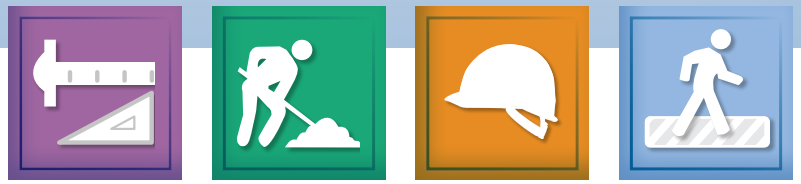
Pennsylvania State Transportation Innovation Council | 2016

INNOVATIONS CATALOG



Have you considered...
...a different way?

pennsylvania
DEPARTMENT OF TRANSPORTATION

U.S. Department of Transportation
Federal Highway Administration

Over a lifetime, we spend 6 years at red lights and 3 years in meetings.

Can innovation give you back *quality of life* to have *more time* for

hobbies, family, friends, and *recreation?*

Have you considered...

using innovation to *make it happen?*

taking back time by *taking action?*

...a different way?

INTRODUCTION

Moving Innovation Forward In Pennsylvania

The State Transportation Innovation Council (STIC) is composed of a multi-stakeholder leadership team led by the Pennsylvania Department of Transportation (PennDOT) and the Federal Highway Administration (FHWA). Through collaboration, the STIC fosters an environment of innovation, imagination, and ingenuity to pursue initiatives and support their rapid implementation to deliver a modern, high-quality transportation system to the citizens of the Commonwealth.

User's Guide Overview

The purpose of this user's guide is to provide a brief description of the many STIC and Every Day Counts (EDC) innovations that could be considered in the delivery of a modern high-quality transportation system.

Focus Areas

The STIC's innovations are categorized into four focus areas. Each focus area represents a critical element of PennDOT's work.

Design

Construction & Materials

Maintenance

Safety & Operations

From Idea to Innovation

The STIC and Technical Advisory Groups (TAGs) identify new ideas to respond to challenges that impact Pennsylvania's transportation infrastructure and promote innovations to enhance safety, efficiency, and sustainability. The Idea to Innovation Process is explained on page 5 and the status of each innovation is provided on pages 6-23.

Table of Contents

Pennsylvania State Transportation Innovation Council (STIC)

Pennsylvania's State Transportation Innovation Council (STIC) is a unique forum that blends together the expertise and experience of stakeholders in the transportation industry with representatives from planning partners, academia, state resource agencies, and local government. The STIC is a critical component of PennDOT's Next Generation efforts and serves as an instrument to implement FHWA's Every Day Counts initiatives.

PennDOT 20/20
www.penndot.gov

- Review and refresh policies, processes, and programs
- Examine functions to create more efficiencies
- Advance current business practices and technology
- Create a culture of continuous improvement

Every Day Counts
www.fhwa.dot.gov/everydaycounts

- Support the deployment of innovations with proven benefits to streamline planning, permitting, design and construction
- Promote state and local implementation of successful research results
- Strongly recommended the creation of State Transportation Innovation Councils nationwide
- Established the Pennsylvania STIC

Working as One Industry to Innovate

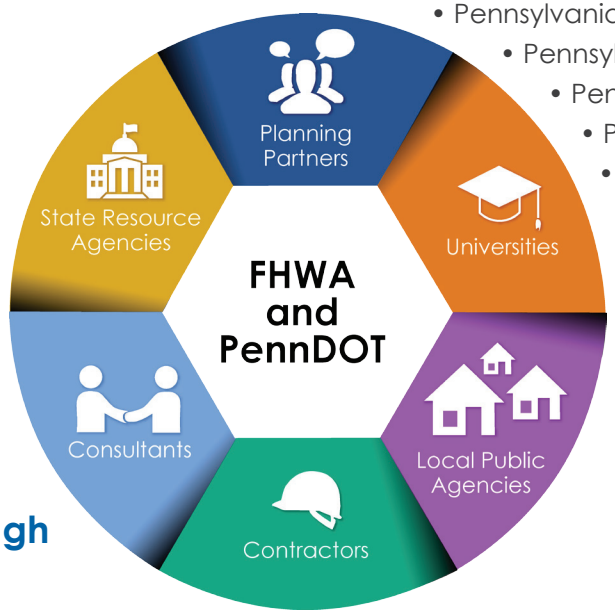
STIC Leadership

Leslie S. Richards
Secretary of Transportation
Pennsylvania Department of Transportation

Renee Sigel
Division Administrator
Federal Highway Administration

Participating Organizations

- American Concrete Pavement Association
- American Council of Engineering Companies
- American Public Works Association
- American Society of Highway Engineers
- Associated Pennsylvania Constructors
- Carnegie Mellon University
- Federal Highway Administration
- Lehigh University
- Pennsylvania Aggregates and Concrete Association
- Pennsylvania Asphalt Pavement Association
- Pennsylvania Association of Environmental Professionals
- Pennsylvania Chamber of Business and Industry
- Pennsylvania Department of Conservation and Natural Resources
- Pennsylvania Department of Environmental Protection
- Pennsylvania Department of Transportation
- Pennsylvania Fish and Boat Commission
- Pennsylvania Historical and Museum Commission
- Pennsylvania Motor Truck Association
- Pennsylvania Public Utility Commission
- Pennsylvania State Association of Township Supervisors
- Pennsylvania State University
- Pennsylvania Turnpike Commission
- Southern Alleghenies Planning and Development Commission
- University of Pittsburgh
- Women In Transportation Seminar
- York County Planning Commission



Innovation Through Collaboration

Technical Advisory Groups (TAGs)

Technical Advisory Groups (TAGs) were created to assist the STIC to evaluate, promote, and deploy innovations. TAG membership is open to everyone and you are invited to become part of the solution by participating in a TAG or by submitting an innovative idea for consideration. For more information, please contact the PennDOT STIC office at ra-pdpenndotstic@pa.gov.

- Construction TAG
- Design TAG
- Environmental TAG
- Facilities TAG
- Intelligent Transportation Systems (ITS) TAG
- Maintenance TAG
- Materials TAG
- Project Delivery TAG
- Safety TAG
- Structures TAG
- Technology TAG

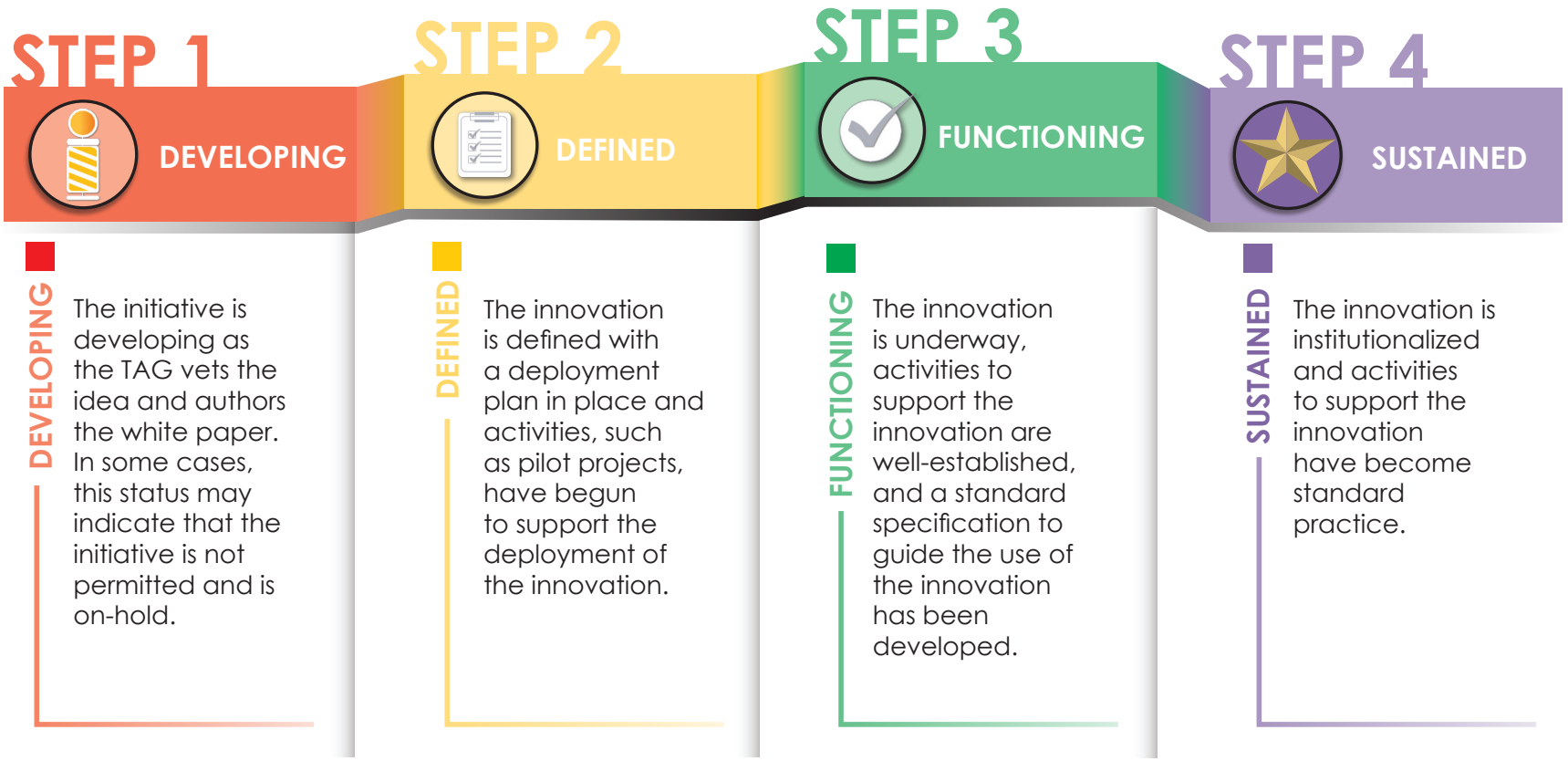
"Our partnership with the Federal Highway Administration and other partners in developing and using the State Transportation Innovation Council is paying dividends for the people of Pennsylvania. The Council's proven innovations have led to reduced construction time, increased efficiencies, and safer roadways. We look forward to the Council producing even more benefits to help us stretch the dollars our constituents invest with us even further."

- Secretary Leslie S. Richards

Pennsylvania Department of Transportation

From Idea to Innovation

As initiatives mature from an Idea to an Innovation, the deployment status changes from the developing stages to sustained and institutionalized practices. The chart below outlines the different stages of innovation deployment. Each innovation is categorized with a status. Consider the innovations listed on pages 6-23 to streamline operations, increase efficiency and improve safety in your next project.



DESIGN INNOVATIONS

The STIC and TAGs have advanced innovations to improve project design, construction, maintenance, and safety and operations. Two design innovations underway are described below.

Modern Roundabout

A modern roundabout is a type of circular intersection or junction in which road traffic flows continuously in a counterclockwise direction around a central island.

Roundabouts provide for increased capacity of vehicles through an intersection; this design allows traffic to continuously flow, and vehicles are only required to yield until a gap in traffic is available. As a result, roundabouts typically carry about 30 percent more vehicles than similarly sized signalized intersections during peak flow conditions. During off-peak hours, roundabouts cause almost no delay to drivers compared to traffic signals, which require drivers to stop and wait at a red light, thus resulting in delays to side-street and left-turning traffic from a major street.

Modern Roundabout

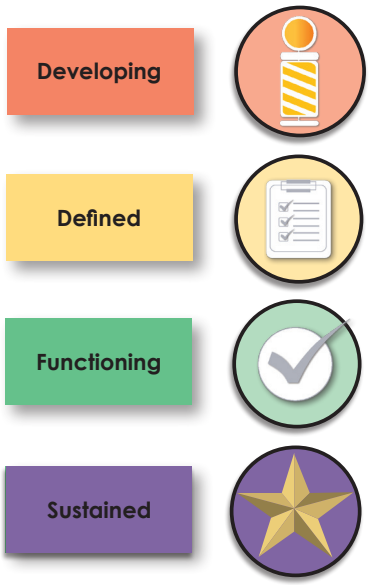
PennDOT requests that roundabouts be considered as options at all moderately complex and major intersection, interchange, and corridor projects and at any intersection project that would otherwise require the addition of left-turn lanes.

Road Identification Signs Over Water Trails (Wayfinding Signs)

Bridges over waterways serve as major location identifiers for boaters, fishermen, and emergency service providers who use these crossings as access points. In some cases, there are no signs to identify these crossings, making use of the streams and access points difficult. This initiative developed a strategy for incorporating wayfinding signs at bridges that cross water trails designated by the Pennsylvania Fish and Boat Commission. This initiative will help users of water trails and recreational facilities to identify their location in relationship to roadway access points and assists emergency responders in locating those in need on a waterway.

Innovation Status:
As the STIC and TAGs advance innovations through the deployment process, the innovation status is updated with an icon as indicated below and in the chart.

Innovation Status Indicators



Design Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations			
Road Identification Signs over Water Trails	Install wayfinding signs on bridges over Pennsylvania Fish and Boat Commission (PFBC) designated water trails during bridge replacement and rehabilitation projects.	Maximizes the use of roadway access and improves user safety and navigation for recreational water trails.	
Standard Subconsultant Agreements	Standardize contract language between a prime and subconsultant to increase efficiency.	Leads to a more immediate project start, reduces the consultant overhead, helps to achieve consistency in contract terms and improves overall project delivery.	
Categorical Exclusion Expert System Rewrite	Rewrite the Categorical Exclusion Expert System to transform the system from a forms-centric approach to a data-centric system.	Streamlines the environmental review process by improving efficiency through enhanced data management, easy-to-enter forms, and reporting.	
Design & Use of Pervious Pavements	Promote the use of pervious pavements which allow water to pass through the pavement to reduce surface runoff and to recharge groundwater sources.	Improves groundwater recharge, reduces stormwater run-off and flow in surface drainage systems, and decreases the need for land-consuming water holding ponds resulting in more sustainable transportation solutions.	
Design Build Traffic Control	Expand the use of the Design Build Traffic Control contracting provision within Pennsylvania and establish procedure for use on minor, moderate, and complex projects.	Saves time and costs by only developing conceptual traffic control plans prior to advertisement and eliminating the effort of additional traffic control plan development during the Final Design Phase.	

Design Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations (continued)			
Implementation of Mechanistic-Empirical Pavement Design System (Pavement ME)	Support the deployment of this software program, which includes calibration and validation of the national pavement performance models and builds upon the mechanistic-empirical pavement design guide.	Leads to better pavement designs with fewer premature failures, better pavement performance, and lower overall life cycle costs. In addition, overall pavement network performance levels should be improved.	
Mitigation Commitments Partnership with PA Fish and Boat Commission	Consolidate available data and GIS layers to develop a resource for mitigation projects, while addressing statewide stream quality and low-head dam issues.	Minimizes the effort needed to identify appropriate sites for mitigation which saves time and money.	
PennDOT NEPA/ Environmental Resources Webpages	Develop and maintain webpages that provide a centralized location for information on environmental laws and regulations.	By creating a streamlined search for information, the webpages will decrease the potential for use of outdatedguidance and enhance public education on environmental laws and regulations.	
Short/Long Term Bridge Instrumentation	Develop and execute a statewide bridge instrumentation program to monitor certain types of bridges to capture actual values for stress, accelerations, or other parameters.	Informs bridge management decision-making regarding repair and retrofits and improves on-demand response to bridges hit by over-height vehicles, barge collisions, and other impacts.	
Moderately Complex Project Design Procedures	Streamline the final design process for projects categorized as Complex or Moderately Complex and reduce redundant reviews of final design products, while placing responsibility for quality on the consultant team performing the design.	Reduces the number of redundant reviews and processing of the final design submissions.	

Design Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations (continued)			
Plan, Specification and Estimate (PS&E) Plan Sheet Reduction	Research opportunities to standardize and reduce the number of required plan sheets in the PS&E package while maintaining adequate project information for a quality construction product.	Streamlines the level of plan sheet detail necessary for effective design, reduces time expended by PennDOT, agency or consultant staff for project reviews, and improves construction consistency with flexibility.	
PS&E Special Provision Reduction	Identify the appropriate number of standard specifications necessary for effective design, construction and maintenance phases, introduce a level of standardization for project design, and reduce the number of special provisions.	Reducing the number of special provisions shortens the review time expended by PennDOT, agency or consultant staff and streamlines project delivery.	
Every Day Counts Innovations			
Accelerated Bridge Construction (ABC)	Promote Accelerated Bridge Construction which uses innovative planning, design, materials and construction methods in a safe and cost-effective manner to reduce the onsite construction time when building new bridges or replacing and rehabilitating existing bridges.	Reduces mobility impacts to 48-72 hours while planning and bridge construction are reduced by years. This leads to significant agency cost savings and improved public support.	
Flexibilities in Utility Accommodation Relocation	Promote the use of existing flexibilities to foster effective utility coordination during the project development process.	Clarifies and promotes procedural and administrative flexibilities to improve coordination and reduce delays.	
Geospatial Data Collaboration (GDC)	Utilize cloud-based technology to allow data sharing and collaboration of Geographic Information Systems data between internal and external partners to create maps and share the latest data.	Promotes data sharing consistency through a single data warehouse, fosters collaboration by forming groups within the data user community, focuses resources, and provides data accessibility and potential cost savings by using a common data sharing approach.	

Design Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
Every Day Counts Innovations (continued)			
Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS)	Promote the use of GRS-IBS construction techniques for low volume roadways to reduce the cost and time for construction and lessen impacts to the traveling public.	Allows bridges to be built quickly at a lower cost and in a manner that is environmentally friendly. The technology is a great solution to address structurally deficient bridges on low volume roadways or over low velocity streams.	
Interchange/ Intersection Design Geometrics	Promote innovative intersection and interchange designs that can accommodate traffic volumes more efficiently while improving safety by minimizing the conflict points where many crashes occur.	Improves safety, reduces delays and construction time, and provides direct and indirect cost savings to businesses, communities, and system users.	
Locally Administered Projects	A three-pronged strategy to aid Local Public Agencies through the complexities of the Federal-aid Highway Program's requirements and processes for establishing and administering Federal-aid projects. The strategy includes: certification/qualification programs, consultant services flexibilities, and stakeholder partnering.	Potentially increases compliance with Federal and State regulations, reduces accountability risk, shortens time and reduces cost, and achieves stakeholder buy-in and local ownership of projects.	
Prefabricated Bridge Elements/ Systems (PBES)	Structural components of a bridge that are constructed offsite.	Saves time and expense by reducing or eliminating the onsite construction time and lessening the mobility impact. PBES are constructed in controlled manufacturing environments, which improves efficiency, quality, and durability.	
Quality Environmental Documents	Incorporate existing FHWA recommendations to improve the quality of environmental documents as well as other state DOT best practices into the Department's Design Manual 1B to provide more specific guidance for developing quality and concise Environmental Assessments (EAs) and Environmental Impact Statements (EISs).	Reduces the amount of work and resources required to prepare the documentation, saves time and money while improving quality, and refocuses efforts on "telling the story" of the NEPA decision-making process in a manner that the public understands while maintaining appropriate consideration for the environment.	

Design Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
Every Day Counts Innovations (continued)			
Ultra-High Performance Concrete (UHPC) Connections for Prefabricated Bridge Elements	Promote the use of Ultra-High Performance Concrete (UHPC), a steel fiber-reinforced, cementitious-based material that provides exceptionally high mechanical and durability related properties. This allows for the redesign of connection details in ways that simplify the detailing and improve the overall bridge layout and fabrication.	Accelerates construction, allows for significant simplification to the design of the component connections, and improves long-term performance.	
Improving DOT and Railroad Coordination (SHRP2 R16)	Utilize the SHRP2 R16 model agreement and tools to collaborate with railroads to expedite development of highway projects involving railroad right-of-way.	Improves communication between transportation agencies and railroads to expedite project delivery and reduce delays.	

Notes:

CONSTRUCTION & MATERIALS INNOVATIONS

The STIC and TAGs have advanced innovations to improve project design, construction, maintenance, and safety and operations. Two construction and materials innovations underway are described below.

Crushed Concrete Aggregate

Crushed Concrete Aggregate (CCA)

At least 41 states recycle concrete pavements and use the crushed material in new pavement applications. The goal of this initiative is to review PennDOT policies, specifications, design process, and any other constraint that might hinder the broader use of CCA as an approved sub-base material.

CCA has the potential to reduce cost, promote recycling, decrease waste and greenhouse gas production, and conserve natural resources.

Time-Based Bidding: A+Bx

Time based bidding, or A+Bx, aims to expedite project completion through competitive bidding on construction time in addition to price. In the new A + Bx formula, the "A" is the low bid for the contract items, and "B" is the total time required for project completion. This differs from the old, commonly used application of A + Bx, where "B" represented the days/time associated with lane closure. Finally, "x" is the construction engineering liquidated damages (as per Publication 408), which is how much it will cost the Department if the contractor goes over the established construction time.

Although A+Bx bidding can be applied to most projects, this approach is most effective on projects where there is a real need to shorten the duration of construction and delays to the traveling public. This approach encourages contractors to develop plans to shorten construction duration and increase efficiency, thus taking advantage of contractor innovation and creativity.

A + Bx Formula

A = Low bid for the contract items

B = Total contract time

x = Construction Engineering Liquidated Damages (CENG) as per Publication 408

Construction & Materials Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations			
Consultant Construction Inspection Selection Dates	Coordinate efforts to stagger consultant construction inspection selection dates so that consultants have the knowledge of as many pending selections as possible when they make their next submission.	Leads to better prepared inspection staff, improved documentation and project reporting compliance.	
Expanded Polystyrene Geofoam (EPG)	Promote the use of Expanded Polystyrene Geofoam (EPG), a lightweight, rigid foam plastic used as an embankment fill to reduce loads on underlying soils or to build highways quickly without staged construction.	Accelerates foundation construction, which reduces project schedules, saves money, requires limited labor for construction, exerts little to no lateral load on retaining structures, and can be constructed easily in limited right-of-way areas and in adverse weather conditions.	
Best Practices for the Design, Evaluation and Quality Control of High Percentage Reclaimed Asphalt Pavement (RAP) Mixes	Evaluate the use of higher percentage Reclaimed Asphalt Pavement (RAP) mixes.	Asphalt pavement recycling includes both economic and environmental benefits. Economic benefits include material cost savings from reducing the amounts of raw aggregates and binders in new mixtures as well as reduced costs associated with transporting raw materials to plant sites. Environmental benefits include reduced emissions and fuel usage associated with extraction and transportation of raw materials.	
Crushed Concrete Aggregates (CCA)	Increase the use of Crushed Concrete Aggregate (CCA), a granular material manufactured by recycling old concrete for use as an aggregate source in new construction.	Reduces waste, cuts costs, and provides durable new roads.	

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations (continued)			
Time Based Bidding (A+Bx)	Increase the application of the time-based bidding method where a monetary value is placed on the time component of a contract and added to the bid amount. A = Low bid for the contract items B = Total contract time x = Construction Engineering Liquidated Damages (CENG) as per Publication 408	Encourages contractors to direct projects on a tight schedule leading to cost savings and fewer traveler inconveniences.	
Trainee Program for Construction Projects	Restructure trainee hour requirements to allow multiple projects as compared to obtaining hours on a single project.	Increases attractiveness of starting a career in the construction industry, increases the pool of candidates, and expands the skilled workforce.	
Use of Non-woven Geotextiles as Interlayers in Concrete Pavement Systems	Non-woven geotextiles can be used in unbonded concrete overlay systems to separate the existing concrete pavement from the new concrete pavement.	Prevents reflective cracking, allows drainage of infiltrated water, provides bedding to reduce bearing stresses, and improves long-term performance.	
Design & Use of Continuously Reinforced Concrete (CRC) Pavements	Examine Continuously Reinforced Concrete (CRC) pavement projects and successful best practices adopted by other agencies to determine if this technology can be used to provide longer-lasting, smoother, lower-maintenance concrete pavements in Pennsylvania.	Removing transverse joints results in smoother pavement, reduced water penetration, fewer maintenance requirements, and lower long-term life cycle costs.	
Elastomeric Spray Type Membrane Waterproofing for Structures	Evaluate alternative solutions to current waterproofing methods. This material is proven to provide a superior seal, and can be used in various applications in bridge construction and rehabilitation programs.	Reduces water infiltration, improves long-term preservation and performance, and decreases maintenance cost.	

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations (continued)			
Structure Backfill Using GRS Technology	Deploy GRS technology to distribute loads more symmetrically to the underlying soils and mitigate the long-term differential settlement at bridge approaches.	Removing the "bump" at the end of a bridge improves ride quality, decreases maintenance necessary for settlement repairs, and extends the longevity of structures.	
Use of Anti-Washout Additive Mixture to Improve Structural Integrity and Reduce Waterway Pollution	Develop a PennDOT specification for use of Anti-Washout Additive Mixture.	Improves structural integrity while reducing the potential for waterway pollution from paste washout and fine particles.	
Every Day Counts Innovations			
Safety Edge$_{SM}$	Utilize the Safety Edge paving technique to minimize vertical drop-off at the pavement edge to make it easier for vehicles that drift off the road to return safely.	Allows drivers who drift off highways to return to the pavement safely, leading to a decrease in highway fatalities and serious injuries. Makes the pavement more durable, potentially leading to less frequent road maintenance.	
3D Models for Construction	Promote the use of 3D models, which allows designers to view intricate design features geospatially and conduct simulations to detect design flaws before construction begins. Data exported from the 3D models can be used in construction to guide GPS controls on equipment.	Allows for faster, safer, more accurate, and more efficient planning and construction.	

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
Every Day Counts Innovations (continued)			
e-Construction	Deploy paperless construction administration delivery that includes electronic submission of construction documentation. Tools include electronic signatures, electronic communication, secure file sharing, version control, mobile devices, and web-hosted data archival and retrieval systems.	Improves communication, allows for a faster approval process with increased accuracy, and a more efficient tracking system.	
Intelligent Compaction (IC)	Promote the use of modern vibratory rollers equipped with an integrated measurement system, an onboard computer reporting system, Global Positioning System (GPS)-based mapping, and optional feedback controls.	Improves in-place density of pavement materials, reduces variability of measured density, and enhances efficiency of compaction.	

Notes:

MAINTENANCE INNOVATIONS

The STIC and TAGs have advanced innovations to improve project design, construction, maintenance, and safety and operations. Two maintenance innovations underway are explained below and several other innovations are in progress.

Sustainable Stormwater Management

This initiative promotes the use of grass and bio-swales in place of existing pipes and drainage facilities to provide sustainable stormwater management along roadways. Replacing pipes with swales reduces maintenance costs and is a more affordable option than replacing an aging network of drainage facilities. This approach will assist municipalities to meet the PA Department of Environmental Protection Agency's Municipal Separate Storm Sewer System (MS4) requirements. PennDOT's Cumberland County Maintenance District is currently piloting bio-swales in Carlisle, Pennsylvania.

Sustainable stormwater strategies on Main Street in Lemoyne, PennDOT District 8-0.

Salt and Snow Training is planned for 2016.

Salt & Snow Training Academy

FHWA has provided **STIC Incentive Funds** to support a Salt and Snow Training Academy for Pennsylvania counties and municipalities. The training will provide local governments with tools to improve winter maintenance operations and promote the benefits of purchasing salt under the PA Department of General Services (DGS) cooperative purchasing program. In addition, this effort will increase awareness, promote operational efficiencies, and equip municipalities to meet Pennsylvania's MS4 requirements.

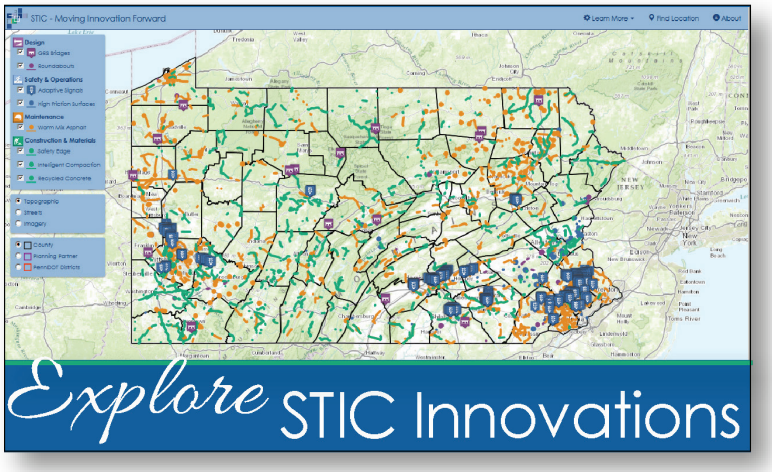
Maintenance Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations			
Commercial Vehicle Mainline Virtual Weigh Stations	Install mainline high-speed Weigh-in-Motion scales for commercial vehicle weight enforcement on highways to increase compliance of weight and safety laws.	Potentially reduces the damage to roadways, leading to increased preservation of pavement and infrastructure.	
Alternate Bidding Process for Grass Seeding	Implement a performance based, multi-year bidding process for a low maintenance grass seed versus a traditional grass seed to maintain grass at less than 8".	Leads to cost savings as the number of mowings for this performance-based approach are expected to be lower than the current maintenance approach. Animal-related crashes may also reduce over time.	
Investigate the Use of Micro-Turbines (Capstone) for Combined Heat/ Power (CHP) at Facilities	Identify opportunities where natural gas micro-turbines can be installed at facilities for heating and electricity.	Provides alternative power supply for transportation facilities that is cost effective and reliable to ensure uninterrupted delivery of services and operations.	
LED Lighting Pilot and Policy	Evaluate the use of LED bulbs over traditional overhead mast bulbs.	Pilot will assist to educate decision-makers on appropriate application of LED lighting on highways and bridges.	
Salt & Snow Training Academy	Provide training to municipalities on innovations regarding how to sensibly use salt when performing winter maintenance, and promote benefits of purchasing salt under the PA Department of General Services (DGS) cooperative purchasing program.	Educates municipalities on winter maintenance innovations, promotes operational efficiencies resulting in cost savings, and improves compliance with MS4 regulations.	
Sustainable Stormwater Management	Promote the replacement of existing pipes with grass swales to improve stormwater management.	Lessens environmental impacts, allows water to absorb into the surface at its own pace, and reduces the need to disrupt traffic for future maintenance or replacements.	

For more information on any of the innovations, please contact the PennDOT STIC office at ra-pdpenndotstic@pa.gov.

Maintenance Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
Every Day Counts Innovations			
Warm Mix Asphalt (WMA)	Encourage the use of WMA in place of traditional hot mix. This technique allows for asphalt to be produced and placed on the road at lower temperatures compared to the usual hot mix method.	Extends the paving season, improves asphalt compaction, allows asphalt to be hauled longer distances, and improves working conditions.	
Traffic Incident Management (TIM) Responder Training	Host a training program that focuses on a response effort to protect motorists and responders while minimizing the impact on traffic flow. Efforts include detecting, verifying and responding to incidents, clearing the incident scene, and restoring traffic flow.	Leads to faster incident response and clearance, saving lives, time, and money. It could also lead to fewer secondary crashes resulting from the original incident and less exposure to moving traffic while the incident is resolved.	



Did you know?

You can map innovations at:

http://www.dot7.state.pa.us/stic/index.html

SAFETY & OPERATIONS INNOVATIONS

The STIC and TAGs have advanced innovations to improve project design, construction, maintenance, and safety and operations. Two safety and operations innovations underway are described below and several other innovations are in progress.

Rumble Strip Installation on Thin Pavement Overlay

PennDOT has developed a collection of best practices from other states to help determine how to address the process and procedures for installing and reinstalling centerline and edgeline rumble strips on thin pavement overlay projects such as seal coats, microsurfacing, warm-mix and hot-mix asphalt.

This initiative ensures that the 10,000 miles of centerline and edgeline rumble strips are preserved as thin pavement overlay becomes a more cost-effective replacement for full-depth paving during road rehabilitation projects.

Rumble Strip Installation on Thin Pavement Overlay

Integrating the Highway Safety Manual into Practice

The Highway Safety Manual (HSM) is an analytical tool published by the American Association of State Highway and Transportation Officials (AASHTO) and supported by the Federal Highway Administration (FHWA). The manual uses traffic and crash data to establish quantitative safety practices to ensure the maximum benefit is obtained from safety investments.

This initiative integrates the Highway Safety Manual procedures and practices into project development at PennDOT. By applying these contemporary road safety management methods, PennDOT expects to maximize the investment of safety improvements.

Safety & Operations Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
		STIC Innovations	
PA Safety Symposium	Host a symposium to bring together legislators and safety professionals to educate legislators on statistics and potential remediation (law changes).	Improves understanding of techniques by safety professionals.	
Rumble Strip Installation on Thin Pavement Overlays	Develop guidance for the installation and re-installation of centerline and edge-line rumble strips on thin pavement overlay projects.	Provides standardized, cost-conscious guidance to transportation agencies seeking to effectively utilize these two features.	
Data Driven Approaches to Crime & Traffic Safety (DDACTS)	A law enforcement operational model that integrates location-based crime and traffic crash data to determine the most effective methods for deploying law enforcement and other resources.	Increases collaboration among agencies and potentially leads to a decrease in both crash frequency and severity, and a decrease in crimes at targeted locations.	
Integrating the Highway Safety Manual into Practice	Integrate the Highway Safety Manual (HSM) into practice. The HSM provides methods to quantitatively estimate crash frequency or severity of a particular improvement.	Informs decision-makers allowing for investment of limited resources to be focused at locations with the highest potential for safety improvement.	
Benchmarking Transportation System Management and Operations (TSMO)	Analyze other states' organizational structures and business-related activities associated with Transportation Systems Management and Operations (TSMO).	Provides a roadmap for understanding TSMO best practices and improving traffic operations in Pennsylvania.	
I-95 Integrated Corridor Management (ICM) Concept of Operations	Develop a macro-scale traffic model to predict outcomes of road closures and detours on I-95 and the Philadelphia region.	ICM optimizes the use of existing infrastructure assets and leverages unused capacity to improve corridor management.	

Safety & Operations Innovations

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
STIC Innovations (continued)			
Smart Applications – Automated Road Condition Reporting	Collect and share data and information to improve incident management, winter services, and traffic operations.	Increases reliable traveler information through 511PA, improves situational awareness and efficiency.	
Transportation Operations Data Warehousing	Implement the collaborative plan to bring data into a common framework for archiving, planning, prioritizing, and performance monitoring of the transportation system as a whole.	Improves collaboration, eliminates unnecessary data efforts, reduces redundancies, and increases access to previously "hidden" datasets.	
Deployment of Pilot Project and Process to Implement Low-Cost Safety Improvements in Multiple Municipalities using Federal and State Funding	Pilot two regionalized projects using state and federal funds to implement Low-Cost Safety Improvement Projects (LCSIPs) and then establish a process to implement regionalized municipal safety projects.	Pilot will assist to identify guidelines for the successful statewide implementation of a program to deploy regionalized Low-Cost Safety Improvements.	
Every Day Counts Innovations			
Adaptive Signal Control Technology (ASCT)	Adjust traffic signal green timing to more effectively manage changing traffic patterns and reduce traffic congestion.	Reduces traffic congestion, excess fuel consumption, and delays.	
Data Driven Safety Analysis (DDSA)	Integrate data analysis tools, predictive estimates on safety performance, and road network screenings into highway investment decisions.	By quantifying the safety impacts, transportation professionals and the public can make more informed decisions to apply countermeasures at roadway locations with the highest potential for improvement.	

Innovation	Description	Impact on Practice / Benefits	Status *(As of December 2015)*
Every Day Counts Innovations (continued)			
High Friction Surface Treatments (HFST)	Utilize HFST to improve safety on roads with a history of wet weather crashes. The site-specific application of this very high-quality combination of durable aggregates and polymer binder restores and maintains pavement friction.	Reduces crashes, injuries, and fatalities. The technology is relatively low-cost compared to geometric improvements and is durable and long lasting.	
Road Diets (Roadway Reconfiguration)	Investigate the use of Road Diets as an opportunity to convert existing four-lane, undivided roadway segments into three-lane segments with two through lanes and a center, two-way left-turn lane. The reclaimed space can be allocated for other uses such as bike lanes, pedestrian refuge islands, bus lanes and parking.	Road Diets can make the roadway environment safer for all users. This approach reduces vehicle-to-vehicle conflicts that contribute to crashes, increases mobility and access for pedestrians and bicyclists, and improves quality of life.	
Smarter Work Zones	Promote strategies for managing work zones and work zone traffic that can minimize travel delays and help maintain motorist and worker safety. This includes the coordination of roadway construction projects to reduce work zone impacts and technology applications to dynamically manage traffic in the work zone environment.	Minimizes travel delays through project coordination among different agencies, enhances the safety of motorists and workers by raising driver awareness, and maintains business and resident access through communication and coordination between agencies.	

Notes:

Have you considered…
…a different way?

Become part of the solution!

Technical Advisory Groups (TAGs) were created to assist the STIC with selection of innovations for promotion. The TAGs serve as champions of innovations and guide the implementation through deployment plans to track progress.

If you are interested in participating in the rapid implementation of successful ideas, please consider joining and becoming active on a TAG.

If you are aware of a successful innovation that is being used elsewhere, please consider submitting the idea to the STIC. For more information, please contact the PennDOT STIC office.

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DEPARTMENT OF TRANSPORTATION

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