

# Implementation of National Innovations and Research Results

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# NCHRP Research Process

by State DOTs

The Process repeats yearly  
with new \$\$ & research projects

NCHRP  
~\$40M/yr  
Research  
Funding

Vendor  
Selection  
by  
Technical  
Panels

NCHRP  
Disseminates  
Research  
Reports

NCHRP  
Program  
Development

Vendor  
Research:  
Reports &  
Findings

NCHRP findings:

research investments  
research investments

provides:

from  
DOT practice  
to achieve the  
investments

## ➤ What We Are Learning

- Management's predisposition to using national research products is very important
- Proactive managers view national research programs as strategic investments for improvements
- Greater implementation potential when PennDOT people are involved in the research
- PennDOT's Implementation System effectively promotes and facilitates use of national research products

# ➤ NCHRP as a Strategic Resource

## Senior management involvement in:

- Problem statement submission
- Problem selection
- Technical panels
- Including staff in process

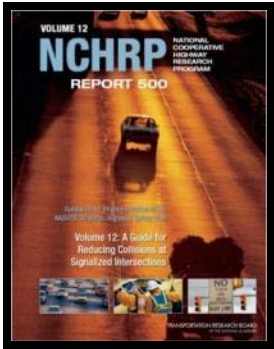
## Encourage staff in proactive involvement:

- Builds staff knowledge
- Provides PennDOT's influence on research
- Prepares for implementation

## Implementation:

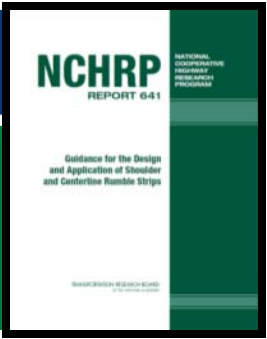
- Implement research results to solve problems *and* improve practices
- Leverage benefits of implementation to influence Department policy





***NCHRP Report 500***  
*Guidance for Implementation of the AASHTO Strategic Highway Safety Plan (SHSP)*

***NCHRP Report 641***  
*Guidance for the Design and Application of Shoulder and Centerline Rumble Strips*



- NCHRP Reports provide guidance for PennDOT districts to make decisions based on proven effective strategies
- PennDOT is implementing an estimated 90% of safety recommendations in some significant capacity

Infrastructure Improvements	Cost per Life Saved	Benefit-Cost Ratio
Centerline Rumble Strip	\$ 25,968	224:1
Edgeline Rumble Strip	\$ 35,468	164:1
Low-Cost Intersection Improvement	\$ 570,279	10:1
Cable Median Guide Rail	\$ 118,711	49:1

Behavioral Programs	Cost per Life Saved	Benefit-Cost Ratio
DUI Enforcement Operations	\$ 528,028	17:1
Seat Belt Enforcement Program	\$ 582,290	28:1
Aggressive Driving Enforcement Program	\$ 1,093,251	15:1

# Implementation through AASHTO Committees

- Chief Bridge Engineer (and ACBE's) active on NCHRP panels and in AASHTO Subcommittee on Bridges and Structures (SCOBS)
- Uses NCHRP developed product list created for SCOBS as a guide for what can be done at PennDOT

Project	Product	Status
12-40	Design and construction GUIDELINES for long-span decked precast, prestressed concrete girder bridges for possible incorporation into the AASHTO LRFD Design Specifications.	Completed June 2009. Agency report is available on NCHRP website
12-73	Design Guidelines for Durability of Bonded CRFP Repair/Strengthening of Concrete Beams	Completed September 2008. Agency report available as N Web-Only Document 155.
12-74	Development of a Precast Bent Cap System for Seismic Regions	Completed June 2010. Published as NCHRP Report 681.
12-75	Design of FRP Systems for Strengthening Concrete Girders in Shear	Completed June 2010. Published as NCHRP Report 678
12-76 12-76(01)	Develop and demonstrate the application of PROTOCOLS for collecting and processing traffic data to calibrate national bridge live-load models.	Completed December 2008. Published as NCHRP Report 681.
12-77	Recommended revisions to the AASHTO LRFD Bridge Design Specifications and the AASHTO LRFD Bridge Construction Specifications to ensure the safe and economic use of high-strength steel reinforcement in structural concrete members.	Completed August 2010. Published as NCHRP Report 679.
12-78	REFINEMENTS to the LRFD methods in the AASHTO Manual for Bridge Evaluation and EXPLANATIONS of changes in truck weight restrictions.	Completion March 2011. To be published as NCHRP Report 70.
15-29	SPECIFICATIONS and refined methods of analysis for the distribution of live load to buried structures.	Completed April 2009. Published as NCHRP Report 647.
18-64	A MANUAL on service life of corrosion-damaged reinforced concrete bridge superstructure elements.	Completed January 2006. Published as NCHRP Report 558.
18-12	GUIDELINES for the use of self-consolidating concrete in precast, prestressed concrete bridge elements for possible incorporation into the AASHTO LRFD Design and Construction Specifications.	Completed June 2008. Published as NCHRP Report 638.
18-14	Evaluation and Repair Procedures for Precast/Prestressed Concrete Girders with Longitudinal Cracking in the Web	Completed November 2008. Published as NCHRP Report 654.
20-071015	SPECIFICATIONS for the distribution of shear in skewed multi-beam bridges.	Completed December 2003.
20-071333	RECOMMENDATIONS on live load deflection limits for steel bridges.	Completed May 2002.
20-072144	Application of LRFD Bridge Design Specifications to High-Strength Structural Concrete: Final Project - Phase 1	Completed December 2007.
20-072289	A strategic plan for increasing the use of incremental launching of highway bridges in the U.S.	Completed October 2007. Report available on project website, considered for publication.
20-072344	GUIDELINES for Selection of Sealers and Treatments for Bridge Deck Cracks.	Completed January 2009. Provided to AASHTO; is being considered for publication.
20-072349	Precast LRFD SPECIFICATIONS and commentary for the design of pedestrian bridges.	Completed April 2005.
20-072352	GUIDELINES for implementing Quality Control and Quality Assurance for Bridge Inspection.	Completed October 2009.
20-072363	BEST PRACTICES for Implementing Quality Control and Quality Assurance for Tunnel Inspection.	Completed August 2010.
20-072376	FIELD GUIDELINES for rehabilitation of existing highway and off-ramp bridges.	Completed June 2009. Published as NCHRP Report 651.
24-21	Recommended changes to Section 10 of the AASHTO LRFD Bridge Design Specifications for the strength limit state design of shallow foundations.	

# Next Gen - Implementing National Initiatives

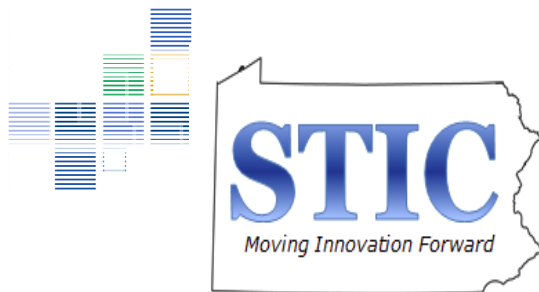
## State Transportation Innovation Council

### It is...

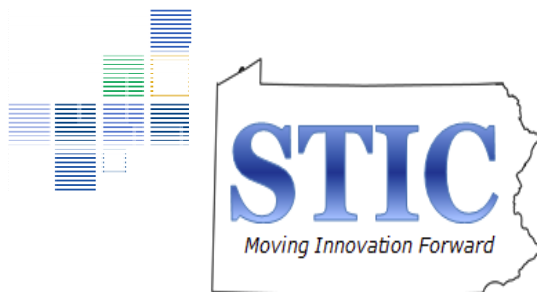
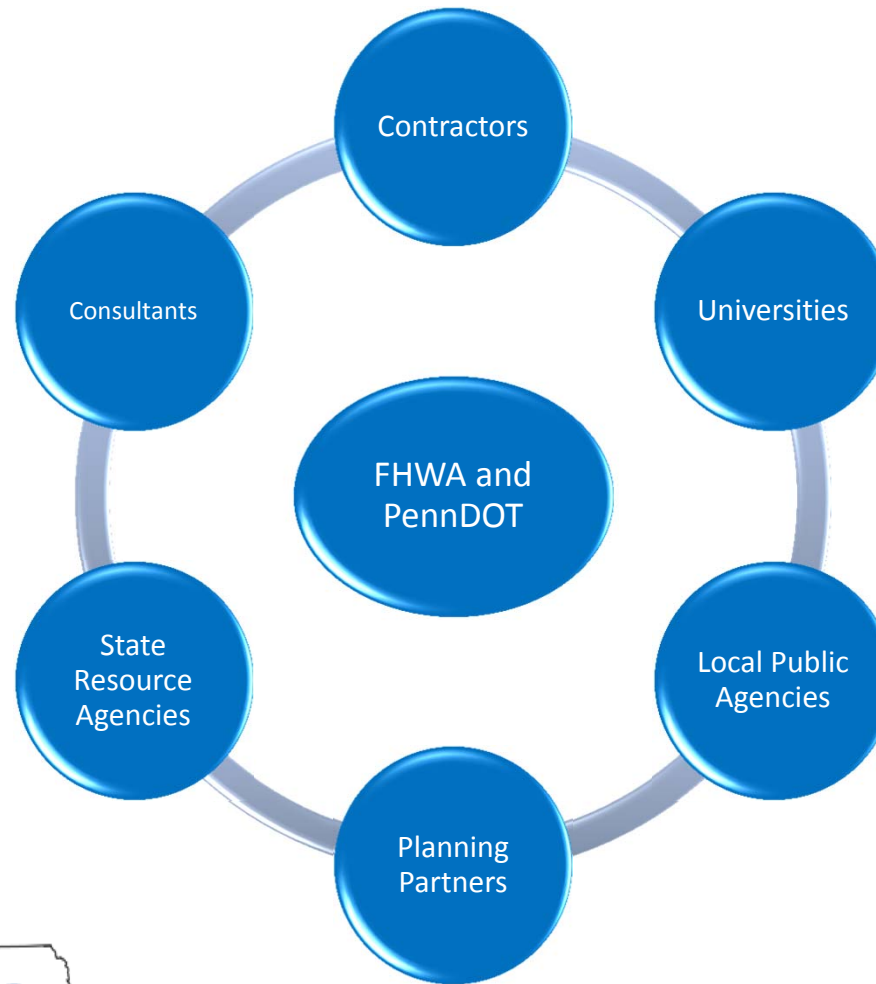
- A multi-stakeholder leadership approach to facilitate the rapid implementation of proven, well-researched technologies, tactics, and techniques

### It is not...

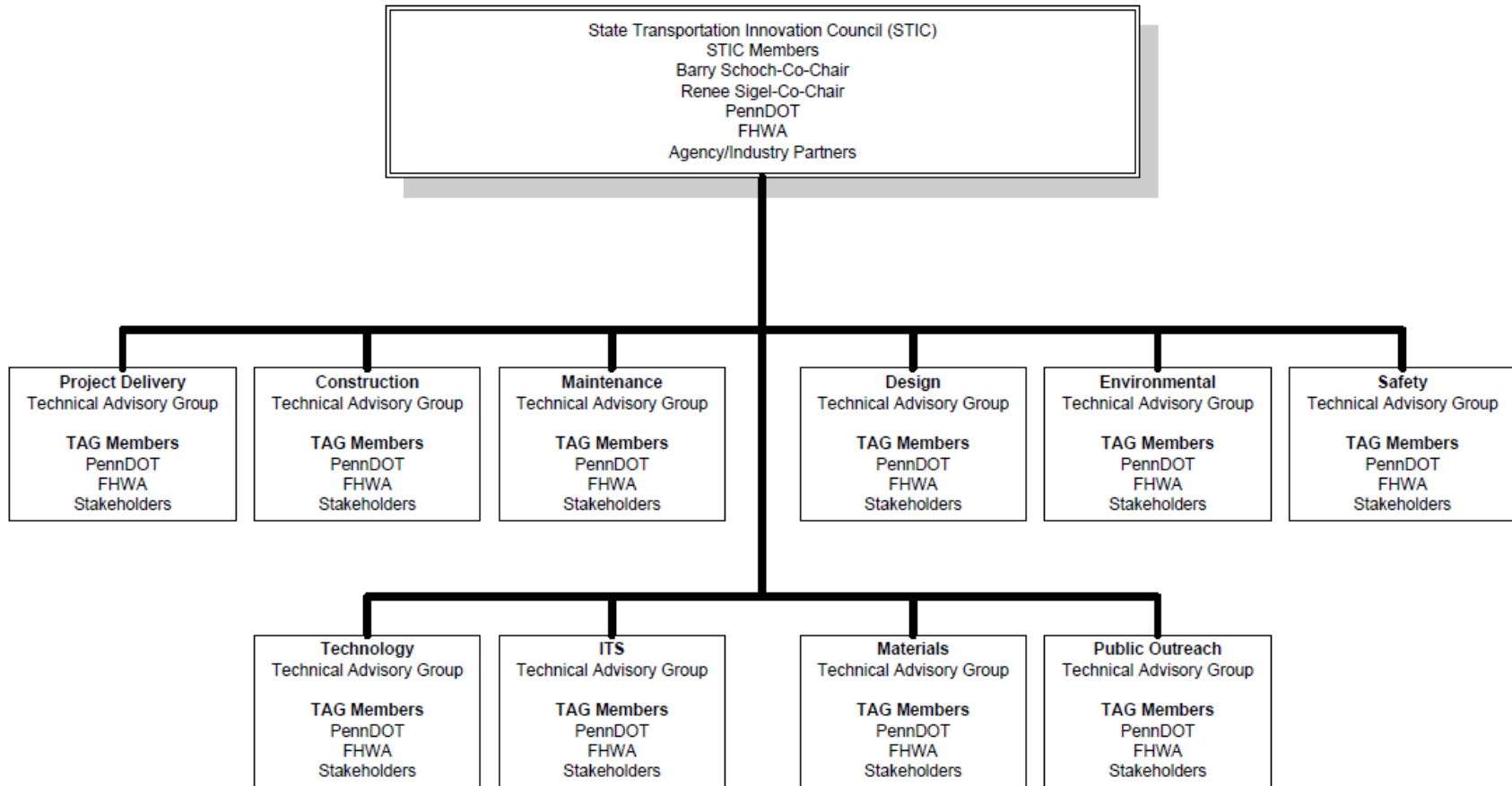
- A venue for unproven, unverified suggestions or ideas



# State Transportation Innovation Council (STIC)



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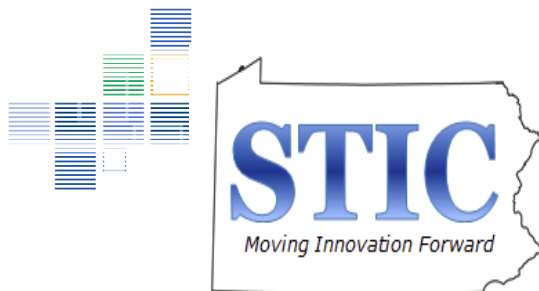
# State Transportation Innovation Council (STIC)

The STIC will...

- Provide leadership to promote selected initiatives
- Create a culture where innovation is standard
- Share information with their represented stakeholders

The TAGs will...

- Conduct first-screen of proposed initiatives
- Prepare and present White Papers
- Monitor and report on deployed initiatives



# State Transportation Innovation Council (STIC)

Initiative	National Goal	PennDOT Contribution
Safety Edge	Adopted in 40 states as standard	Standard special provisions issued 38 projects planned
Prefabricated Bridge Elements	100 bridges	(1) project to be constructed in District 8 – Issued Precast Bridge Component Standards
Geosynthetic Reinforced Soil Integrated Bridge System	20 states with spec; 30 bridges on NHS in 20 states – 75 bridges off NHS	2 bridge constructed in 2012 13 to be constructed in 2013. 23 to be constructed in 2014.
Adaptive Signal Control	Used by 40 agencies	111 operational 100 planned
Warm Mix Asphalt	30 states meet usage target	23% WMA utilization (from 12% in 2011)
Flexibility in Utilities	No national target	Electronic signatures on reimbursement agreements in use





# Shippensburg Rails to Trails



## Applies national research and technology efforts:

- NCHRP Report 556: Design and Construction Guidelines for Geosynthetic-Reinforced Soil Bridge Abutments with a Flexible Facing

NCHRP Project 20-07(244): Modifications for AASHTO LFRD Bridge Design Specifications to Incorporate or Update the Guide Specifications for Design of Pedestrian Bridges

- FHWA Every Day Counts: Geosynthetic Reinforced Soil Integrated Bridge System (GRS-IBS)



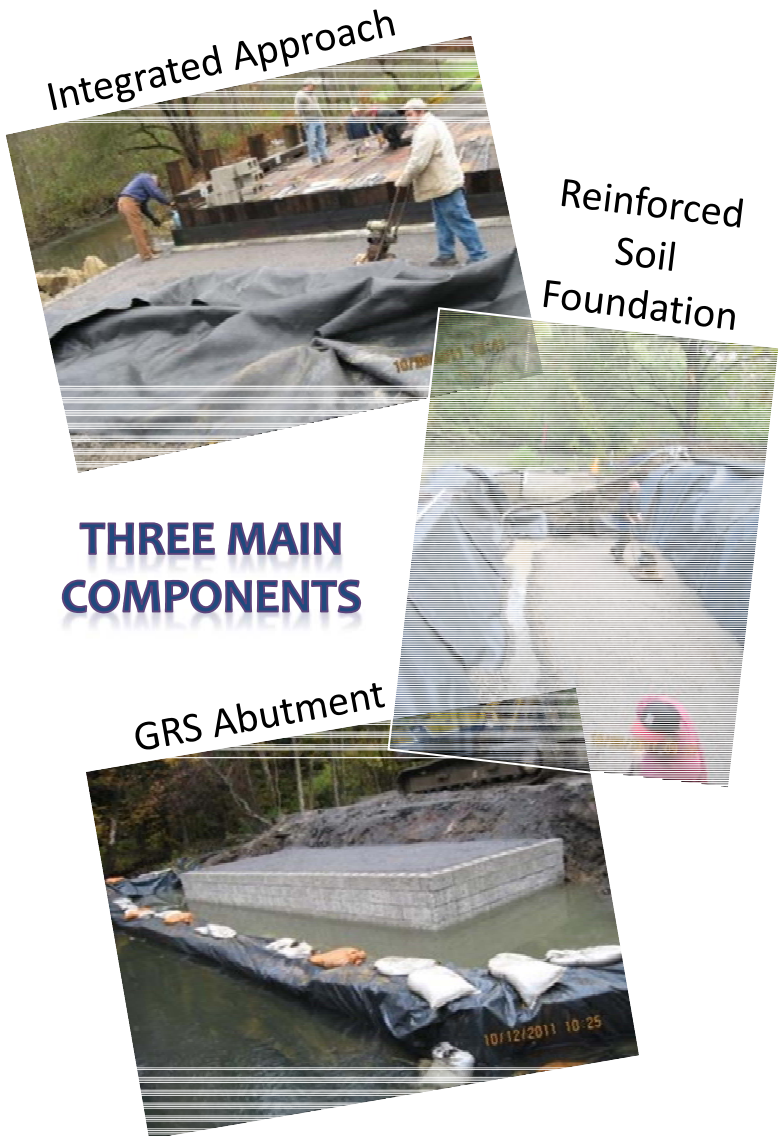
*Future bridge site*

## Benefits:

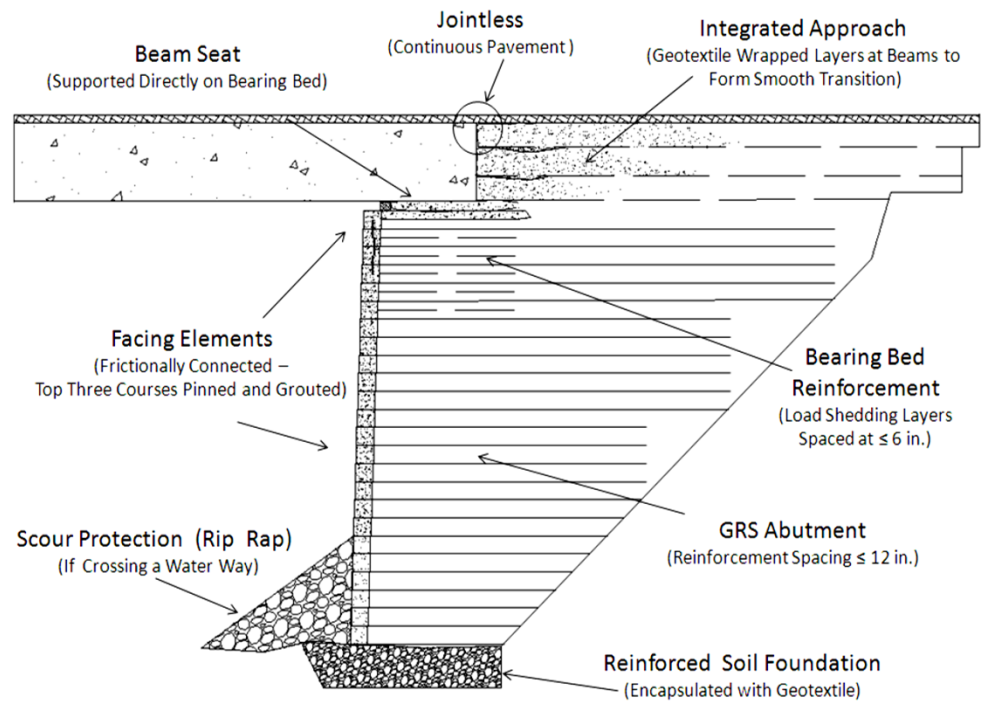
- Easier construction
- Less cost and time
- A model for future LTAP efforts



# GRS-IBS Geosynthetic Reinforced Soil Integrated Bridge System



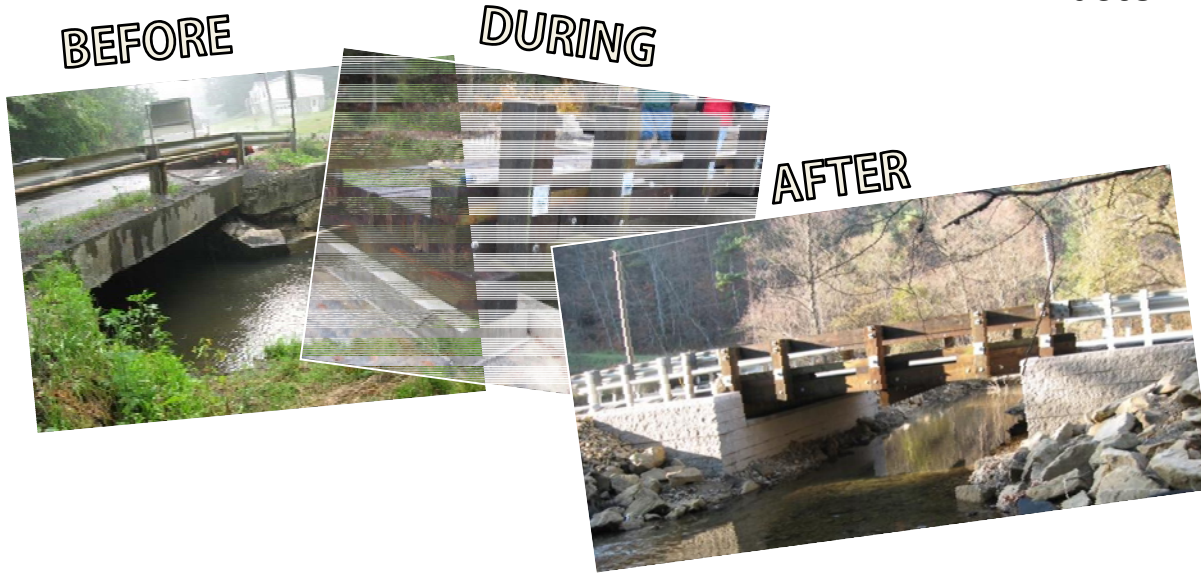
## THREE MAIN COMPONENTS



# GRS-IBS Geosynthetic Reinforced Soil Integrated Bridge System

## Case Example: Mount Pleasant Road Bridge

Huston Township, Clearfield County



### Benefits:

- 1) Reduced construction time
- 2) Reduced costs
- 3) Easy to build and maintain
- 4) Can be done by local forces with readily available materials & equipment
- 5) National research has proven that the system works and can be implemented in PA

**OPEN TO TRAFFIC IN 30 DAYS**

Mount Pleasant Road Bridge	
GRS-IBS	PennDOT Local Force Pre-Cast Box Culvert
\$102,000	\$150,000
<b>Cost Savings: \$48,000</b>	

## ▶ Institutionalizing the Implementation Effort

- Publication 55: *Bridge Maintenance Manual*, is being updated with a new GRS-IBS section
- A Strike-off Letter will be published and institutionalize the updated Pub 55
- Publication 447: *Approved Products for Lower Volume Local Roads*





# ▶ Institutionalizing Communications



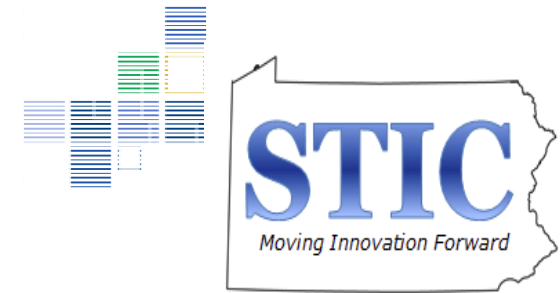
Smart Solutions



GRS-IBS Demo Day

## Next Steps

- Communicating the benefits of early participation in research projects:
  - helps identify winning innovations and opportunities for application
  - develops champions for later implementation
  - helps document value by defining appropriate before and after measurements
- Continue to document the Research Division's role in NCHRP results implementation
- Continue to promote identified innovations through the STIC



# Thank You

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