Mountain Tunnel Update

Steven R. Ritchie
Assistant General Manager, Water
November 15, 2016
Mountain Tunnel Background

• Mountain Tunnel was constructed in 1918. It is 19 miles long from Early Intake to Priest Reservoir.
• It is a single conduit in this reach of the water delivery system.
• The upper 7 miles are through granite and are unlined. The lower 12 miles are through less competent rock and are lined with concrete.
• The last major inspection in 2008 revealed a number of locations where the lining was deteriorating.
• Three major activities are underway:
  • Adits and Access Improvements
  • Tunnel Inspection and Repair in early 2017
  • Long-Term Tunnel Improvements planning (bypass tunnel or lining repairs)
• The Adits and Access Improvements are underway. They are intended to improve our ability to work on the tunnel and execute emergency repairs if and when needed. They will be complete in mid-2017.

• The engineering consultant is on board to perform the January 2017 tunnel inspection and condition assessment.

• For the Long-Term Improvements, a reevaluation will occur in mid-2017, after the January inspection.

• At that point, the decision will be made on whether to build a bypass tunnel or repair the existing tunnel.
Mountain Tunnel Adits and Access Improvements

Priest Portal

Switchyard Adit

Early Intake

Adit 8/9

Adit 5/6

South Fork East

Pressure and Turbidity Monitoring
Mountain Tunnel Adits and Access Improvements

PROJECT PURPOSE:
To advance the goal of returning Mountain Tunnel to service within three months of a water service interruption by improving access to and into the tunnel from existing adits.

PROJECT SCOPE OF WORK:
• Improve Adit 5/6 and Adit 8/9 access roads by grading and resurfacing road with crushed rock
• Enlarge Adit 5/6 & Adit 8/9 openings by replacing 3-ft diameter bulkheads with new 8’ x 8’ bulkhead doors
• Enlarging the clearances and widening the adits to allow vehicle access into the tunnel
• Installation of new pressure and turbidity instrumentation at two locations
• Installation of new pressure instrumentation at three locations
PROGRESS TO DATE:

- Completed emergency temporary repairs at two unique locations along the Adit 5/6 road.
- Completed grading and resurfacing of the Adit 5/6 and Adit 8/9 access roads and staging areas.
- At both adits, demolished the existing entrance grills and doors and installed the formwork and steel door frames for the new bulkhead doors.
- Completed concrete pour of the new plugs at Adit 5/6 and Adit 8/9. The new concrete is currently curing.
Mountain Tunnel Adits and Access Improvements (HH-981)

PROGRESS TO DATE:

- Moving the new bulkhead door frame into Adit 5/6
- Chiller tube installation prior to concrete pour of new plug
- Grading and resurfacing the adit access roads
UPCOMING MILESTONES:

- **November 30, 2016:** Complete hydrostatic testing of the new 8’x8’ bulkhead doors at Adit 5/6 and Adit 8/9.
- **January 3, 2017:** Start of two-month Mountain Tunnel shutdown. HH-981 Contractor to facilitate Mountain Tunnel inspection by HH-986 Contractor and CS-249 Inspection Team
- **January 18, 2017:** Begin demolition of concrete plugs and widening adit to allow vehicle access
- **February 27, 2017:** Complete demolition and widening of adits
- **March 26, 2017:** Substantial Completion
- **May 25, 2017:** Final Completion
Mountain Tunnel Inspection and Repairs

PROJECT PURPOSE:

- Conduct inspection to update the 2008 Condition Assessment
- To make interim repairs to the Tunnel lining while the long term alternative is evaluated

HH-986 CONSTRUCTION SCOPE:

- Access road paving and staging area development at Priest Reservoir area
- Support 2017 inspection, including access to tunnel
- Approx. 7,200 linear feet of lining repairs from Priest Portal
- Clean out rock trap
- Install rock trap bridge
- Handle discharge water
- Clean up tunnel and exit
2017 Mountain Tunnel Interim Repair (HH-986)

PROGRESS TO DATE:
• Issued Notice To Proceed on August 29, 2016
• Safety and environmental trainings
• Installation of base rock on Rickson Road
• Paving of Rickson Road
• Delivery and set up of field offices
• Ongoing weekly progress meetings
Tunnel Inspection Tasks
(Day 2 thru Day 15 of Shutdown)

- Safety/hazard analysis (including installing station markers and communication system)
- Visual assessment and mapping of lining defects of the lined sections
- Physical inspection and mapping of rock in the unlined sections
- Visual inspection via Remotely Operated Vehicle of the South Fork siphon
- Destructive and non destructive testing of the lining (Schmidt Hammer testing, LiDar scanning, GPR)
- Collection of lining and rock cores from tunnel
Other Work

• Moccasin Fish Hatchery
• Possible discharging at South Fork to relieve “excess” flows during the shutdown
• Repair to historic zipline at South Fork
• Coordination with CS-249 contractor performing drilling activities for water collection
PILOT WATER RECIRCULATION SYSTEM:

• These are efforts to maintain the viability of the fish hatchery during the Tunnel shutdown.

• The SFPUC will:
  • Deliver 3 cfs/day during the shutdown period for operation of the system
  • Monitor available water storage for the Hatchery
  • Verify flow rate on a daily basis
  • Provide diesel generators and fuel to power system

• The State Department of Fish and Wildlife will:
  • Hire contractor to design, procure, and install the pilot recirculation system for the hatchery
  • Operate and maintain the system during the shutdown
Mountain Tunnel Emergency Response

• Mountain Tunnel Restoration Plan, published June 2015
  • Mobilization of staff, consultants and contractors to repair/mitigate any failure with a return to service goal of less than 90 days
  • Work is underway to establish contract mechanisms, staging areas etc. to carry out the Restoration Plan

• Mountain Tunnel Emergency Response Plan, published April 2016 covered the ability to:
  • Manage emergency Hetch Hetchy outages of 90, 180 and 270 days
  • Extend the time that planned outages can last beyond 2 months
  • Estimate and prepare for source shifting capability of Wholesale Customers

• Working closely with SCVWD and EBMUD regarding intertie availability during shutdown

• Finalizing 2017 Master Shutdown Checklist and conducted Risk Workshop, including generation of a Risk Register.
Phase I Geotechnical Investigation commenced September 2016

Confirming Project Performance Standards – Nov 2016

Condition Assessment Methodology Concurrence– Dec 2016

Hydraulic Field Study - March 2017

Concrete/Rock Lab Testing and Evaluation – March to June 2017

Confirmation of Preferred Engineering Alternative – August 2017
# Mountain Tunnel Long-Term Improvements Schedule

## MOUNTAIN TUNNEL IMPROVEMENTS

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<th>2015</th>
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Legend: Indicates Tunnel is shutdown.

MT Program Schedule Nov 2015
November 2018 Shutdown

- Determination of need for additional Interim Repairs in mid-March 2017
- Design/CEQA review: April 2017 to Jan 2018
- Bid/Procurement: Feb 2018 to July 2018
- Notice To Proceed in July 2018
- Shutdown period, 100 days commencing on Nov 1, 2018
Conclusions

- Management and repair of Mountain Tunnel is a high priority for the SFPUC.
- Three concurrent contracts are being managed to perform interim improvements and inform long-term project decision-making.
- Emergency response management is being actively pursued to ensure a successful shutdown process, achievement of shutdown objectives, and uninterrupted water deliveries during shutdown.