

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



NCGS FIELD TRIP
Friday November 2, 2012

The Caldecott Fourth Bore Project: Tunneling Through a Miocene Plate Boundary

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The new Fourth Bore of the Caldecott Tunnel will add two westbound lanes to the north of the existing six that connect Alameda and Contra Costa Counties along State Route 24. The tunnel has been designed and constructed using the New Austrian Tunneling Method (also known as the Sequential Excavation Method). This system is appropriate for addressing the abruptly changing ground conditions of the East Bay Hills: one small section of tunnel is excavated and supported using shotcrete and rock bolts, and a fully reinforced concrete lining completes the tunnel. The length of excavation and the type and amount of initial support is tailored to the immediate ground conditions.

The Fourth Bore traverses Miocene sedimentary rocks that span the transition of the North American/Pacific Plate margin from one of subduction to that of transform. Three main formations of the Miocene age are found between the portals of the tunnel, from west to east: the Sobrante, the Claremont, and the Orinda Formations. Each presents unique challenges to the designers and constructors of the tunnel. The Fourth Bore represents a culmination of more than 100 years of tunneling through this hillside.

On this field trip, we'll discuss the design and construction of the new Fourth Bore, the history of the Caldecott Tunnels, the tectonic significance of the formations within the tunnel, some of the challenges posed by these formations, and some of the extensive paleontological findings made during excavation of the tunnels. The trip will begin in the project construction office in Lafayette, where a brief presentation will describe the purpose and scope of the project, the funding sources that have made it possible, and the New Austrian (Sequential Excavation) Tunneling Method. An overview of the field trip will also be provided. From there, we'll drive through the third bore and make a stop at the west portal of the original Kennedy Tunnel at the western side of the tunnel. Here we'll talk about the history of the tunnels and some of the early work performed on Bores 1 and 2, which were constructed in 1937. Our next stop will be on the west side of the tunnels to see an exposure of the Sobrante Formation. (We will pause for a brief photo opportunity at or near the western portal.)

The discussion will then focus on the challenges of tunneling through the weakest rocks found in the tunnel. It was, in fact, in these ground conditions, that the Project marked a significant milestone in late November 2011, with the breakthrough of the tunnel's top portion approximately 200 meters east of the Oakland portal. From there, we move east through our imaginary tunnel to the type-locality of the Claremont Formation. Here we can see the Claremont very much as it is exposed in the tunnel – nearly vertical and locally overturned. Just east of this location is a small erosional feature that delineates the contact between Claremont and Orinda Formations. This transition from deep marine porcelanites of the Claremont to more terrestrial gravels, sands, and muds of the Orinda represents the transition of the plate boundary from subduction to predominantly strike-slip. The trip will culminate on the east side of the tunnel where we can see the well-known exposures of Orinda Formation conglomerate, sandstone, and mudstone. We'll discuss the paleontology of the Caldecott Tunnels, focusing on the vertebrate-rich Orinda Formation.

Important Information for Your Visit to the Caldecott Fourth Bore:

- We will meet at the Lafayette Construction Office (3390 Mount Diablo Blvd, Suite 200) for a short presentation, and to distribute safety gear, including reflective vests, hardhats, and goggles
- Please park behind the office in the back rows of the parking lot, if possible, and enter the building from the back. (This is the easiest way to find us.) We are upstairs on the second floor.
- **Carpooling is essential, especially to the job site.** There is very limited parking on the western side of the tunnel. We will circulate attendees list.

Attire:

- Please wear long pants and shirts with sleeves (we suggest dressing in layers)
- **Appropriate footwear is required: hiking shoes or boots are best.** Absolutely no tennis shoes, flipflops, cowboy boots, high heels, or other footwear that has a heel, does not cover the foot, or does not provide adequate traction.

For safety reasons, individuals not wearing the appropriate attire will not be permitted on the construction site.

Liability Waiver Forms:

- Our contractor, Tutor Saliba (TSC) requires that each site visit participant signs a liability waiver form, and signs in at the TSC office in Orinda.

**THIS FIELD TRIP WILL BE LIMITED TO 40 PEOPLE IN TWO GROUPS.
(Morning Session - 9:00 am to 12:30 pm.: Afternoon Session 1:30 pm to 5:00 pm)**

***** **Field Trip Logistics** *****

Time & Meeting Place: November 2, 2012, 8:30 am Morning Session; 12:30 pm Afternoon Session
3300 Mount Diablo Blvd., Suite 200, Lafayette.

Cost: \$20/person (guidebook, lunch, refreshments, soft drinks)

*******REGISTRATION FORM (Caldecott Tunnel Field Trip)*******

Name: _____ E-mail: _____

Carpool origin: _____ Phone: _____ Phone (alternate): _____

Lunch: Regular: _____ Vegetarian: _____ (Please check one) Check Amount: _____

Preferred Session -----

Please mail a check made out to "NCGS" to: **Tridib Guha
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Questions: e-mail: tridibguha@yahoo.com Phone: (925) 370-0685 (evening) (925) 451-1999 (day)