

BART Agreement Number: 6M8142

Approval Date: 4/26/2022

Work Plan No.: B.28-01 - A-Line, S-Line and W-Line Tunnel Water Mitigation Design Services

Scope:

2. Scope of Services

The Design Team will initially provide a specialist team consisting of inspectors and tunnel engineers to assess the water intrusion conditions at the tunnels. The Design Team will prepare an engineering assessment report of water intrusion issues with figures and provide a list of feasible mitigation measures.

Ancillary Task: Project Management

The Project Management Team will perform the following activities in support of the project:

- Coordinate work plan activities, including communications/meetings/record keeping, progress reporting, subconsultant management, and agreement administration.
- QA review of project submittals and deliverables.
- Manage subconsultant: setup subcontracts, monitor progress

Ancillary Task: Review Available Relevant Data and other Pre-Inspection Activities

The Design Team will review available BART As-Built drawings, BART As-Built Specifications, Calculations, Shop Drawings, Photos, Construction Plans, and Prior Records for the above referenced tunnels. The report of the relevant data will be included in the report under Task 2.

Coordination with BART and Local Agencies

The Design Team will assist BART staff to coordinate the following activities:

- Obtain approvals from BART Operations, M&E, and other BART departments, if needed to obtain the BART approvals and BART support staff required to obtain track allocations and perform the inspection work.
- Determining the inspection method and the tunnel access details, including any rental equipment or any BART furnished equipment in preparation of Site Specific Work Plan (SSWP)

Assumptions:

- BART to provide electronic copies of relevant As-Built Drawings, As-Built Specifications, BART Inspection Records, and other applicable data that is relevant to this Work Plan.

Task 1 - Field Inspection and LiDAR Scanning

Task 1 includes the on-site inspection activities, both from on track high rail vehicle, on foot, and through digital scanning. The tunnels to inspect are (highlighted in yellow):

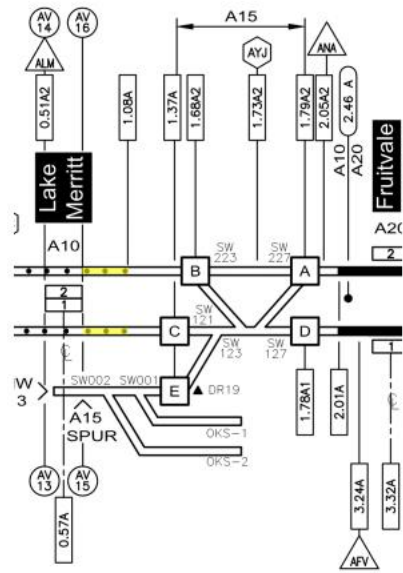


Figure 1 - A-Line

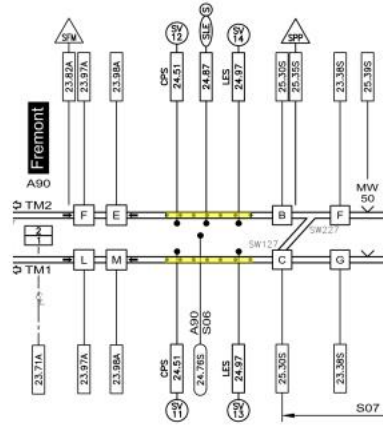


Figure 2 - S-Line

Group Name	Approx. Milepost	Approx. Total Tunnel Length
A-Line	0.64 to 1.08	0.44 miles (each)
S-Line	24.24 to 25.11	0.87 miles (each)

On Track High Rail Vehicle Inspection

The Design Team will conduct visual field investigations from an on-track high-rail vehicle and will take notes, photographs and videos of the tunnel structures and the water infiltration affected areas for further home office analysis. The Design Team will collect samples of formation minerals and waters, if deemed necessary, leaking into the tunnel and analyze for constituents that might affect future mitigation efforts.

After the on-track high rail vehicle visual inspections, an office work analysis will be performed to document the tunnel conditions with respect to water intrusion.

LIDAR Scanning

The Design Team will accompany a digital scanning subconsultant who will perform Lidar Scans as well as high definition photographic scans of the tunnel structures. The scanning will be performed using a track mounted cart which is pushed through the tunnels.

Assumptions:

- Field inspections will take place during blanket hours. Field inspections will be performed in one business trip. If field inspections require more than one business trip this may be considered additional effort.
- BART to provide on-track hi-rail vehicles and operators for Design Team for tunnel water intrusion inspection at no cost to Consultant.
- BART to provide at least one (1) Employee in Charge (EIC). The Design Team will provide (1) Safety Escort for every five (5) non-RWP trained attendees for each site visit. Design Team will consist of approximately two (2) technical team members per investigation.
- Five (5) nights of inspections are assumed. These will be conducted in a single business trip. If multiple business trips are required, then this will be considered additional work.
- Inspections will be scheduled and performed at mutually agreed upon dates. Scheduling inspections to coincide with 'wet weather' will extend the overall work plan schedule.
- Tunnel cross passages are excluded from the inspections.

Task 2 – Engineering Assessment Report

Task 2 includes preparation of the written report to document the findings from Task 1. The written report will also include recommendations for suitable mitigation approaches.

Research Tunnel Water Intrusion Mitigation Methods

The Design Team will report on the research of water intrusion mitigation methods that have been implemented on mined concrete tunnels.

Prepare and Submit Engineering Assessment Report

The Design Team will prepare and submit a written Engineering Assessment Report to document the results of the as-built drawings, geotechnical report, and literature review, and the field inspection findings of the tunnel water intrusion. The Engineering Assessment Report will include:

- Introduction
- Tunnel Types per As-built Drawings Review
- Evaluation of the Condition of the Tunnels Regarding Water Intrusion

- Evaluation of Possible Leak Causes (faults, joints, formations, etc.)
- Photos
- Review of Water Infiltration Remediation Methods with discussion of pros and cons.
- Recommendations
- Tunnelbands (in Appendix)

Respond to BART Review Comments

The Design Team will provide written responses to BART Review Comments and will incorporate the comments into a revised Engineering Assessment Report.

Assumptions:

- BART to provide written review comments within 20 working days of receipt, printed or electronic.
- 2 hardcopies of the Draft and Final Condition Assessment Reports will be provided, in addition to electronic (pdf) copies.

Task 3.1 – Prepare Cost Estimate to Repair Cracks and provide Inspection and Engineering Services during Construction

Task 3.1 includes the development of a comprehensive cost estimate to repair the cracks identified for repair in Tasks 1-2, along with the inclusion of providing both on- and off-site inspection and engineering services during Construction.

Assumptions:

- This task assumes BART Maintenance will perform this work.

Prime: AECOM

Subconsultant	Amount	DBE (Y/N)	SBE (Y/N)
Gall Zeidler	\$409,539	N	N

Work Plan Value: \$483,561