers finished fixing the barrier rails, replacing the damaged electrical wiring and hardware, and cleaning up the work site. Caltrans had announced that the road would reopen sometime before the morning commute on Friday, May 25. Instead of holding a ceremony, everyone from the Governor on down agreed that the road would reopen as soon as it was ready, without causing any further delay to commuters. At 8:40 p.m. on Thursday,



The I-880 ramp reopened to traffic on May 8, 2007.



The first vehicles traveled across the new I-580 ramp on May 24, 2007, beating all predictions.

May 24, the first vehicles traveled across the new ramp, beating all predictions. As the *San Francisco Chronicle* declared in its headline the next morning, "A-Maze-ing!"

Finishing well ahead of the 50-day milestone, C.C. Myers earned the maximum bonus amount. "This was a team effort," says Himick. "Our subcontractors did a fantastic job. When the owner, the contractor, and the subcontractors all work off the same page, it shows what you can accomplish."

"All involved sought creative and innovative methods to cut the construction time without compromising quality," adds Iwasaki. "Almost from the first moment, Caltrans and its contractors were determined to turn a horrific accident into the project of a lifetime, something in which everyone could take pride."

To learn more about the Maze reconstruction project, contact Randell Iwasaki at Caltrans, 916-654-5791 (email: randell_iwasaki@dot.ca.gov).

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ProVAL Produces a Smoother Ride in Ohio

The Ohio Department of Transportation (ODOT) optimized its diamond grinding strategy and achieved a smoother ride on a highway construction project recently by using the Federal Highway Administration's (FHWA) Pavement Profile Viewing and Analysis (ProVAL) software. ProVAL allows users to view and analyze pavement profiles collected by inertial pavement profile measurement equipment. It is currently the only software application that can read data from numerous inertial pavement profilers and standardize the data using a common format (see November 2006 *Focus*). ProVAL's data format was recently adopted as an ASTM International standard, "E 2560-07: Standard Specification for Data Format for Pavement Profile." The new standard will be included in the 2008 *Annual Book of ASTM Standards*.

ODOT had resurfaced the asphalt pavement on U.S. 23 in southern Ohio and put a new deck on a bridge but the ride was found by its area engineer to exceed the State's acceptable levels. "We decided to diamond grind to correct the problem. We used the diamond grinding simulator in ProVAL to optimize our grinding strategy and help us determine where to grind. It made us smarter about what we were doing," says Brian Schleppi of ODOT. ProVAL's simulation was right on target with the independent calculations performed by ODOT's contractor, Safety Grooving and Grinding, and the actual grinding that was ultimately done for the project.

"I had been introduced to the program but we had never used it before," says Duff Parker of Safety Grooving and Grinding. "It could definitely help you pinpoint areas that needed corrective action. We will be using it in the future."

Diamond grinding for ODOT's U.S. 23 project was performed on June 13, 2007. "Everyone was very pleased with the result," says Schleppi. "We were able to

remedy the rideability issues." For the section of the bridge that had the worst ride problem, the International Roughness Index (IRI) calculation was 152. A lower IRI means a smoother ride. The ProVAL simulation predicted an IRI of 108 after grinding, with the actual result being 70. Similarly, the bridge's left wheel path had an IRI of 324, with a predicted result of 208 after grinding. The final result was 128.

ODOT is requiring all of its contractors this year to use ProVAL to calculate pavement smoothness indices.

ProVAL, which traces its origins to FHWA's Long-Term Pavement Performance Program, was first introduced in 2001 as a tool for processing and analyzing pavement profile data. Road profilers use lasers and other technology to measure pavement smoothness, as calculated using indexes such as IRI. ProVAL's new 2.72 version, developed by the Transtec Group, Inc., in Austin, Texas, reflects user requests for new features. Features first introduced in version 2.7 include the ability to customize the software to reflect user preferences. Users can change the main screen, for example, so that it displays the features they use and removes those not needed. Users can also customize the data input and automate the setup selections, as well as define and save specific settings that comply with agency specifications. Another new feature is the Profile Editor. Using this tool, users can

edit and filter data sets instantly and export the results to other software programs such as spreadsheets. Version 2.72 has further improved the reporting and table exporting features and enhanced the ability to customize ride statistics.

"ProVAL has gone a long way in optimizing diamond grinding," says John Roberts of the International Grooving and Grinding Association. "Whether it be a bridge deck or pavement, it removes the guesswork and produces a far better product at a far more inexpensive cost. It is a very innovative piece of software."

To download a free copy of ProVAL or to learn more about the software, visit www.roadprofile.com. The Web site also features a list of frequently asked questions on using ProVAL, resource documents, links to more information on pavement profiling and pavement smoothness, and a user forum.

To learn more about ODOT's use of ProVAL, contact Brian Schleppi at ODOT, 614-752-5745 (email: brian.schleppi@dot.state.oh.us). For more information on ProVAL, contact George Chang at Transtec, 512-451-6233, ext. 227 (email: gkchang@thetranstecgroup.com); Mark Swanlund at FHWA, 202-366-1323 (email: mark.swanlund@fhwa.dot.gov); or Bob Orthmeyer at FHWA, 708-283-3533 (email: robert.orthmeyer@fhwa.dot.gov). *



Left: Diamond grinding is performed on the longitudinal construction joint in the left wheel path of a bridge deck on U.S. 23 in southern Ohio. Right: The bridge deck after diamond grinding was performed, greatly improving ride quality.

Highways for LIFE's 2007 Projects Showcase Innovation

Arizona, Georgia, Maine, Missouri, Oregon, and Virginia will each receive up to \$1 million as recipients of the Federal Highway Administration's (FHWA) 2007 Highways for LIFE (HfL) program grants. The awards are designed to help States incorporate technologies and approaches that will cut highway construction time while improving quality, safety, and durability. This year's grants will be announced in two phases, with the second round of projects expected to be awarded in August.

The Arizona Department of Transportation will use its \$1 million grant to help reconstruct a section of Route 179 in Sedona. The project includes construction of a prefabricated bridge and six roundabouts, which are circular intersections with design and traffic control features to improve traffic flow and safety. Innovative contracting will also be showcased, including the use of incentive and disincentive clauses.

The project team has set a goal of maintaining 100 percent access to area businesses and residences during construction, which was a priority identified by the community. The project is expected to reduce fatalities and injuries by 20 percent compared to the current route, while also reducing pavement noise and enhancing ride quality. Construction is expected to begin this summer, with completion in the summer of 2009.

The Georgia Department of Transportation's \$1 million HfL grant will help build a new interchange on Interstate 85 in Troup County to lessen traffic congestion. Incorporating a design-build approach, Georgia expects to reduce construction time by 40 percent by

The HfL grants are designed to help States incorporate technologies and approaches that will cut highway construction time while improving quality, safety, and durability.

The screenshot shows the 'HIGHWAYS FOR LIFE' website. The header includes the FHWA logo and navigation tabs: Projects, Technology Partnerships, Success Stories, and Communication Tools. The main content area is titled 'Announcing Phase I of the FY '07 Highways for LIFE Projects'. It lists several projects: Reconstruction of a section of State Route 179 in Sedona, AZ; New interchange on Interstate 85 in Troup County, GA; Bridge replacements on State Highway 116 in Old Town and on Route 4 in Addison, ME; Rebuilding a section of I-29/I-35 in Kansas City, MO; Replacement of five bridges on Oregon 38 between Drain and Elkton, OR; Repair a two-lane ramp on I-40 at US 50 in Fairfax County, VA; and Bridge replacement on Route 1559 in Prince William County, VA. A 'Featured Success Story: Florida' section describes the Groves Avenue Prefabricated Bridge Project, where a 1-4 foot four to six lanes the old Groves Avenue Bridge had to go. Offsite from the Florida DOT had seen an innovative bridge building technique in use overseas. There, crews used self-propelled modular transporters or s-p-m-ts to lift old bridges out of the way and then replace them with precast concrete bridge spans in a short amount of time. The Groves Avenue project is the first time s-p-m-ts have been used in the construction of a bridge over an interstate highway in the United States. A video on the Groves Avenue project (wmv, 14 mb) is mentioned. The right sidebar contains a quote from Michael P. Jackson, Former Deputy Secretary for DOT, about the purpose of the HfL program to accelerate the adoption of innovations and new technologies, thereby improving safety and highway quality while reducing congestion caused by construction. It also lists 'What's New' including the 2007 HfL Memo, Phase 1 Announcement of the Highways for LIFE Demonstration Construction Projects (FY 2007), Solicitation for FY 2008 Highways for LIFE Demonstration Construction Projects, and Presentations from the 2007 HfL Conference. There are also links for 'Contacts' (Division Office Contacts, HfL Program Contacts) and 'Archive' (HfL Archive).

using contractor incentives and a strategy for clearing any work zone incidents that do not involve injuries in less than 20 minutes. Bidders will also be encouraged to use innovative materials and technologies, such as prefabricated bridge elements.

Construction is estimated to begin this fall, with completion in the spring of 2009. Georgia will also receive a waiver from HfL for the usual required 20 percent State funding match.

In Maine, the \$412,000 HfL grant will go towards bridge replacements on Highway 116 in Old Town and on Route 4 in Addison. By using precast, pre-stressed concrete superstructures that will be built offsite in a controlled environment, the Maine Department of Transportation (MaineDOT) expects to enhance the durability of the bridges and cut construction time.

MaineDOT's goals include an 80 percent reduction in construction time and zero work zone injuries. Construction began in the spring of 2007, with completion expected this summer, thus avoiding long detours for school buses in the fall.

The Missouri Department of Transportation (MoDOT) will receive a \$1 million grant to rebuild a section of I-29/I-35 in Kansas City to increase capacity, improve safety, and upgrade the Missouri River crossing. The project will use design-build contracting to encourage innovation in design, traffic management, and construction phasing.

In unison with the goals of the HfL program, the proposed work for this project will meet goals for ride smoothness and reduced pavement noise. MoDOT will also require the contractor to develop a quality management system for the project and to maintain a quality assurance staff. A community advisory group will meet with project leaders to identify public priorities for the project, such as bridge aesthetics.

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Highways for LIFE, continued from page 5

Construction is expected to begin in early 2008, with completion in the fall of 2011.

Oregon's \$1 million HfL grant will be put to use in replacing five bridges on Oregon 38 between Drain and Ekton. The Oregon Department of Transportation (ODOT) will use prefabricated bridge elements made with high performance concrete for enhanced durability and strength.

ODOT will accelerate the replacement of the five bridges by moving the prefabricated structures into place overnight using self-propelled modular transporters. The goal is to minimize disruption to the traveling public and truck traffic by avoiding the use of an 80-km (50-mi) detour. Construction is slated to begin this summer, with completion in summer 2008.

The Virginia Department of Transportation (VDOT) will receive \$1 million to repair a two-lane ramp on I-66 at U.S. 50 in Fairfax County. To minimize traffic disruptions, the work will be done at night and only one lane and shoulder will be replaced at a time. The use of precast, prestressed concrete slabs and nighttime lane closures is expected to cut construction time from more than 100 days to 35 nights. Integrated intelligent transportation systems technologies will also be used to improve traffic flow and safety in the work zone. Construction is expected to begin this fall, with completion in the fall of 2008.

In another Virginia project, a prefabricated bridge superstructure will be used to

replace a bridge on Route 15/29 in Prince William County. The bridge project will use innovative contracting methods that incorporate incentives and disincentives. A rapid construction method will also be implemented that will use nighttime lane closures to reduce the impact on drivers by 80 percent. This project will not receive any direct HfL funding but its 20 percent State funding match requirement is being waived. Construction is expected to begin this fall, with completion in the spring of 2008.

For more information about HfL, contact Mary Huie at FHWA, 202-366-3039 (email: mary.huie@fhwa.dot.gov), or visit www.fhwa.dot.gov/hfl. *

Highways for LIFE Launches Newsletter

Check out the *Innovator*. The Highways for LIFE (HfL) program's new newsletter will share information on how the highway community is adopting and benefiting from innovations. In each issue, the newsletter will focus on technologies, innovations, and process changes that accelerate construction, improve safety, lower congestion, extend the life of highway projects, and enhance user satisfaction. Articles will cover success stories, measured benefits to motorists, how-to information, and program updates, as well as feature interviews with industry experts on how and why they used innovations and what they learned in the process. Readers are also encouraged to submit article ideas or topics they would like to see covered in future issues.

To subscribe, send an email to HfLT@dot.gov or call 202-366-0131.



Highway Technology Calendar

The following events provide opportunities to learn more about products and technologies for accelerating infrastructure innovations.

Precast/Prestressed Concrete Institute (PCI) National Concrete Bridge Conference

October 22–24, 2007, Phoenix, AZ

Sponsored by PCI and the Federal Highway Administration (FHWA), the conference will provide a forum for state-of-the-art reports on concrete bridges, showcasing precast, prestressed concrete bridges in particular. The conference is aimed at State and Federal bridge designers, consultants, academics, and industry engineers.

Contact: John Dick at PCI, 312-360-3205 (email: JDick@PCI.org), or Gary Jakovich at FHWA, 202-366-4596 (email: gary.jakovich@fhwa.dot.gov). Information is available online at www.pci.org/news/bridge_conference.

Seventh National Conference on Transportation Asset Management

November 6–8, 2007, New Orleans, LA
Three thematic tracks will be featured at the conference: Integration of Maintenance and Operations into Transportation Asset Management, Putting Economics into Practice, and Transportation Asset Management in the Ports and Harbors Community. The conference is sponsored by the Transportation Research Board's (TRB) Committees on Transportation Asset Management and Transportation Economics, with support from FHWA's Office of Asset Management.

Contact: David Floyd at TRB, 202-334-2966 (email: dfloyd@nas.edu), or Francine Shaw-Whitson at FHWA, 202-366-8028 (email: francine.shaw-whitson@fhwa.dot.gov).

International Conference on Optimizing Paving Concrete Mixtures and Accelerated Concrete Pavement Construction and Rehabilitation

November 7–9, 2007, Atlanta, GA

The conference will provide an international forum to address various aspects of concrete mixture optimization and accelerated concrete pavement construction and rehabilitation that result in long life for pavements. The event is being organized as part of the technology transfer activities for FHWA's Concrete Pavement Technology Program.

Contact: Shiraz Tayabji at CTLGroup, 410-997-0400 (fax: 410-997-8480; email: stayabji@CTLGroup.com), or Sam Tyson at FHWA, 202-366-1326 (email: sam.tyson@fhwa.dot.gov). Information and online registration are available at www.fhwa.dot.gov/pavement/concrete/2007CPTPconf.cfm.

Highway Quality Conference

November 13–14, 2007, San Diego, CA

Sponsored by the National Partnership for Highway Quality (NPHQ), the conference will share information about advanced tools and techniques, best practices, and innovations in highway quality.

Contact: Bob Templeton at NPHQ, 512-301-9899 (email: btemplenphq@aol.com), or Ken Jacoby at FHWA, 202-366-6503 (email: ken.jacoby@fhwa.dot.gov). Information is also available at www.nphq.org.

World Steel Bridge Symposium 2007

December 4–7, 2007, New Orleans, LA

The symposium will bring together design engineers, construction professionals, transportation officials, representatives from academia, and others to discuss state-of-the-art practices for enhancing steel bridge design, fabrication, and construction techniques. This event is sponsored by the National Steel Bridge Alliance and FHWA.

Contact: Elizabeth Purdy at the American Institute of Steel Construction, Inc., 312-670-5421 (email: purdy@aisc.org), or Vasant Mistry at FHWA, 202-366-4599 (email: vasant.mistry@fhwa.dot.gov). For additional information, visit www.steelbridges.org (click on "World Steel Bridge Symposium").

Fourth International Conference on Bridge Maintenance, Safety, and Management

July 13–17, 2008, Seoul, Korea

The conference will address such topics as bridge management systems, design and analysis, reliability and risk management, fatigue analysis, measurement and monitoring, and damage assessment. The event is being organized by the International Association for Bridge Maintenance and Safety and hosted by the Korea Bridge Design and Engineering Research Center at Seoul National University.

Contact: Ian Friedland at FHWA, 202-493-3023 (email: ian.friedland@fhwa.dot.gov), or visit www.iabmas08.org. *

FOCUS

Focus (ISSN 1060-6637), which is published monthly by the U.S. Department of Transportation's Federal Highway Administration (FHWA), covers the implementation of innovative technologies in all areas of infrastructure.

Its primary mission is twofold: (1) to serve the providers of highway infrastructure with innovations and support to improve the quality, safety, and service of our roads and bridges; and (2) to help promote and market programs and projects of the various offices of FHWA's Office of Infrastructure.

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Publication No. FHWA-HRT-07-015

HIF-1/07-07(11M)E

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FHWA Releases New Technical Publications Catalog

A wealth of publications available from the Federal Highway Administration's (FHWA) Turner-Fairbank Highway Research Center (TFHRC) are featured in its latest *Technical Publications Catalog* (Publication No. FHWA-HRT-07-025). The third catalog to be issued by TFHRC covers publications released from October 2005 to September 2006, including fact sheets, flyers, product briefs, reports, summaries, and TechBriefs. Most products are immediately accessible online or can be obtained from the FHWA Product Distribution Center (phone: 301-577-0818; email: report.center@fhwa.dot.gov). Along with the previous versions released in 2003 and 2005, the catalog serves as a vital resource for all transportation practitioners, including engineers, transportation specialists, policymakers, and information specialists.

The catalog is available online at www.tfsrc.gov/techpubcat/07025.htm. For more information, contact Martha Soneira at FHWA, 202-493-3468 (email: martha.soneira@fhwa.dot.gov). *

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