

# CALDECOTT FOURTH BORE



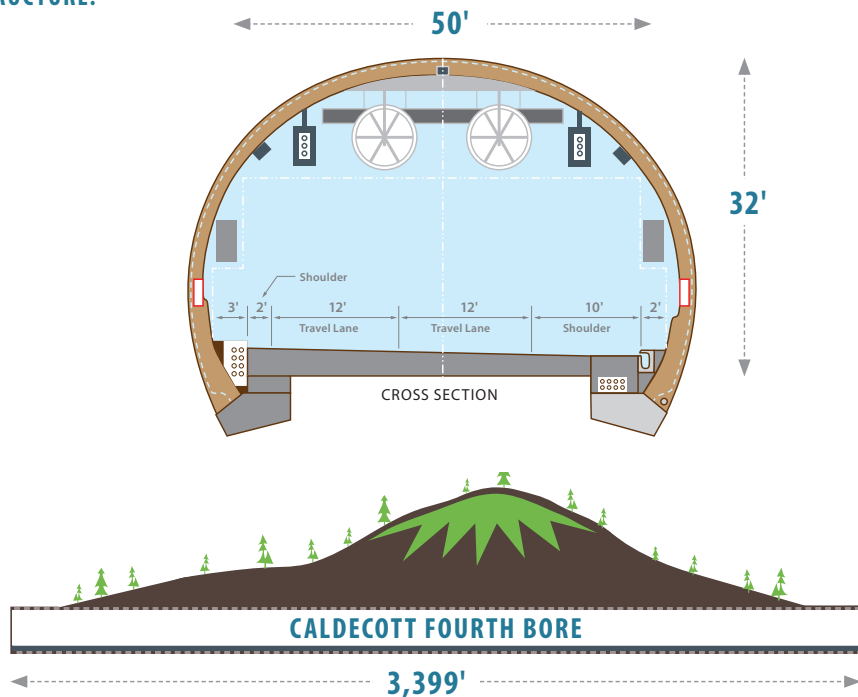
On Friday, November 15, 2013, Contra Costa Transportation Authority (CCTA) and project partners Caltrans, Metropolitan Transportation Commission, and Alameda County Transportation Commission cut the ribbon on the Caldecott Fourth Bore, signifying the successful completion of a monumental engineering feat – and the long-awaited start of smoother traffic flow along a critical corridor for 160,000 motorists each day.

Years in the making, the Fourth Bore was completed on time and under budget at a cost of \$417 million. Since the ribbon cutting, the Fourth Bore has improved mobility for motorists and emergency crews; reduced delays and improved travel times; eliminated the need for daily tunnel reversals and lane merges; and enhanced safety of the traveling public and Caltrans maintenance workers. The Fourth Bore represents what is possible when communities, public agencies, and individuals join one another in partnership toward a shared goal.

Since opening to traffic, the Fourth Bore has delivered upon our promise to alleviate traffic in the off-peak direction by adding greater reliability to motorists' commutes, providing one tunnel lane for each lane of traffic on State Route 24. Learn how the award-winning Fourth Bore was constructed through these project highlights.

# BY THE NUMBERS

## TUNNEL STRUCTURE:

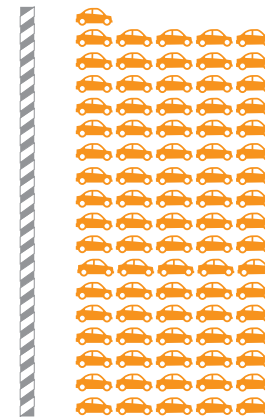


## VOLUME OF SHOTCRETE IN INITIAL LINING:

696,294 FT<sup>3</sup>

## VOLUME OF CONCRETE FOR FINAL LINING:

1,082,516 FT<sup>3</sup>



1.6 = 1,956

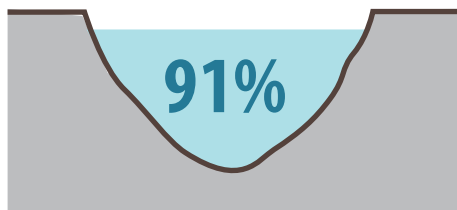
MILLION KG OF STEEL REBAR CARS (1=818.2 KG OF STEEL)

## DID YOU KNOW?

Enough steel rebar was used to make 1,956 average american cars.

## TOTAL EXCAVATION VOLUME OF IN SITU MATERIAL:

6,448,236 FT<sup>3</sup>

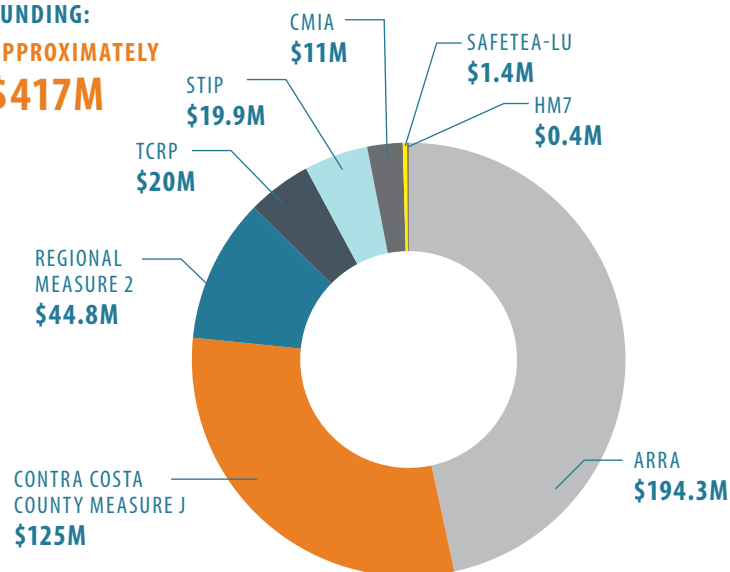


## DID YOU KNOW?

Enough dirt was excavated to build 91% of the San Pablo Dam.

## FUNDING:

APPROXIMATELY \$417M



## HISTORY:

First and Second Bores Constructed

Third Bore Constructed

Fourth Bore Constructed

1937

1964

2013

## TRAVEL TIME SAVINGS FOR MOTORISTS:



1,250

vehicle-hours per weekday



# PROJECT MILESTONES A.K.A. HOW TO BUILD A STATE-OF-THE-ART TUNNEL

## CHAPTER 1: WE BEGIN!

To great fanfare, CCTA and local and regional partner agencies convened on Friday, January 22, 2010 to break ground on the start of construction on the Caldecott Tunnel Fourth Bore Project. At the time of the groundbreaking, the Fourth Bore was the largest American Recovery and Reinvestment Act Stimulus funding in the nation, a testament to the regional importance of the project and the hard work of the project team.

Throughout construction, safety remained a top priority for the project team. One of the most significant safety challenges was tunneling through the East Bay Hills where ground conditions tend to change rapidly. Although tunnel designers took core samples and conducted related research prior to the start of tunneling, the risks posed by potential crumbling ground, flooding, and fire were always top-of-mind for any tunnel worker. That said, the project was completed with an excellent safety record. The project team ensured the installment and maintenance of many safety measures to protect workers, motorists, and the integrity of the tunnel.

Tunneling activities saw the larger-than-life presence of a Wirth roadheader, a 130-ton, 1000-volt, 54-foot-long track-mounted machine with a rotating drilling head on the boom. Workers used the 130-ton roadheader to grind the exposed rock tunnel face and then deposit the cuttings onto a conveyor belt for discharging out of the back of the machine. Debris was then hauled out of the tunnel and off site. The roadheader was operated robotically to further enhance worker safety.



Caldecott Fourth Bore Groundbreaking Ceremony



Wirth 130-Ton Roadheader in Action



# PROJECT MILESTONES A.K.A. HOW TO BUILD A STATE-OF-THE-ART TUNNEL



Caterpillar 330 Excavator



Laser Surveying



Precision-Driven Breakthrough

## CHAPTER 2: WHEN EAST MEETS WEST – TUNNEL “BREAKTHROUGH”

The Caldecott Fourth Bore “breakthrough” – when the opposite sides of a tunnel meet – was a major project milestone. On Tuesday, November 29, 2011, the breakthrough marked the complete excavation of the top portion, or “topheading,” and demonstrated the immense progress that the project had made since tunneling began. Excavation of the Fourth Bore began on the eastern side (Orinda) in August 2010 and on the western side (Oakland) in March 2011. The topheading was excavated first for efficiency and to maintain control of the surrounding rock.

The California Division of Occupational Safety and Health classified the Fourth Bore as gassy due to trace amounts of naturally occurring hydrocarbons. This classification required the use of tunnel-safe equipment including the Wirth roadheader on the eastern end, a modified Caterpillar 330 excavator on the western end, a ventilation system to maintain air quality in the tunnel, and special safety training and equipment for tunneling crews.

The project team indeed had a momentous task ahead: to achieve this breakthrough in the most challenging ground in the entire tunnel. This made the exact timing and location of the breakthrough difficult to determine until the final 24 hours. Because safety was a top concern, the team made a concerted effort to add substantial reinforcement and extra precautions to ensure that the breakthrough was highly controlled. All said, the two ends of the tunnel met with near-flawless precision: the west tunnel broke through only five millimeters vertically and 13 millimeters horizontally away from the east.

# PROJECT MILESTONES A.K.A. HOW TO BUILD A STATE-OF-THE-ART TUNNEL

## CHAPTER 3: A STATE-OF-THE-ART TUNNEL

Upon completion of the Fourth Bore's excavation, façade, and soundwalls, the project team installed state-of-the-art fire and life safety systems. These systems allow trained professionals to monitor and respond to threats inside the tunnel, including fires and other hazards, as well as providing real-time information to help motorists exit safely in an emergency.

These systems are monitored and controlled at the Operations and Maintenance Control (OMC) building, which was constructed on the west end of the tunnel. From the OMC building, safety professionals monitor all four Caldecott Tunnel bores as well as the Webster-Posey Tubes.



Operations and Maintenance Control (OMC) Building

## A JOINING OF TWO COMMUNITIES



Unveiling of Medallion Artwork

The Medallion Competition, held at schools throughout Contra Costa and Alameda Counties, was a creative and impactful way of engaging the community and providing beautiful artwork to represent neighbors on both sides of the tunnel. As a result of the competition, six concrete medallions based on designs created by local students were cast and mounted on the Fourth Bore's two faces, leaving an indelible impression on an important landmark.

## IN MEMORIAM

We wish to commemorate Tunnel Designer Bhaskar Thapa who passed away just a few months before the Fourth Bore opened to traffic – and just prior to his 50th birthday. For many years, Bhaskar worked tirelessly alongside numerous others to ensure the vision of the tunnel would become reality.



Tunnel Designer Bhaskar Thapa