



Pennsylvania State Transportation Innovation Council
Innovation Through Collaboration
Accomplishments 2017

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The Pennsylvania State Transportation Innovation Council (STIC) is comprised of a multi-stakeholder leadership team co-chaired by the Pennsylvania Department of Transportation (PennDOT) and the Federal Highway Administration (FHWA). The STIC brings together a diverse team of transportation stakeholders to forge a collaborative environment of innovation, imagination and ingenuity to pursue rapid implementation of specific initiatives to deliver a modern, high-quality transportation system to the citizens of Pennsylvania. The STIC supports the deployment of FHWA Every Day Counts (EDC) initiatives, and identifies new strategies and innovations to enhance safety, efficiency and sustainability.

2017 STIC Members

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Leslie S. Richards, Secretary

Pennsylvania Department of Transportation

Moises Marreo, Acting Division Administrator

Federal Highway Administration

Members

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Temple University

A. Emin Aktan, Ph.D.

Drexel University

Rodney Bender, P.E.

Pennsylvania Public Utility Commission

James Casilio, P.E.

Pennsylvania Aggregates and Concrete Association

Sherri Chippo, Ph.D.

American Public Works Association

Will Clark

York County Planning Commission

Mark Compton

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Crystalann Deardorff, P.E.

Women in Transportation Seminar

Douglas George, P.E.

American Society of Highway Engineers

Charles Goodhart

Pennsylvania Asphalt Pavement Association

Brad Heigel, P.E.

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Pennsylvania Association of Environmental Professionals

Gregory Lebo, P.E.

American Council of Engineering Companies

Doug McLearn

Pennsylvania Historical and Museum Commission

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Brandon Peters

Southern Alleghenies Planning and Development Commission

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University of Pennsylvania

Tom Shervinskis

Pennsylvania Fish and Boat Commission

Clayton Stahl, P.E.

American Concrete Pavement Association

Kevin Stewart

Pennsylvania Motor Truck Association

Muhannad Suleiman, Ph.D.

Lehigh University

Edward Troxell

Pennsylvania State Association of Boroughs

Alfred Uzokwe, P.E.

Pennsylvania Department of Conservation and Natural Resources

Jason Wagner

Associated Pennsylvania Constructors

Ramez Ziadeh, P.E.

Pennsylvania Department of Environmental Protection

A MESSAGE FROM THE CO-CHAIRS

We are proud to present the Pennsylvania State Transportation Innovation Council's (STIC) 2017 Accomplishments Summary, which details the progress achieved over the past year to further advance a variety of innovations that will benefit Pennsylvania's transportation system. This year, the STIC was dedicated to the advancement of innovations for deployment, focusing on several initiatives currently in development. The STIC's Technical Advisory Groups (TAGs) focused their efforts on major development and deployment milestones that could be achieved over the course of the year. As we enter 2018, we look back to recognize those accomplishments.

The STIC is committed to supporting a culture of innovation at all levels of government in Pennsylvania. This commitment to innovation is especially important at the local level. In 2017, the STIC collaborated with the Federal Highway Administration (FHWA) and the Pennsylvania Department of Transportation (PennDOT) to host the first-of-its-kind Local Government Safety Seminar. Attendees were invited to attend in person or via simulcast to learn from transportation safety experts about how to foster a safety culture in their communities through roadway safety planning as well as identifying and funding cost-effective countermeasures to improve safety.

For its success with the Local Government Safety Seminar and other local government outreach efforts over the past few years, we are proud to announce that the STIC received the American Association of State Highway and Transportation Officials (AASHTO) Innovation Initiative and FHWA Center for Accelerating Innovation 2017 STIC Excellence Award. This award recognizes the STIC's commitment to engaging communities across the Commonwealth of Pennsylvania to deliver innovative transportation solutions that improve safety and save lives.

As we end one year and begin another, we would like to offer our sincere gratitude and appreciation to Renee Sigel, former FHWA Pennsylvania Division Administrator and co-chair of the STIC, for her years of outstanding leadership and support. Through her leadership, the STIC led the way through innovation to become a nationally recognized program.

We also thank the numerous STIC and TAG members for their efforts that supported the STIC's success this past year. In 2018, the STIC will concentrate on expediting the development of innovations for deployment to keep Pennsylvania on the map as a leader in innovation. This is an exciting time for the STIC, and we eagerly anticipate working with you to move innovation forward.



Leslie S. Richards, Secretary
Department of Transportation



Moises Marreo, Acting Division Administrator
Federal Highway Administration





PennDOT Secretary Leslie S. Richards and Acting FHWA Division Administrator Moises Marrero accept the FHWA/AASHTO 2017 STIC Excellence Award for the Pennsylvania STIC's Local Government Outreach campaign.

A Year of Excellence

The STIC received the American Association of State Highway and Transportation Officials (AASHTO) Innovation Initiative and the Federal Highway Administration's (FHWA) Center for Accelerating Innovation 2017 STIC Excellence Award for its local government outreach efforts. Pennsylvania's local governments are responsible for maintaining more than 78,000 miles of roadways and 6,400 structures. Maintaining this vast and aging collection of assets requires innovation and collaboration. The STIC is committed to engaging communities across the state to foster a culture of innovation and deliver transportation solutions that are proven to improve efficiency, sustainability and most importantly, save lives.

With 67 counties and over 2,500 municipalities in Pennsylvania, this outreach effort was a significant undertaking, requiring innovative communications tools and out-of-the-box thinking. The STIC launched a survey inviting local officials, township supervisors and roadmasters to share their transportation challenges and their preferred training and communication methods. Over 445 respondents participated in the survey, which provided valuable information on the top transportation issues and effective communication methods for engaging local government representatives.

Over the past few years, the STIC collaborated with local governments to identify, pilot and promote innovations that have the potential to improve efficiency and safety on local road networks while reducing environmental impacts. Examples of these efforts include the Salt and Snow Management Course, in which over 50 on-site classes were held across Pennsylvania, providing training to more than 1,100 participants. The STIC also held a High Friction Surface Treatment Demonstration Day that attracted more than 20 local government representatives and offered an opportunity for attendees to observe an actual application.

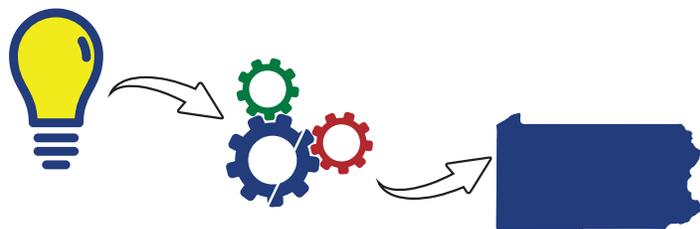
The STIC reached out to educate local governments at several events, including the Local Government Innovation Day that was held in Washington County in November 2016 and attended by nearly 100 individuals representing counties, cities, boroughs, townships, and state and federal government. In July 2017, a Local Government Safety Seminar was held at the Farm Show Complex in Harrisburg, with over 200 individuals taking part in person or via simulcast. More information on the Local Government Safety Seminar is located on pages 8-9.

The STIC Management Team would like to thank several STIC members for endorsing the award nomination: Will Clark from the York County Planning Commission, Elam Herr from the Pennsylvania State Association of Township Supervisors and Edward Troxell from the Pennsylvania State Association of Boroughs.

2017 TAG Priority Initiatives

From Innovation Development to Deployment

The STIC owes its success largely to the hard-working individuals who make up the Technical Advisory Groups, also known as TAGs. These TAGs develop candidate innovations for deployment. Since the STIC's inception in 2012, more than 100 innovations have been identified for potential development and many are in use across the commonwealth today.



In January 2017, the STIC began its efforts to refine the process for advancing pending innovations through development and deployment. The STIC Management Team worked with each TAG to prioritize their current initiatives, identify significant milestones for advancement and evaluate any deployment challenges that may exist. This 2017 STIC Accomplishments Summary features the major highlights, successes and progress of these priority initiatives during the past year.



Innovative Waterproofing Can Help Bridges Achieve Longer Life Span

Elastomeric Spray Type Waterproofing for Structures
Construction TAG

PennDOT District 2 did a pilot project using Elastomeric Spray Type Membrane Waterproofing to reduce water infiltration and improve performance and durability.

The Construction TAG focused its efforts in 2017 on further developing the Elastomeric Membrane Spray Type Waterproofing Initiative that would help extend the life span of bridges. Elastomeric Membrane Spray Type Waterproofing is an alternative waterproofing solution process that provides a superior seal that can be used in various applications in bridge construction and rehabilitation programs. The waterproofing system can fill gaps, corners and irregular surface areas more effectively than current waterproofing systems, and will ultimately prevent water and salt from leaking into construction joints, backwalls and other concrete surfaces, which lead to accelerated deterioration. The TAG believes that preventing water and salt from penetrating essential areas is one of the most critical factors to achieving a 100-year life span for bridges.

This initiative was submitted through the STIC as a homegrown idea from PennDOT District 2 where a pilot project was successfully completed using this technique. Currently, the TAG has a Step 1 Clearance Transmittal, which was distributed for comment and will establish a statewide standard for the use of Spray-Applied Waterproofing Systems. The materials used for this project are also being tested in PennDOT's Materials Testing Lab. The TAG hopes to soon have this technique listed in PennDOT's Bulletin 15, so it can be used more broadly.

Design-Build Evaluation Underway in PennDOT's District 12

Design-Build Traffic Control
Design TAG



The Design TAG is collaborating with District 12 on a Design-Build Traffic Control Plan project in Westmoreland County.

The Design TAG saw the successful incorporation of its innovation for Design-Build Traffic Control Plan (DBTCP) development in a PennDOT District 12 project. The innovation could improve project delivery by exploring ways to provide greater contractor flexibility in constructing the project. This initiative expands the use of the DBTCP contracting provision within Pennsylvania and establishes procedures for its use on minor, moderate and complex projects. Current policy and procedures allow the low-bid contractor to finalize the traffic control plan based on the construction phasing and schedule. The final traffic control plan will be reviewed by PennDOT District and Central Offices and Federal Highway Administration representatives. In contrast to traditional Design-Bid-Build (D-B-B) projects, this project delivery innovation allows the contractor and designer to work together to develop traffic control plans that are more responsive to flexible construction phasing and schedules.

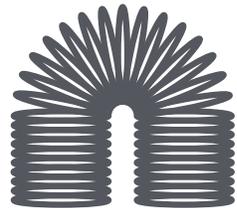
The Design TAG is collaborating with District 12 to pilot a DBTCP for the Interstate 70/State Route 31 Interchange project in South Huntingdon Township, Westmoreland County. Bids were opened and awarded for this nearly \$67 million project in November 2017, and the Notice to Proceed was issued in December. The TAG will be working closely with the district and its contractor on traffic control plan

development and review, and will ultimately evaluate the effectiveness of the approach.

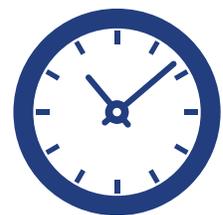
The idea to use this approach came from other similar interstate reconstruction and rehabilitation projects in Districts 11 and 12. One such project was the Interstate 70 New Stanton Interchange project, in New Stanton Borough, Westmoreland County, which consolidated two adjacent, substandard interchanges into a single, safer interchange. The New Stanton Interchange project used traditional D-B-B in which the contractor recommended substantial revisions to construction phasing and the corresponding traffic control plan that ultimately reduced construction duration from four years to three, and resulted in the use of far less temporary pavement and accelerated concrete.

The Design TAG is also looking to pilot DBTCP development on some smaller-scale projects. The TAG is reaching out to the districts for candidate pilot projects and will be creating outreach materials to communicate the benefits of DBTCPs.

“...reduced construction from four years to three and resulted in the use of far less temporary pavement and accelerated concrete.” – PennDOT District 12



greater flexibility



efficiency



schedule control



Better Materials Testing Helps Improve Pavement Quality

Mechanistic-Empirical Pavement Design System
Design TAG

Creating a pavement design guide that reflects current nationwide standards was another focal point of the Design TAG in 2017. The Mechanistic-Empirical (ME) Pavement Design System is a software program that includes calibration and validation for national pavement performance models and builds upon the ME Pavement Design Guide. This initiative focuses on various elements in material mix design, paving construction standards and pavement performance. This will allow for a more customized design using Pennsylvania-specific inputs related to materials, weather and traffic that should provide more reliable performance predictions. It will also bring PennDOT closer to implementing the state of practice in the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design and Pavement Structures.

This past year, the TAG developed a PennDOT User's Guide to help navigate the complexity of this software and how it will relate to Pennsylvania-specific projects. The guide is currently in draft form, and the TAG will be working to finalize the guide as a next step. The TAG also plans to continue to work through implementation issues related to rigid and flexible design parameters from comparisons of DARWin-ME and Pavement ME design software systems.

Saving Time, Money and Our Environment with Better Bridge Design

Standardizing Stream Restoration Structures
Environmental TAG

The Environmental TAG understood that creating design and construction standards for stream restorations can provide consistent, easy-to-use guidance for PennDOT, other agencies and local governments throughout the commonwealth. The stream structure standards will be used for constructing bridges and culverts, and will improve stream channels. These structures are intended to provide scour protection, redirect stream alignment, reduce bank erosion and undercutting, and restore channel geometry.



The result will be an effective long-term, low-maintenance, naturally enhanced stream bank stabilization and additional environmental benefits such as improving fish habitats. This initiative will save time and money by eliminating individual designs on a project-by-project basis.

The TAG is working on the deployment plan process and is currently identifying additional internal and external resources to support development. Once deployed, the standards will reduce design and construction time and costs, improve and standardize contractor bidding, enhance procurement, and benefit water quality and localized fish habitat.

“The Environmental TAG is looking into developing stream structure standards that would be used for constructing bridges and culverts, and will improve stream channels.”



Working Toward Energy Savings and Sustainability

Energy Analytics for Sustainability Facilities TAG

Energy analytics and projected savings are the heart of the Facilities TAG’s work to develop and ultimately enhance sustainability for PennDOT and the commonwealth. The TAG spearheaded an Energy Analytics Study with the focus on showing how efforts to collect and analyze energy and water resource data form the foundation of decision-making processes for commonwealth agencies and commissions. The effective use of energy analytics, such as Energy Use Intensity (EUI) and cost per square foot, provides a basis for informed decision-making to guide investments in energy conservation and sustainable initiatives.

This initiative will enable agencies to understand their exact energy usage by individual locations and will allow site comparisons to identify high-usage areas for potential upgrades. This information can also be used to uncover potential equipment failures by changing energy use patterns that may result in significant cost savings.

After the study was presented to the STIC in January 2017, the TAG collaborated with the Department of General Services (DGS) to host an Energy Summit in May 2017, where the use of enhanced software, auctions, predictive maintenance and other topics were discussed and strategized. DGS has been meeting with agency heads about this initiative and is working to implement advanced software known as Energy CAP to aid in the collection and interpretation of energy trends and data.

Lighting the Way for Safer Roads

Light-Emitting Diode (LED) Highway Lighting and Policy Maintenance TAG

The Maintenance TAG evaluated the use of LED highway lighting bulbs over traditional high-pressure sodium (HPS) lighting bulbs, and effectively used 2017 to promote the use of LED luminaires on highways and bridges across Pennsylvania. This effort will give highway lighting designers another option to choose when scoping their projects for efficiencies, motorist safety and community needs.

LED lighting has an estimated life span of 20 years with a 10-year manufacturer guarantee. Initial estimates show that overall cost efficiency of LED lights is about 30 percent when compared to traditional HPS bulbs. Since the use of LED lighting is relatively new (PennDOT has been using LED lighting for about three years), the TAG is continuing to monitor progress, effectiveness and potential cost savings. The pilot project used LED lights on the Clarks Ferry Bridge, carrying US 22/322 over the Susquehanna River, in Reed Township, Dauphin County. Since then, LEDs have been used on bridges across the state including several in the Harrisburg area. LED luminaires are now being used across the industry, as HPS bulbs are being produced less by manufacturers. HPS bulbs need to be changed and cleaned every three years, with the maintenance of LED lights only requiring lens cleaning with no cyclical replacement. LED and HPS lights cast the same amount of light; the difference between the two is in the color of the light. LEDs cast a white light that appears brighter to motorists than the orange light cast by HPS bulbs. LED lights also better penetrate fog.



The TAG’s goal was to incorporate LED highway lighting specifications into Publication 408, a task they accomplished over the past year. The TAG was also able to get a lighting manufacturer approved in Bulletin 15 for future highway/bridge projects and local municipalities use. According to lighting manufacturers, highway lighting fixtures will continue to evolve, blending newer technology with LEDs while ensuring motorist and pedestrian safety.

DID YOU KNOW...

LED lights are also used in traffic signals. PennDOT’s Green Light-Go program awards up to **\$40 million** annually for traffic light improvements to local municipalities and planning organizations, LED replacement being one of them.



Reducing Surface Runoff in Parking Lots, Sidewalks and Trails

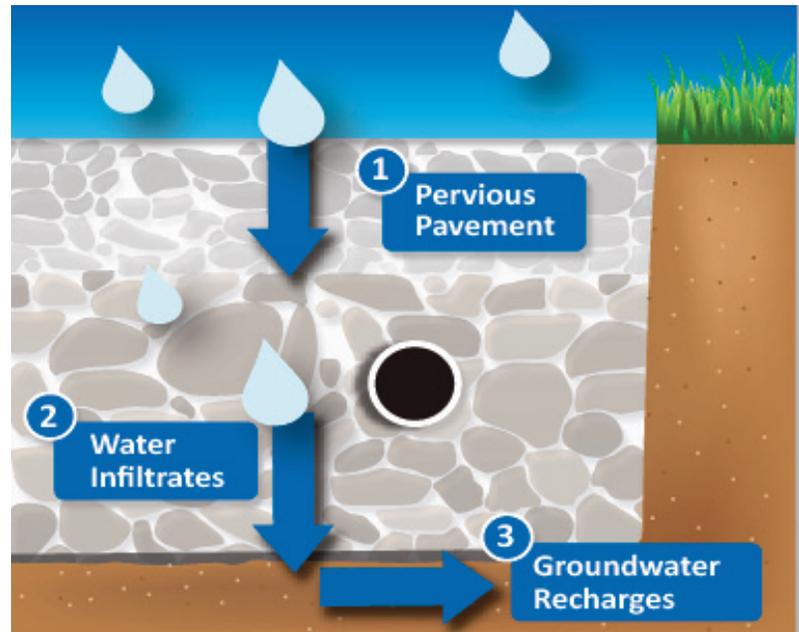
Pervious Pavements

Materials TAG

The Materials TAG is actively researching and promoting the use of pervious pavements that allow water to pass through porous pavement to reduce surface runoff and recharge groundwater sources.

Asphalt and concrete pervious pavements allow water to pass through the surface and temporarily settle in a stone reservoir before infiltrating the ground. Although not currently appropriate for high-traffic volumes or high-speed roads, this technology is especially useful for parking lots, sidewalks and trails, where heavy loads are not expected. Maintenance of pervious pavement is an important component to its durability and benefits. Debris and sediment may lodge in the pavement pores and significantly slow water drainage. On an annual basis, pressure washing or vacuuming are recommended to ensure proper permeability. It is also recommended to regularly inspect the surface and test its permeability.

Pervious pavements are approved for use by PennDOT. The TAG is working to identify projects on which to utilize the product and evaluate the specifications. They are working with the Local Technical Assistance Program (LTAP) to develop coursework on this pavement initiative and educate local municipalities on this technique.



Asphalt and concrete pervious pavement allows water to pass through the surface and temporarily settle in a stone reservoir before infiltrating into the ground.



DID YOU KNOW...

- Groundwater accounts for **56%** of the commonwealth's water supply, especially in rural areas of the state.
- Every acre of land that is covered with an impervious surface generates **27,000 gallons** of surface runoff instead of groundwater recharge during a one-inch rainstorm.

STIC Event Highlight: Educating Local Officials for Safer Roads

In collaboration with PennDOT and the FHWA, the STIC hosted a Local Government Safety Seminar in July at the Farm Show Complex in Harrisburg. The event was designed to educate local government officials about roadway safety planning, proven safety solutions and where to find funding and programs to help address safety issues for local roadways. Seminar topics included building a safety plan, and how to identify, fund and install cost-effective safety countermeasures to reduce crashes and fatalities.

To provide opportunities for local governments to attend the seminar, participants were given an option to attend in person at the Farm Show Complex or remotely at their work stations via simulcast. Participation was impressive with 110 in-person attendees and more than 100 simulcast participants at over 80 locations representing local governments and planning organizations around the state.

Presentations were provided by experts from PennDOT, FHWA, the National Highway Traffic Safety Administration, planning and advocacy organizations, and local government representatives who shared success stories on improving roadway safety in their communities. The event was broken into four focal areas with the first session focusing on safety planning and identifying the safety problem. The session demonstrated the importance of building a transportation safety plan and how to find the right solutions to safety challenges using best practices. The second session focused on safety countermeasures to help address issues and challenges in local communities, followed by a session focusing on ways to foster a safety culture through education and enforcement. The final session discussed funding opportunities for local transportation safety programs, including the availability of grants and other dedicated funding sources, and how to apply for them.

“If we can get every local community in Pennsylvania to develop an annual transportation safety plan, we could easily knock down the number of roadway fatalities in Pennsylvania,” said Pat Wright, Local Technical Assistance Program and seminar moderator.

Transportation Secretary Leslie Richards delivered a keynote presentation about the PennDOT Connects program, which is designed to foster collaboration between PennDOT and local governments to ensure that local concerns and needs are considered early in the project design process. “I wanted to find a way where we truly felt that every dollar we invested in a PennDOT asset was a dollar invested in the community,” said Secretary Richards. She also stressed the importance of municipal participation in the PennDOT Connects process. “The more we

know what is important to you, the better we can design projects moving forward,” she added. PennDOT Connects encourages municipal partners and PennDOT employees to work together to find solutions that will identify and address safety needs.

“This event has been very helpful and informative for local governments to learn about the cost-effective measures that can be taken to improve safety in local communities.”

– Jane Billings, Swarthmore Borough, Delaware County



The Local Government Safety Seminar was held on July 19, 2017. Participants were able to attend the event in-person at the Farm Show Complex or view the event via a simulcast link.

Among the shared success stories, Jane Billings, Borough Manager, discussed Swarthmore Borough’s decision to install a roundabout and how safety has improved tremendously at the intersection. In addition to being safer for vehicles, the roundabout provides shorter crossing paths and increased protection for pedestrians from vehicles passing through the intersection.

Several STIC members also attended the seminar to demonstrate their support of the safety initiative. Will Clark, of the York County Planning Commission, presented on the benefits of creating a road safety plan.

“The STIC recognizes the importance of educating the local governments on safety and realizes this is an integral part in helping Pennsylvania develop a safer transportation system for all roadways across the state.”

– Will Clark, STIC Member



The Local Government Safety Seminar brought together participants, representing local government and planning organizations from across the state.



The Local Government Safety Seminar had presentations by experts from PennDOT, FHWA and the National Highway Traffic Safety Administration, planning and advocacy organizations, and local government representatives.

Putting Innovation into Practice

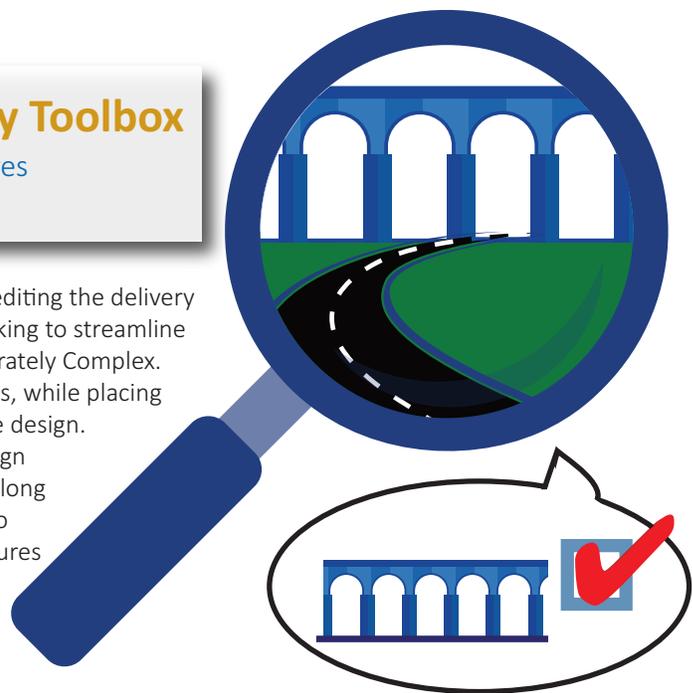
Given that 200 fatalities (based on 5-year averages) or roughly 16 percent of all Pennsylvania highway deaths occur on local roads annually, PennDOT’s Highway Safety Section is working with the Local Technical Assistance Program (LTAP) to find new and efficient ways to apply low cost safety improvements in local government regions. PennDOT and LTAP are piloting a new contract system that would involve the municipalities filling out detailed quantity forms to provide to their PennDOT districts. These detailed forms lay the groundwork for the districts to

apply low cost safety improvements. PennDOT is piloting this new process in projects in PennDOT Districts 9 and 11. The pilot municipalities currently have the necessary forms developed and are working with the districts’ project delivery staff members to implement these safety improvements. PennDOT is also working to develop a new municipal agreement for the eight municipalities involved. These legal agreements will allow PennDOT contractors to do work on locally-owned roads and establish maintenance responsibilities for the municipalities.

Another “Tool” in the Project Delivery Toolbox

Complex or Moderately Complex Project Design Procedures
Project Delivery TAG

Opportunity is on the horizon for project managers interested in expediting the delivery of time-consuming complex projects. The Project Delivery TAG is working to streamline the final design process for projects categorized as Complex or Moderately Complex. The goal is to reduce the number of reviews during the design process, while placing more responsibility for quality on the consultant team performing the design. Proposed changes build upon PennDOT’s existing Minor Projects Design Procedures for Consultant Designed Projects. The initiative has had a long path to building consensus with members of the design community to make it a useful option. It will allow for relatively simple bridge structures that are part of larger complex projects to proceed through final design with limited reviews, eliminating much of the review efforts required by PennDOT, while maintaining a quality product through the processes established by the design consultant.



Overall, this initiative could allow for improvements in project delivery timelines and provide options for better utilization of PennDOT resources currently engaged in the project development process. The TAG is moving the initiative toward implementation with the anticipated release of revisions to the PennDOT’s Design Manual, Part 4 coming soon.

Learning More in Less Time

Trainee Program for Construction Projects
Project Delivery TAG

The Project Delivery TAG determined that updating and enhancing PennDOT’s Construction Trainee program would be beneficial to the industry and is working to build consensus between the various stakeholders who have a vested interest in the program. Currently, trainees are required to complete a minimum of 1,000 hours on a single project. The idea is to restructure the trainee hour requirements to be obtained on multiple projects. The TAG’s efforts would provide an accelerated apprenticeship program and additional training resources that are available to the construction industry for new employees interested in the construction industry.

PennDOT and FHWA support the initiative to determine a new process to reduce apprenticeship time, while achieving qualified and educated construction workers. PennDOT plans to outline and document the process to define core requirements to obtain a waiver of the 1,000-hour requirement and implement a template to use for tracking purposes.

Helping Local Municipalities Implement Safer Roadways at Lower Cost

Pilot Project and Process to Implement Low-Cost Safety Improvements
Safety TAG

Budgetary constraints cause many local governments to struggle with funding priority projects from year to year. Given that 200 fatalities (based on 5-year averages) or roughly 16 percent of all Pennsylvania highway deaths occur on local roads annually, the Safety TAG is concentrating its efforts to educate and inform local municipal leaders about achievable, low-cost projects that can improve safety on local roads.

“Two-thirds of the roadways in Pennsylvania are locally owned and maintained. Twenty-five percent of reportable crashes occur on local roads.”

The TAG is working with the project delivery staff in PennDOT Districts 9 and 11 to develop low-cost safety pilot projects to support the direction of Highway Safety Improvement Program (HSIP) funds from state to local highway use where greater safety benefits may be realized. This effort could pave the way to the planning and delivery of local safety projects where the greatest needs are identified.



The Safety TAG is currently working to implement low-cost safety improvement projects in several municipalities.



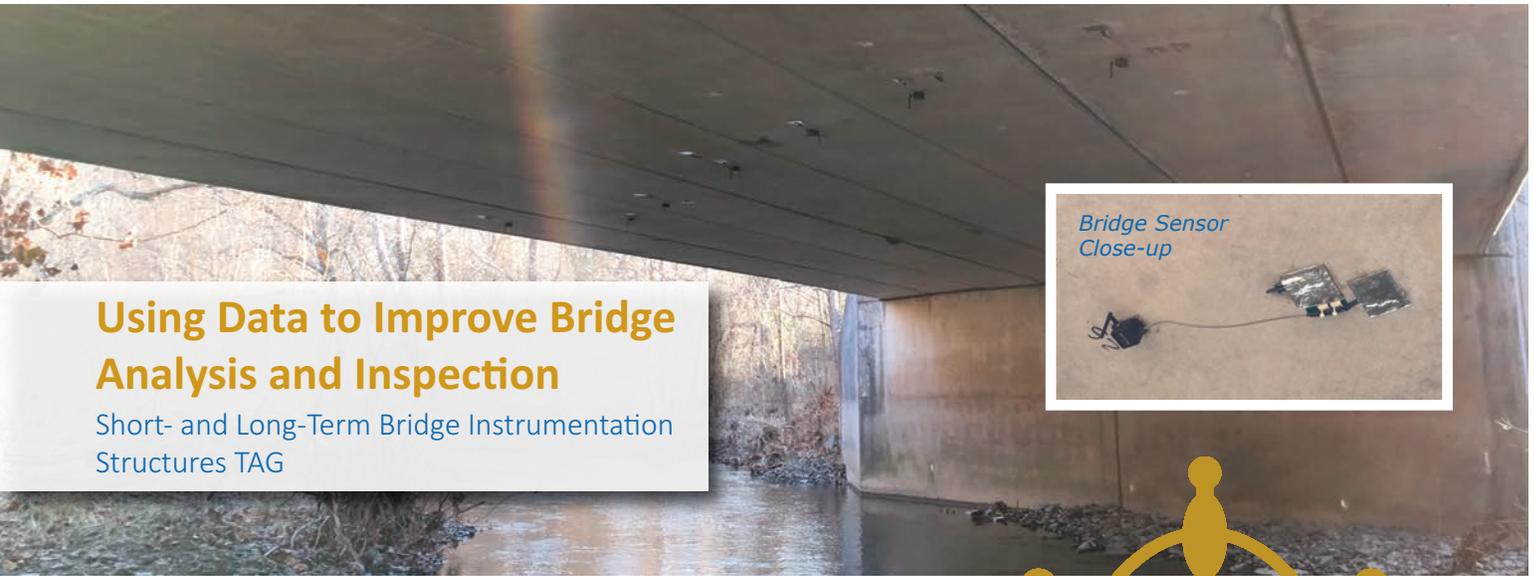
Ensuring Driver Safety with Effective Rumble Strips

Rumble Strip Installation on Thin Pavement Overlay
Safety TAG

Routine placement of thin pavement overlays as part of resurfacing operations may be anything but routine on those roadway surfaces where rumble strips are in use. Repaving roadway surfaces, even thin pavement overlays, can reduce overall rumble strip effectiveness by covering or filling in the grooves. Rumble strips, also known as Sonic Nap Alert Patterns (SNAPs), are typically milled into the pavement surface at the edge line and centerline areas. When driven over, they provide feedback to drowsy and inattentive drivers that stray from their lane of travel.

The Safety TAG evaluated and believes that in the paving process, rumble strips can be reinstalled on thin pavement overlay operations without reducing pavement performance. The TAG is developing guidance for the installation and reinstallation of centerline and edge line rumble strips on thin pavement overlay projects that can be adopted by PennDOT to maintain the effectiveness of this important safety feature.

Thin pavement overlays are a cost-effective solution to address pavement performance issues, but can result in covering the rumble strips.



Using Data to Improve Bridge Analysis and Inspection

Short- and Long-Term Bridge Instrumentation Structures TAG

The use of state-of-the-art instrumentation to monitor bridge conditions is under evaluation by the Structures TAG. The goal of this evaluation project is to develop and execute a statewide bridge instrumentation program to monitor and capture actual values for stress, accelerations or other parameters on certain types of bridges.

The TAG plans to identify and evaluate available technologies to determine the overall cost effectiveness of installing sensors on structures by comparing the information returned and the total cost of that information versus standard inspection methods.

While not new, bridge sensorization has benefited from advances in technology that have allowed data to be obtained, stored and maintained in a more cost-effective manner. The TAG is working to monitor a project throughout the next year as an exercise in measurement of cost effectiveness and not technical ability.



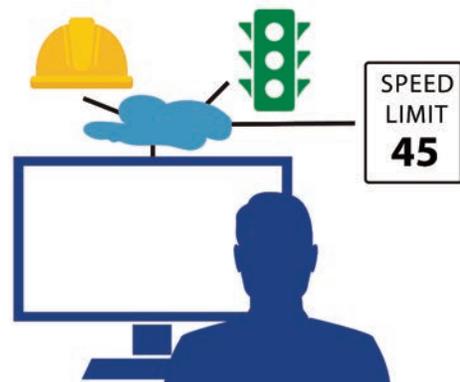
Technological Advancements Yield Changing Needs for Data Management

Transportation Operations Data Warehousing and Management Traffic Operations TAG

As PennDOT receives an ever-increasing amount of data on an annual basis, its ability to manage and use that data becomes more challenging. Turning data into useable information will help PennDOT move toward a more data-driven approach for projects related to traffic operations. As PennDOT better understands where congestion and mobility issues occur, the causes of the congestion, and which solutions offer the best cost benefit, it will be able to continually improve traffic operations programs and maximize available resources.

To address rapidly advancing technology and continually changing needs in data management, the Traffic Operations TAG is working with the University of Maryland and Purdue University to turn a variety of data into useable information. PennDOT's information technology staff is also helping to turn data into information that will provide PennDOT with a better

understanding of the effects of incidents throughout the commonwealth. For each of these projects, there are varying forms of data warehousing needed to capture data from different sources and make it easily accessible. Moving forward, traffic operations data warehousing efforts will continue to grow and adjust in an agile fashion to ensure these needs can be met now and into the future.



Automated Vehicles Grow the Need for Reliable Traffic Information

Lane Reservation System Traffic Operations TAG

Accuracy in knowing and conveying work zone and special event location information is critical to a well-managed traffic operations program. The Traffic Operations TAG is exploring potential benefits of a lane reservation system that could assist by reducing work zone conflicts and capacity-restricting work zones, as well as providing the information needed to better manage traffic.

Connected and automated vehicles (CAV) are the future of transportation, and Pennsylvania is among the leaders in the development of this technology. An ability to provide accurate and up-to-date closure and lane restriction information to CAV manufacturers would make Pennsylvania inviting in this highly competitive environment. The TAG is collaborating with the Smart Belt Coalition, which is a collection of transportation agencies and universities from Ohio, Pennsylvania and Michigan. The Smart Belt Coalition has identified a lane reservation system across the region as a high-priority project and is currently working to find a funding source for future deployment.



PennDOT Secretary Leslie S. Richards takes a ride in a Highly Automated Vehicle at the Safety Symposium in 2016.

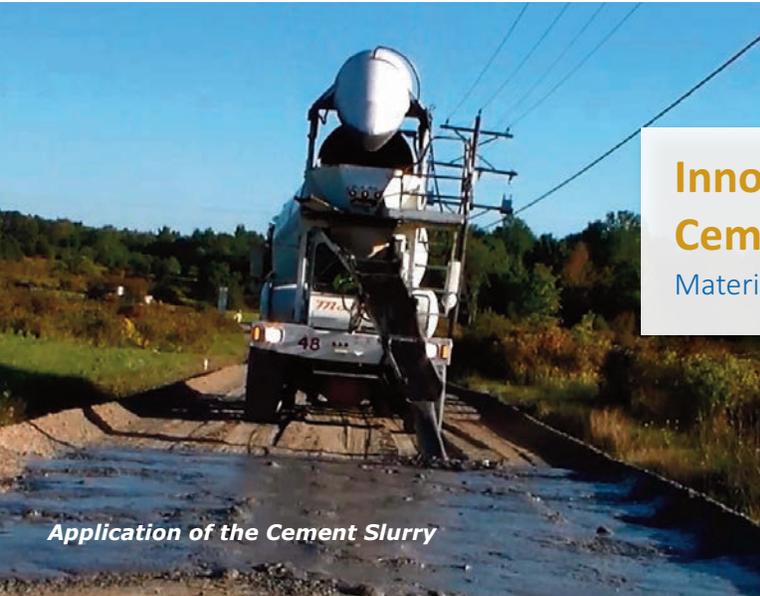
The Autonomous Vehicle Task Force Co-Chairs, PennDOT Deputy Secretary for Driver and Vehicle Services Kurt Myers and PennDOT Special Advisor to the Secretary Roger Cohen, provided a presentation at the May 2017 STIC Business Meeting regarding Pennsylvania's efforts to lead the development of policy for testing and deployment of Highly Automated Vehicles (HAV). The presentation highlighted how HAV technology will have a transformative effect on every aspect of society from transportation dynamics to land use and the economy. Pennsylvania is regarded as a leader in this emerging technology.

"TAG-Teaming" for Better Transportation Systems in Pennsylvania



Members of the Safety and Design TAGs meet to discuss the Thin Pavement Overlay policy related to rumble strips.

Through the STIC's goal of creating a culture of innovation and collaboration, several innovations can routinely bring TAGs together to advance these innovations. In 2017, some TAGs worked together to move their priority initiatives toward deployment. For example, the Safety TAG received several technical comments on their revised specification for the Rumble Strips for Thin Pavement Overlays initiative. The Safety TAG is collaborating with the Design TAG whose members will be providing the design background and technical expertise to review the comments received, refine the initiative, and address potential challenges to developing a specification. Throughout the STIC, opportunities for collaboration abound. "TAG Teaming" is proof positive.



Application of the Cement Slurry

Cement Slurry is a mix of cement and water that is applied to a liquid form to the ground roadway base during full depth reclamation projects to provide base stability.



Grinding the Cement Slurry into the Roadway Base

The cement slurry is supplied to full depth reclamation projects by ready-mixed concrete trucks loaded at nearby concrete plants. Video clip photos were provided by Masters Concrete.



Finishing with a Chip and Seal Coat

Innovation Highlight: Cement Slurry for Full Depth Reclamation

Materials TAG

Advancing innovations to deployment requires the ability to deal with many moving parts while working in a responsible, but diligent fashion. Rapid development best describes the dedicated efforts of the Materials TAG in 2017, as the TAG advanced the Supply Cement Slurry for Full Depth Reclamation (FDR) in Ready Mixed Concrete Trucks initiative completely through the development phase – from introduction as an innovation to white paper development and deployment planning.

Cement slurry is a mix of cement and water that is applied in a liquid form to the ground roadway base during FDR projects to provide base stability. The cement slurry also provides environmental benefit as a dust palliative. The cement slurry is supplied to FDR projects by ready-mixed concrete trucks loaded at nearby concrete plants, instead of the traditional method of spreading the dry cement on the roadway base. The initiative also helps to expedite the FDR process and requires less equipment to perform the FDR. This initiative is particularly beneficial for rural, stabilized roads.

Indiana and Ohio have been effectively using this technique, and the Materials TAG identified that using this technique in Pennsylvania could also prove beneficial. Masters Concrete successfully deployed a pilot in Lenox Township, Susquehanna County. The TAG is working to include a specification for this technique in Section 344 (Full Depth Reclamation) of Publication 408 and Section MS-0370-0035 (Full Depth Reclamation) of Publication 447.

The TAG recognized the many benefits of this innovation and was motivated to move it quickly through the development phase. At the November STIC Business Meeting, the TAG received approval to move the initiative forward. Additionally, the STIC Management Team presented the Materials TAG members with the “STIC Puck Award” for their hard work in moving this innovation through the development phase in less than a year. This award is presented at every STIC business meeting to a STIC Member, TAG, or individual who has displayed energy and stewardship of driving innovation to a new level.

Every Day Counts Initiatives

In 2009, FHWA launched Every Day Counts (EDC) to identify and rapidly deploy proven innovations. Through EDC initiatives, FHWA works with state partners to identify new tools, products and technologies. Every two years, FHWA hosts regional summits where states can learn about the innovations and collaboratively select technologies and tools that are the best fit to address their transportation needs. The EDC Round 4 (EDC-4) Summit was held in October 2016; below are descriptions of the six EDC-4 innovations that were selected for deployment in Pennsylvania.

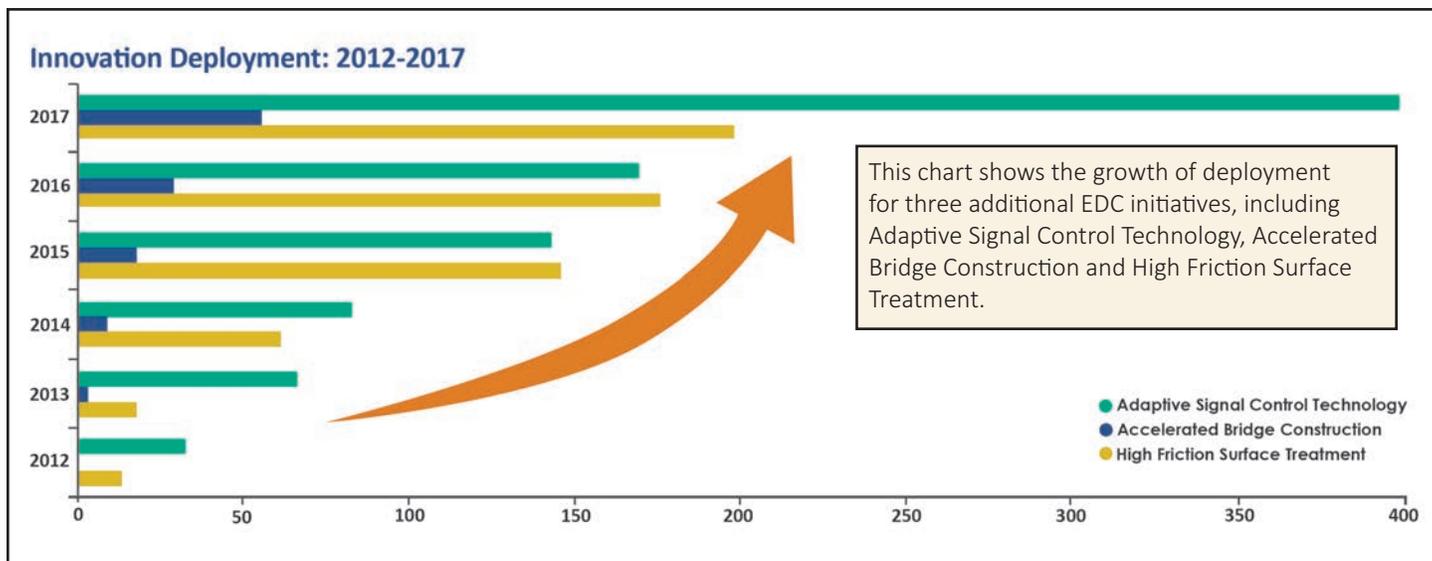


INITIATIVE	DESCRIPTION
Automated Traffic Signal Performance Measures (ATSPMs)	High-quality service can be delivered to customers with significant cost savings to agency maintenance and operations. Several implementation options are available, ranging from a low-cost, open-source code framework to a fully integrated traffic signal system.
Collaborative Hydraulics: Advancing to the Next Generation of Engineering “C.H.A.N.G.E.”	Current modeling techniques used for hydraulic design apply several assumptions that can lead to overly conservative or inaccurate results. Advanced hydraulic modeling technologies offer planners, scientists and engineers tools to depict specific physical, environmental and habitat characteristics more accurately through 3-D visualization of flow, velocity and depth.
Data-Driven Safety Analysis	This type of analysis enables agencies to predict the safety implications of their decisions with confidence. Engineers now can quantify the safety impacts when making investment decisions, just as they do with environmental, traffic and other traditional impacts. The analyses result in more scientifically sound, data-driven approaches to committing resources, as well as fewer and less severe crashes on the nation's roadways.
e-Construction & Partnering: A Vision for the Future	State DOTs have traditionally administered contracts and managed construction of highway projects using extensive, paper-based documentation systems. By using digital e-Construction technologies, DOTs can enhance collaboration among stakeholders on project teams, while improving communications and workflow to streamline the delivery of projects.
Pavement Preservation “When & Where”	Applying a pavement preservation treatment at the right time (when), on the right project (where), with quality materials and construction (how) is a critical investment strategy to help meet performance expectations. This innovation helps deploy an array of different analyses, treatments and construction methods to help infrastructure owners achieve and sustain a desired state of good road repair despite tight budgets.
Using Data to Improve Traffic Incident Management (TIM)	This innovation focuses on improving the adoption and consistency of the collection of TIM data and increasing the volume of data from transportation, law enforcement and other responder agencies. This innovation promotes the use of low-cost, off-the-shelf technologies that streamline data collection.

Every Day Counts Accomplishments

Since 2012, PennDOT has been working to deploy several Every Day Counts (EDC) initiatives from past EDC rounds. One in particular is Warm Mix Asphalt, which uses lower temperatures than traditional asphalt to reduce fuel consumption and lessen emissions. According to FHWA, it is projected that by 2020, 1,293 million tons of Warm Mix Asphalt will be produced for the nation's roads since its initial deployment in 2009. This would save approximately 778 million gallons of fuel worth over \$4 billion. In Pennsylvania, PennDOT has included Warm Mix Asphalt in over 88 percent of its asphalt paving in 2017. New construction paving projects account for over 92 percent of Warm Mix Asphalt usage, and 78 percent of Warm Mix Asphalt was used for Department-force work.

Rapid Growth in EDC Innovation Deployment



2017 STIC Incentive Program Awardees

Each year, FHWA's STIC Incentive program offers up to \$100,000 per state to support or offset costs of standardizing innovative practices. Over the last few years, these funds have helped move several initiatives forward in Pennsylvania, including the Salt and Snow Management Course and this year's Local Government Safety Seminar. In 2017, the following two initiatives received STIC Incentive program funding.

Using Funds to Produce More Efficient Bridges

The Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS) technique was introduced to PennDOT in 2011, and since then has been used in over 25 projects across the state. GRS-IBS allows PennDOT and municipalities to build bridges in a quick and cost effective manner that is environmentally friendly.

Nearly all PennDOT districts have a GRS-IBS bridge, and those that do not are seeking implementation opportunities. PennDOT is in the process of updating the specifications for bridge construction that utilize GRS-IBS technology. Initially a very conservative approach was implemented for the new technology.

GRS-IBS Activity in Pennsylvania



The acceptance and refinement of the process has necessitated the need to update and expand the specification. Areas being considered include increasing allowable annual average daily traffic (ADT), limitations on length, and structural features; including the composition and type of the facing blocks. Future analysis will include stream velocity and scour countermeasures to expand the range of conditions for GRS-IBS technology. Updates to the specifications are anticipated to be completed within the next two years.

GRS-IBS technology applied to a bridge in Bradford Township, McKean County.

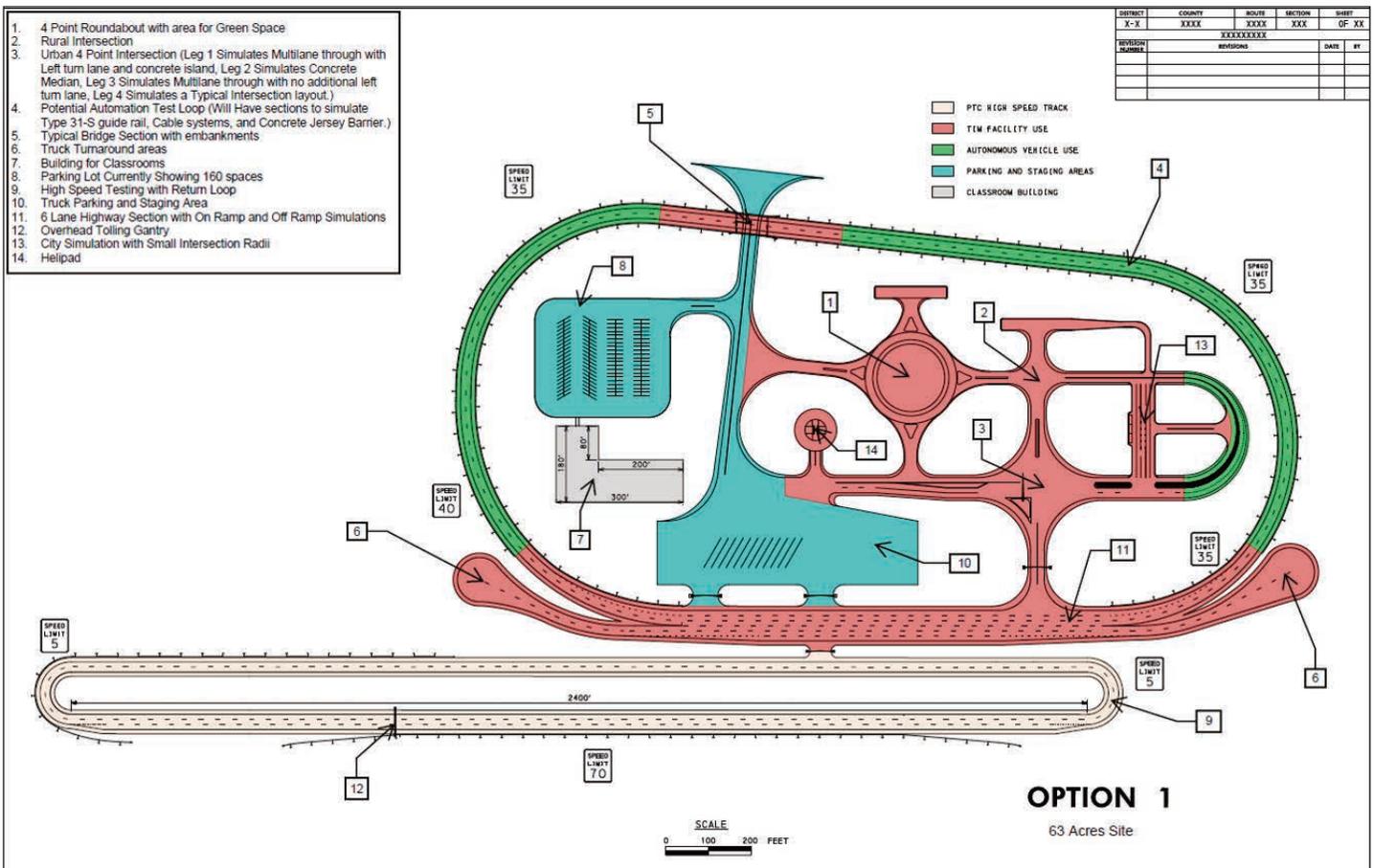
If You Build It, They Will Come

Efforts are underway to locate a Traffic Incident Management (TIM) training facility in Pennsylvania. This facility would not only serve Pennsylvania but would become the premier training facility for the Mid-Atlantic states. The facility would once again place Pennsylvania on the map as a leader in safety technology as well as continue its East Coast dominance for connected and autonomous vehicle (CAV) testing grounds. The future site has the promise to house classrooms and in-the-field experiences for incident (crash) management for first responders, electronic tolling and CAVs, to name a few.

The business plan development, site identification and creation of a site development plan are being led by the Pennsylvania Turnpike Commission in conjunction with PennDOT, the Pennsylvania Emergency Management Agency (PEMA), Pennsylvania State Police (PSP) and the FHWA. It would blend classroom training concepts with applications in a simulated environment utilizing a variety of real-life crash scenarios. This concept helps support the increased attention to TIM and the national safety goal of Toward Zero Deaths. The optimal future site would also be capable of testing innovative technologies and equipment related to roadway safety and automation. It would provide experiential training to first responders,

including emergency management personnel, state police, media, tow truck drivers, etc. Similar sites exist in Tennessee and Florida, but none currently exist in the Northeast. Pennsylvania wishes to be a leader and predominant host for other states by building this facility in a centrally-located site.

The project team is aggressively pursuing this initiative and has already completed interviews with stakeholders to gather input and ideas of what the ideal site plan would look like. They are also visiting locations and identifying partners. The next step is to finalize the business plan by spring 2018.



The conceptual design plan of the TIM Training Facility.



Innovation in Motion

In 2016, the STIC introduced their quarterly e-newsletter *Innovation in Motion*. This educational channel provides a recap of STIC initiatives, links to approved specifications and white papers, links to STIC outreach materials and publications, and information on recent events. The e-newsletter reaches a variety of stakeholders, with the number of respondents having grown exponentially over the past year. The STIC will continue to use this informational channel to communicate STIC activities. For previous issues and to sign up to receive future editions, visit the STIC webpage on PennDOT's website, www.pendot.gov.



Thank You to Our Members

The Pennsylvania STIC would like to express sincere thanks and appreciation in recognition of the exceptional service and dedication of the following members whose terms on the STIC expired at the end of 2017:

- **Sherri Chippo, Ph.D.** – American Public Works Association (APWA)
- **Will Clark** – York County Planning Commission
- **Crystalann Dearnorff, P.E.** – Women in Transportation Seminar (WTS)
- **Douglas George, P.E.** – American Society of Highway Engineers (ASHE)
- **Charles Goodhart** – Pennsylvania Asphalt Pavement Association (PAPA)
- **Elam Herr** – Pennsylvania State Association of Township Supervisors (PSATS)

2018 STIC Business Meetings

- Save the Dates
- March 14, 2018
 - July 18, 2018
 - November 14, 2018

Please note: The dates are subject to change.

For More Information:



State Transportation Innovation Council
ra-pdpenndotstic@pa.gov
www.pendot.gov