



# *SHRP2 R06G Implementation Assistance Program Update on Nondestructive Testing for Tunnel Linings*

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SHRP2 R06G IAP Project of FHWA/AASHTO/CH2M



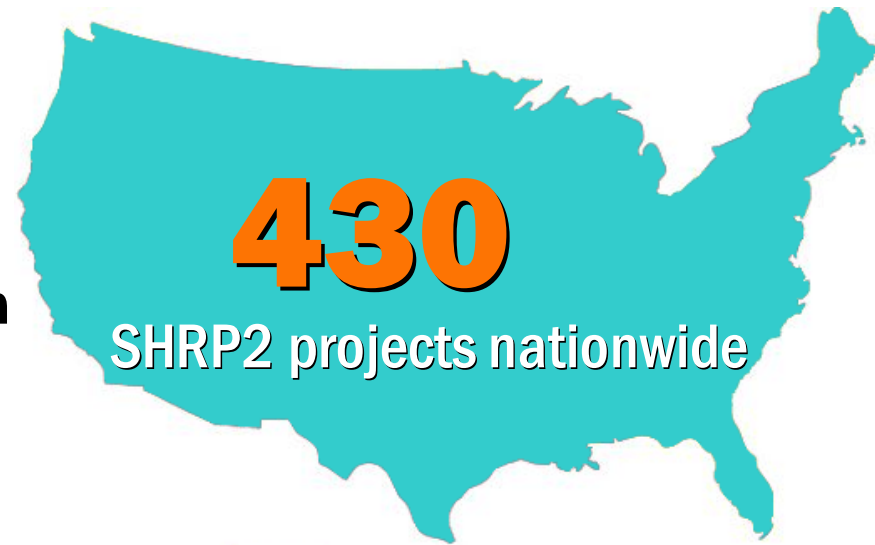
U.S. Department of Transportation  
Federal Highway Administration

AMERICAN ASSOCIATION  
OF STATE HIGHWAY AND  
TRANSPORTATION OFFICIALS

**AASHTO**

# SHRP2 at a Glance

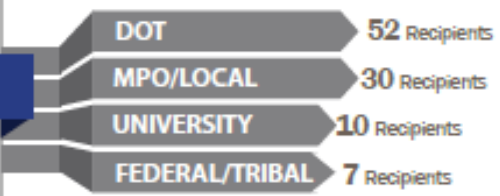
- **SHRP2 Solutions** – 63 products
- **Solution Development** – processes, software, testing procedures, and specifications
- **Field Testing** – refined in the field
- **Implementation Assistance Program**  
430 IAP transportation projects; adopt as standard practice
- **SHRP2 Education Connection** – connecting next-generation professionals with next-generation innovations



# SHRP2 Implementation: Moving Us Forward

**\$130 million**

**FUNDING ASSISTANCE**



**63**

**SHRP2 SOLUTIONS**

**430+**

**PROJECTS IMPLEMENTED**



**224,761**

**PARTICIPANTS ENGAGED**

**8,939**

**OUTREACH ACTIVITIES**



**14,961**

**HOURS TECHNICAL ASSISTANCE**

**RESULTS**

**Save lives, money, and time**

- Bridges being built more quickly
- Smoother traffic flows and less congestion
- Reduced construction costs
- Safer roadways
- Smarter environmental reviews

2016 SHRP2 Highlights Report at <https://www.fhwa.dot.gov/goshrp2>

# SHRP2 R06G - Mapping Voids, Debonding, Delaminations, Moisture, and Other Defects Behind or Within Tunnel Linings by Texas Transportation Institute/Texas A&M University

- Air-coupled ground-penetrating radar (GPR)
- Thermography (handheld thermal camera)
- SPACETEC scanner (LIDAR laser surface mapping of tunnel lining)
- Ground-coupled GPR
- Ultrasonic tomography (UST)
- Ultrasonic shear wave pulse echo
- Portable seismic property analyzer (PSPA)
- Ultrasonic surface waves (USW)
- Impact Echo (IE)



# Pennsylvania DOT – Round 4

Initial Seminar on NDE Methods Completed

Field Testing of Two Tunnels Completed using Various Scanning Methods of LIDAR (tunnel surface mapping with laser technology), Infrared Thermography and Ground Penetrating Radar with Advanced Infrastructure Design (SPACETEC) and Penetradar

Testing Report Completed and Reviewed

Showcase Event held with over 60 Participants in October, 2016 by PennDOT in Pittsburgh



# Colorado DOT – Round 4



Initial Training on NDE Methods Completed

Initial Testing of Tunnel 4 in Clear Creek Canyon Completed with LIDAR and Infrared Thermography

SOW for Additional Field Testing of Tunnels using Various Scanning Methods Issued

Planning for Next June Showcase Event Under Way

## Round 7 – 4 State DOT's

4 States Received SHRP 2 R06G Round 7 IAP Funding in Fall, 2016 with most state DOT's planning to complete their projects in 2017:

- California
- Colorado
- Oregon
- Virginia

# Resources

- FHWA: Hoda Azari, Ph.D., Turner-Fairbank Highway Research Center, McLean, VA, [Hoda.Azari@dot.gov](mailto:Hoda.Azari@dot.gov)
- AASHTO: Patricia Bush, Washington, DC [pbush@aaashto.org](mailto:pbush@aaashto.org)
- SHRP2 R06A Bridge NDT and R06G Tunnel NDT Subject Matter Experts:
  - Larry Olson, PE, Olson Engineering, Rockville, MD  
[larry.olson@olsonengineering.com](mailto:larry.olson@olsonengineering.com)
  - Dennis Sack, PE, Olson Engineering, Wheat Ridge, CO  
[dennis.sack@olsonengineering.com](mailto:dennis.sack@olsonengineering.com)
- [www.fhwa.dot.gov/goshrp2](http://www.fhwa.dot.gov/goshrp2)
- SHRP2 R06A Bridge and R06G Tunnel NDT Information and PennDOT R06G report available at:

[http://shrp2.transportation.org/Pages/R06\\_NondestructiveTesting.aspx](http://shrp2.transportation.org/Pages/R06_NondestructiveTesting.aspx)