AASHTO
Subcommittee on
Bridges and Structures
Technical Committee
for Tunnel (T-20)
Executive Summary: Tunnels are unique elements in the transportation network. With emerging technology at hand, tunnels are increasingly surfacing as an economic alternative. Numerous tunnel owners have their own design, construction, inspection and operation standards. Limited and scattered national guidelines, standards and specifications are impeding the process to have a successful design and operations. In 2005 a technical tunnel committee (T-20) under AASHTO Subcommittee on Bridges and Structures (SCOBS) was established with the main objective to develop uniform standards for design, construction, inspection, maintenance and operations of highway tunnels in US. In order to reach this objective T-20 is working hand-in hand with FHWA, since FHWA is a strong and equal partner, to ensure safety and provide guidance and also a major proponent in rule making. T-20 is also collaborating with TRB (AFF60) and other technical groups including, but not limited to PIARC, IB, TTA, ITA, Tunnel USA, IES RP22, and reaching with various research entities like NFPA, to get a better understanding of where the industry is and develop a roadmap to address the issues and also be efficient in utilizing available resources.

From the international scan in 2006 (report: Underground Transportation Systems in Europe: Safety, Operations, and Emergency Response) to the domestic scan in 2009 (Best Practices for Roadway Tunnel Design, Construction, maintenance, Inspection and Operations) T-20 mapped research needs and initiated many projects from best practices to design guidelines, to assist tunnel owners. In 2007 a resolution was balloted and approved by SCOBS to add a separate LRFD Specification Section for tunnels, and in 2008, a resolution was balloted and approved for the Tunnel definition.

This document will serve as the Strategic Plan for the AASHTO SCOBS. This plan was developed as a guide for T-20 committee members in serving the needs of the SCOBS development and maintenance of Tunnels standards, specifications and guidance. It will also serve as the focal point to achieve T-20 objectives.

T-20 has identified the following as objectives:

- Identify and pursue research opportunities and provide research and emerging technology to states and other users
- Work with FHWA, AFF60 Tunnel Committee, and other agencies to develop best practices/guidelines/specifications in the design, construction, maintenance, inspection and operation of tunnels
- Collaboration with other national and international tunnel groups

Identify training and education needs related to roadway tunnels, the success of the Strategic Plan depends upon its execution and implementation. This plan will provide general direction for identifying and pursuing research opportunities, develop standards, provide guidance, collaborate with tunnel owners and agencies, and provide general support to SCOBS.
VISION

To provide SCOBS leadership towards research and innovation and advancing the state of the practice in Design, Inspection/Evaluation, Maintenance, Construction and Operation of our nation’s tunnels.

MISSION

Through active involvement with various stake holders such as state DOTs, consultants, contractors, suppliers and other Tunnel groups; communicate regularly on tunnel related research and practice issues and share information and continue to move forward towards the AASHTO strategic plan.

Objectives and Action Items

1. Identify and pursue research opportunities and provide research and emerging technology to states and other users.
   a. A key focus for T-20 will be to identify, pursue, and implement research and emerging technologies. T-20 will utilize NCHRP and other research opportunities in delivering synthesis/guidelines/manuals and specifications. T-20 identified and prioritized the following areas of research for roadway tunnels:
      i. Design
      ii. Construction
      iii. Inspection
      iv. Maintenance
      v. Operations
      vi. Emergency Response

      All these areas are equally important in delivering safety to the tunnel crew and the motorists. Since 2005 T-20 has identified various tasks in the above mentioned six areas and delivered synthesis, guidelines, best practices and manuals for roadway tunnel owners. T-20 will build on work already done, such as previous research efforts, domestic and international scans, and will participate in future seminars and workshops focused on advancing the state of the practice for roadway tunnels.

   Action Items:


   b. Actively participate in reviewing and providing direction in developing AASHTO LRFD Tunnel Design and Construction Specifications (NCHRP 12-89)

   c. Complete NCHRP 20-59, Emergency Exit Signs and Marking Systems for Highway Tunnels
Strategic Plan 2015

d. Discuss with AASHTOWare the possibility of including tunnel inspection elements into Bridge Management software.

e. Complete NCHRP 20-07, Best practices for Coordinated Ventilation Control Schemes in Roadway Tunnel’s

2. Work with FHWA to develop best practices/guidelines/specifications in the design, construction, maintenance, inspection and operation of tunnels

Action Item:
   a. Coordinated with FHWA and ensure that there are no conflicting messages or views in pursuing the common goal.
   b. Follow up with FHWA to understand the impacts of proposed rulemaking on the National Tunnel Inspection Standards.
   c. Participate in developing NHI course for the tunnel inspection.

3. Collaborate with other national / international tunnel groups
   a. Coordinate with all stake holders, but not limited to TRB (AFF60), NFPA, PIARC, IB, TTA, ITA, Tunnel USA, IES RP22, State DOT’s and FHWA to promote and conduct workshops, conferences and identify common research issues. This will provide a snap shot of all ongoing research and major advancements in tunnel industry.
   b. Communicate best practices to the states and other tunnel owners through AASHTO/FHWA tunnel website.

Action Item:
   a. Identify various workshops and meetings and represent/participate in meetings conducted by the stake holders.
   b. Pursue the possibility to conduct a nationwide tunnel seminar and indentify possible funding sources.

4. Identify education and training needs for tunnels owners and users
   a. Provide education and training for roadway tunnel owners and users.

Action Item:
   a. Identify through survey and other means, education and training needs for roadway tunnel owners and users. To better understand the finance issues, identify various stake holders in public and private entities that are involved in financing for tunnel construction.
Strategic Plan 2015

Research tasks that T-20 Completed (C) or Undertaken (U):

<table>
<thead>
<tr>
<th>Areas</th>
<th>Tasks Completed or Undertaken</th>
</tr>
</thead>
</table>
| Design        | • AASHTO Tunnel Manual (Technical Manual for Design and Construction of Road Elements – Civil Elements) (C)  
              | • AASHTO LRFD Tunnel Design and Construction Specifications (NCHRP 12-89) - July 2016 – Ballot in 2017 (U) |
| Construction  | • None at this time                                                                          |
| Maintenance   | • Development of Guidelines for Rehabilitation of Existing highway and Rail Transit Tunnels (NCHRP 20-07/Task 276) (C)  
| Inspections   | • Best Practices for Implementing Quality Control and Quality Assurance for Tunnel Inspection (NCHRP 20-07/Task 261) (C)  
              | • TOMIE Manual (Tunnel Operations Maintenance Inspection and Evaluation) and SNTI (U)  
              | • High-Speed Nondestructive Testing Methods for Mapping Voids, Debonding, Delaminations, Moisture, and Other Defects Behind or Within Tunnel Linings (SHRP 2 R06(G)) (U) |
| Operations    | • Safety and Security in Roadway Tunnels (NCHRP 20-07/Task 230) (C)  
              | • Design Fires in Road Tunnels (NCHRP Synthesis 20-05/Topic 41-05) (C)  
              | • Making Transportation Tunnels Safe and Secure (NCHRP 20-67) (C)  
              | • Highway tunnel Operations (NCHRP Synthesis 20-05/Topic 05-08) (C)  
              | • NCHRP 20-07- Best practices for Coordinated Ventilation Control Schemes in Roadway Tunnel’s. (U) |
| Response      | ALL Best Practices for Roadway Tunnel Design, Construction, Maintenance, Inspection, and Operations (C)  

Identified research topics with ranking

<table>
<thead>
<tr>
<th>Areas</th>
<th>Research topics or tasks to be undertaken</th>
<th>Current Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>• None at this time</td>
<td></td>
</tr>
</tbody>
</table>
| Construction  | • NCHRP Synthesis 20-05 - Fireproof coatings for tunnels for concrete and steel (best practices).  
              | • NCHRP Synthesis 20-05 - Pre-qualifications of contractor to construct new tunnel and rehab existing tunnels (for various systems) | 4               |
|               |                                                                                                         | 5               |
| Maintenance   | • NCHRP 20-07 project to survey existing tunnel maintenance and operations personnel in the U.S. to determine best practices for sources of training, amount of training, recommended training by position and employee retention methods. | 1               |
## Strategic Plan 2015

<table>
<thead>
<tr>
<th>Inspections</th>
<th>None at this time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td></td>
</tr>
<tr>
<td>• NCHR 20-07 - Project to investigate energy saving practices for various types and sources of highway tunnels lighting systems.</td>
<td>3</td>
</tr>
<tr>
<td>• NCHR 20-07 - Project to survey existing tunnel owners to determine best practices for establishing and maintaining target levels of condition, system reliability and performance.</td>
<td>2</td>
</tr>
<tr>
<td>Emergency Response</td>
<td></td>
</tr>
<tr>
<td>• None at this time</td>
<td></td>
</tr>
</tbody>
</table>

### Scans (Domestic and International)

<table>
<thead>
<tr>
<th>Completed Scans</th>
<th>Year</th>
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</table>

### Scans that are of interest

- International Scan on Design and Construction Management Practices of Tunnel Projects Constructed with Large Diameter Tunneling Boring Machines.