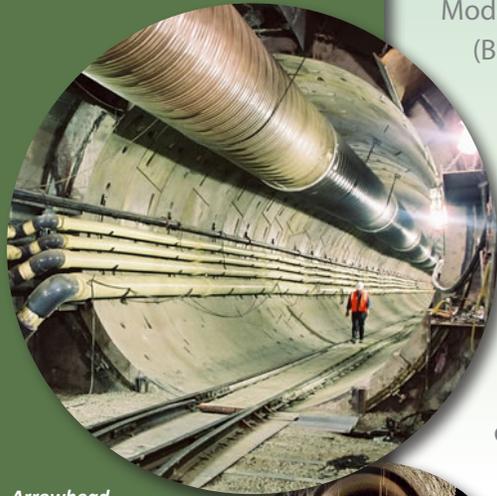


Incorporating Proven Tunnel Technology and Reuse of Excavated Material

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Arrowhead
Inland Feeder



Hetch-Hetchy/
San Francisco Bay Tunnel

Modern tunnels, such as those proposed for the Bay Delta Conservation Plan (BDCP), rely on highly advanced technology. This advanced technology has proven successful in the design, construction, and operation of tunnels in the United Kingdom, France, Japan, China, Mexico, New York, and California. Currently, the State Water Project (SWP) operates more than 15 miles of tunnels in California.

Proposed Delta tunnels would be excavated using a circular cutterhead that mines through the soil at approximately 150 feet below the surface. While no two tunnel projects are exactly alike, BDCP tunnels, and the specialized contractors building them, would utilize modern technologies developed from past projects with similar features, such as length, depth, diameter, and construction conditions. Water and biodegradable, eco-friendly soil conditioners are mixed with the soils to create a toothpaste-like material that is easily transported to the surface via conveyor belt or rail car. This excavated material will be tested and evaluated to determine suitability for various reuse options. "Reusable tunnel material" can then be transported to the opportune reuse location and use.

BDCP is evaluating numerous options for the reuse of excavated tunnel material to reduce local impacts from the proposed construction of water conveyance facilities, and would put the excavated material to beneficial use. Material excavated during construction, often referred to as "tunnel muck" (currently identified as reusable tunnel material), has been identified for many possible reuses, including strengthening levees, raising subsiding Delta islands, and restoring natural habitats, among other uses. While tunnel material has been successfully reused for various purposes around the world, the California Department of Water Resources (DWR) is currently performing tests to ensure the feasibility and safety of reusing this excavated material.

No final decisions on the BDCP can be made prior to the completion of environmental review and public input. The elements described here have been identified for the purpose of further analysis pursuant to the California Environmental Quality Act, the National Environmental Policy Act, the Endangered Species Act, the Natural Community Conservation Planning Act, and other applicable statutes.

Uses and Location of Reusable Tunnel Materials

Reuse of excavated tunnel material is expected to reduce impacts to locations within Delta communities previously identified as “tunnel muck disposal sites.” Reuse of tunnel material will be evaluated in the Public Draft Environmental Impact Report/Environmental Impact Statement (to be released in 2013). As part of the analysis of the refined project, potential reuses and locations have been identified. DWR is currently conducting laboratory tests and studies to ensure the suitability of excavated tunnel material for the reuses listed below:

- **Habitat Restoration** – Reuse of excavated tunnel material for habitat projects will contribute to the approximately 145,000 acres of habitat restoration and protection identified in the BDCP. Tunnel material may be used to reverse Delta island surface subsidence and to create conditions beneficial to migratory birds, including greater sandhill cranes.
- **Levee Improvements/Flood Mitigation** – Tunnel material could be used to strengthen Delta levees identified for maintenance and repair.
- **Structural Fill** – Materials have potential use as structural fill for construction of conveyance facilities.

Case Study – San Francisco Public Utilities Commission

As part of a broad Water System Improvement Program, a 5-mile-long tunnel is under construction beneath the San Francisco Bay to update aging infrastructure transporting water to San Francisco and other parts of the Bay Area. The San Francisco Public Utilities Commission began construction of the tunnel in 2010 with a 15-foot-diameter tunnel boring machine. Of the nearly quarter-million cubic yards of excavated material, more than 98 percent has been reused for restoration of nearby sites, including the United States Fish and Wildlife Service’s Bair Island Restoration and restoration of a private quarry site. Tunnel excavation was completed in early 2013, approximately 6 months ahead of schedule, and no excavated material remains at the staging area near the Dumbarton Bridge.



Photo courtesy of San Francisco Public Utilities Commission, Bay Tunnel project.