AASHTO – T20
Tunnel Committee Mid-Year Meeting
January 13, 2015
Marriott Marquis Independence Salon F (M4)

Presented by
Louis J. Ruzzi, P.E.
Chairman AASHTO T20 Tunnels
Liberty Scope:

- The Liberty Tunnel, built in 1924, provides primary access to downtown Pittsburgh for the South Hills Communities of Pittsburgh. The Liberty Tunnel carries more than 50,000 vehicles a day and consists of twin, 28’-6” wide horseshoe shaped arch concrete lined bores, approximately 5,889 feet long. This project is the modernization of the tunnels to NFPA 502 requirements where practical. This included structural repairs, new lighting, new 5kv power distribution system, upgrades to life safety systems, drainage improvements and pavement restoration, retaining wall replacement, structural repairs to fanhouse, CCTV and switchgear replacement and fan motor upgrades. Four phases of the program have been completed. Phase 5 is estimated to commence in 2016. The estimated total cost of the program is around $70M.
Phase I

Work Performed in the Outbound Tunnel

- July 2008 - August 2009
- Contractor – Wellington Power Corp.
- Electrical work to provide power to tunnel portals
- Performed shotcrete concrete repair and rehabilitation on one of the eight vertical ventilation shafts.
- Performed misc. shotcrete repairs on outbound tunnel arch and walls.
- Final Costs $5,744,496.35
Shotcrete
Phase II

- September 2009 – February 2011
- Contractor – Mosites Construction Co.
- ARRA Funded
- Installed New conduit duct bank in inbound tunnel.
- Various Shotcrete repairs
- Replaced bowed support beams in the ventilation shafts.
- Replaced roofing system on North and South portals.
- Final costs $11,976,021.45
Phase III

- September 2010 – November 2011
- Contractor – Wellington Power Corp.
- ARRA Funded
- Installed New tunnel Lighting System
- Misc Shotcrete concrete repairs
- Remodeled tunnel portal interiors.
- Final costs $8,342,560.20
Phase IV

Major Work

- Portal Reconstruction and replicating original portal details
- Replacement of Ventilation Wall at Center of the tunnels
- Structural repairs of Tunnels walls
- Structural repairs of cross passage and floor replacement
- Lighting replacement at Cross-Passages
- Wingwall rehabilitation
- Wall Coatings
- Running Man Signs
Running Man
March 12, 2013 Phase IV was awarded to Swank Construction Company, LLC Notice to Proceed issued on March 25, 2013
Squirrel Hill Tunnel Rehabilitation I-376

- Project Scope of Work- Rehabilitation of all major Tunnel Systems including:
  - Structural wall, tile, and arch ceiling repairs
  - Removal of tunnel air duct floor
  - Repair of West Portal Building Soffit Slab
  - Full lighting, conduit, and electrical system replacement
  - Life safety system renovation- new gas detectors, CCTV, emergency egress signage, fan rehabilitation
  - Addition of:
    - Oil/Water Separator
    - Manual Dry Standpipe System

- Total Cost: $49.5 Million
Squirrel Hill Tunnel Rehabilitation

- Tunnel Ceiling Removal
- Conduit Replacement in Tunnel Portal Buildings
- Oil Water Separator Installation
Squirrel Hill Tunnel Rehabilitation

- Tunnel Wall and Wall Tile Replacement
- West Portal Building Soffit Slab Repairs
Squirrel Hill Tunnel Rehabilitation

Tunnel Lighting Replacement

Addition of Manual Dry Standpipe
Squirrel Hill Tunnel Rehabilitation

“Running Man” Egress Signage

Photo Luminescent Cross-passageway Panels
Squirrel Hill Tunnel Rehabilitation

Ventilation Analysis/Testing
Ft. Pitt Tunnel Ceiling Removal

- Project Scope of Work- Emergency Removal of Suspended Tunnel Ceiling and related work including:
  - Removal of Tunnel suspended and SS Hanger Ceiling Portions
  - Retrofit of Luminaire Dissimilar metal connections
  - Life safety system renovation- new gas detectors, CCTV, and emergency egress signage
  - Addition of:
    - New Waterline and Manual Dry Standpipe System
    - New Uninterruptable Power Supply (UPS)
    - Retrofitted AM/FM radio
    - Conduit system safety supports

- Total Estimated Cost: $16.3 Million
Ft. Pitt Tunnel Ceiling Removal

Tunnel Ceiling Removal

Tunnel Luminaire Retrofit
Ft. Pitt Tunnel Ceiling Removal

Tunnel Waterline Replacement/
Standpipe Addition

“Running Man” Egress Signs
Allegheny Tunnel Transportation Improvement Project

• Project Description

- The Pennsylvania Turnpike Commission is studying the feasibility of replacing the Allegheny Tunnel with either a new tunnel or a bypass as a result of increasing concerns regarding: traffic congestion; frequency and severity of accidents in the vicinity of the tunnel; and physical and structural conditions of the existing tunnel.

- L. Robert Kimball & Associates is the prime consultant for the study. Three corridors are being studied. Each corridor has a new tunnel and bypass alternatives for a total of six alternatives being studied. Two of the corridors are to the north of the existing tunnel and one is to the south.
The Approximate Costs Are Below:

<table>
<thead>
<tr>
<th>Approximate Costs (2011)</th>
<th>Lowest cost Cut*</th>
<th>Lowest cost Tunnel*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Cost Estimate</td>
<td>$25M</td>
<td>$35M</td>
</tr>
<tr>
<td>Right-of-Way Costs</td>
<td>$5M**</td>
<td>$2M</td>
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<tr>
<td>Construction Estimate</td>
<td>$212M</td>
<td>$500M</td>
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<tr>
<td>Total Project Costs</td>
<td>$242M</td>
<td>$537M</td>
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</tbody>
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*Does not include Operations and Maintenance
** Includes Mitigation for replacement property
• The field studies and investigations are currently being finalized.
• The Final Detailed Alternatives Analysis and draft report are to be completed early 2015 and a public meeting announcing the preferred alternative will be held early summer 2015.
• Preliminary Design will start late 2015.
Project Description

- The Pennsylvania Turnpike Commission is in the Final Design stage of a complete rehabilitation of the Tuscarora Tunnel with Gannett Fleming as the prime consultant designer.
- The PTC has elected to remove the ceiling from Tunnel 1 and install a full geomembrane waterproofing system. Tunnel 2 we are installing drainage relief holes and drainage chases at vertical wall joints and repairing the waterproofing in the arch. Saccardo Nozzles will be installed in both tunnels for improved ventilation. Other improvements to both tunnels include the installation of all new lighting, repairing structural items, installing lane signals and CCTV, and installing new roadway drains. We will be applying a coating to the exterior portals of the tunnels to reduce the black hole effect, improving ventilation and plumbing in portal buildings, and installing a new SCADA controls system, and installing fire detection and alarm systems in the tunnels.
- Final Design has been initiated with completion scheduled for spring 2016.
- Construction is anticipated to begin in 2016.
Lehigh Heat Detection Project

• **Project Description**
  - The Pennsylvania Turnpike Commission is proceeding with separate construction contracts for the replacement of existing heat detection equipment and the installation of additional detection equipment individually for the Northbound Tunnel #1 and Southbound Tunnel #2 facilities.
  - Work effort includes the replacement of the existing heat detection sensing equipment along with the installation of new manual alarm pull stations.
  - Work in Tunnel #1 Northbound is complete and Tunnel #2 Southbound is scheduled to be bid in spring 2015.
Lehigh Air Plenum Insulation and Lining System Rehabilitation Project

- **Project Description**
  - This project is the replacement of the existing, failed waterproofing and insulation systems in-kind and installation of experimental systems for locations without existing waterproofing and insulation in the Northbound Lehigh #1 Tunnel supply air plenum.
  - Work in Tunnel #1 Northbound is scheduled to be completed in the summer of 2015.