Quick Response

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A Caltrans-led construction team was able to quickly repair a damaged Bay Area interchange following a major explosion.

THE MACARTHUR MAZE ISN’T AS FUN AS IT SOUNDS. It’s a nickname for a network of major interchanges east of the San Francisco-Oakland Bay Bridge that distributes traffic to East Bay freeways. The Maze connects Oakland, Berkeley, and San Francisco via five major highways, whose combined average daily traffic is approximately 80,000 vehicles.

Earlier this year, the Maze was the site of a major accident that made national headlines. At 3:41 a.m. on April 29, 2007, a tanker truck, carrying 8,600 gallons of fuel and traveling southbound from I-80 to I-880, overturned and exploded. According to police reports, the accident occurred when the driver changed lanes and the fuel shifted from one side to the other, tipping the truck. The explosion and fire occurred on the bridge deck of southbound I-880 and beneath the connector ramp from the Bay Bridge to eastbound I-580. The heat from the free-burning gas fire caused the steel box beam bent cap at Bent MB19, as well as spans 18 and 19 on I-580, to buckle and collapse onto the I-880 connector ramp directly below. The estimated high temperatures were in excess of 1,500 °F, which caused the steel to soften and forge under its own weight. This collapse closed both the southbound I-880 and eastbound I-580 connectors, interrupting San Francisco-Oakland Bay Bridge traffic.

The collapsed portion of I-580—a total of 160 ft long and 51 ft wide—encompassed the steel girders on both sides of the bent (MB19) as well as the bent cap itself. The failed spans had six steel girders with a 45-ft-wide concrete deck. Luckily, the I-880 connector sustained less damage.

The California Department of Transportation (Caltrans) management and government officials reacted immediately and decisively to prioritize reconstruction. Within hours, senior bridge officials were meeting to set priorities, and engineers were on-site assessing damage. By the end of the first day, Governor Arnold Schwarzenegger declared a State of Emergency and procured federal support for emergency reconstruction funds.

Immediately after removal of debris and stabilization of the structure, steel and concrete samples were obtained. After testing, Caltrans engineers determined that the I-580 superstructure, which remained standing, was not heat damaged, with exceptions at the upper columns. Caltrans engineers also determined that the I-880 structure had suffered minimal damage.

Eight days later, after shoring from below and minor repairs were completed on the I-880 connector, Caltrans reopened it to traffic. As a result, the primary items of work required to replace the collapsed section were the girders, bent cap, and deck. Caltrans engineers realized that rebuilding quickly would hinge on the availability of materials and obtaining the right contractors. On the day of the accident, Caltrans officials mobilized a worldwide search to assess steel availability and fabrication capabilities. This information, gathered within two days, became a critical guide for engineers selecting the reconstruction alternatives.
On October 31, the House Transportation and Infrastructure Committee approved legislation to authorize $2 billion in spending for repairs and reconstruction to the most structurally unsound bridges in the U.S. The bill was drafted by committee chairman Cong- ressman Jim Oberstar (D-MN) in response to the I-35 bridge collapse in Minnesota that killed 13 people and injured at least 140. Chairman Oberstar originally proposed a $2.5 billion initiative, partially funded by a five-cent fuel tax for automobiles over three years. However, that amount has been scaled back to $2 billion in light of political oppo- sition from the Senate and White House, both of which are fearful that the new tax would contribute to the highly politicized issue of growing fuel prices. The approved $2 billion amount is a fraction of the De- partment of Transportation’s estimate that $65 billion is needed to address all critical bridge failures.

The bill now waits to be considered and voted upon by the full House of Represen- tatives and has yet to be introduced in the Senate.

Best Regards,
Conn Abnee
NSBA Executive Director