

State Transportation Innovation Council (STIC)

STIC Business Meeting

MEETING DATE:	Wednesday, Nov. 16, 2022
TIME:	1 p.m. – 4 p.m.
LOCATION:	Hershey Lodge, 325 University Dr, Hershey, Pa. (remote option via Webex)
ATTENDANCE:	Refer to Attendance List

Welcome and Introductory Remarks

Anja Walker, Pennsylvania Department of Transportation (PennDOT) Bureau of Innovations (BOI), welcomed attendees and thanked the Associated Pennsylvania Constructors (APC) for hosting the meeting during their Annual Fall Seminar at the Hershey Lodge. Ms. Walker introduced STIC co-chairs, Yassmin Gramian, P.E., PennDOT Secretary, and Alicia Nolan, Federal Highway Administration (FHWA) PA Division Administrator, for their opening remarks.

Secretary Gramian said she was excited to attend the meeting in-person and see current and former PennDOT staff and expressed gratitude to APC for hosting the meeting. The transportation industry has experienced challenging times over the last few years, and the STIC has played an important role in continuing to encourage innovation. Innovation is fundamental to the mission of PennDOT, and Secretary Gramian highlighted the success of the PA STIC, which emphasizes partnership and collaboration with business partners, the PA Turnpike Commission (PTC), FHWA and local governments. Secretary Gramian thanked STIC members for their hard work, curiosity, and open-mindedness. Secretary Gramian also thanked Technical Advisory Group (TAG) members for their efforts, as they perform many of the most fundamental STIC activities, such as innovation development and implementation. Additionally, Secretary Gramian acknowledged the STIC's 10th anniversary, and the efforts made to celebrate this milestone. Secretary Gramian encouraged attendees to visit the [STIC 10th Anniversary](#) webpage as well, which includes a STIC timeline, articles, and podcasts highlighting the last 10 years of the STIC. She introduced Administrator Nolan for her remarks.

Administrator Nolan was pleased to be at the meeting in person after being unable to attend the STIC Business Meeting in July. Ms. Nolan expressed the importance of in-person meetings as a forum for expressing and developing new ideas. She praised the STIC's engagement and its implementation of new ideas, showcasing more efficient and cost-effective technologies. Ms. Nolan recognized the 10th Anniversary of the award-winning PA STIC and all the dedicated individuals who are a part of it.

FHWA Update

Ms. Walker introduced Yathi Yatheepan, P.E., FHWA Innovation and Research Coordinator, to provide FHWA updates. Mr. Yatheepan thanked PennDOT for its active involvement in [Every Day Counts](#) Round 6 (EDC-6). Regarding EDC-7, he stated that a one-hour executive session to introduce EDC-7 innovations is scheduled for Dec. 2, 2022, and a virtual EDC-7 summit is planned from Feb. 14-16, 2023. Mr. Yatheepan indicated that the roll out of EDC-7 innovations is expected to start in April 2023. The roll out was delayed, as FHWA needed to formulate the program alongside implementation of the Bipartisan Infrastructure Law (BIL) provisions. Mr. Yatheepan stated that the [Accelerated Innovation Deployment \(AID\) Demonstration Program](#) funding solicitation period was planned for September 2022 but was delayed, without the release of a revised timeline for solicitation. Currently, \$1 million in AID Demonstration Program funding is proposed per state, but the funding level could increase.

Mr. Yatheepan detailed grant opportunities, including the [Accelerated Implementation and Deployment of Pavement](#)

[Technologies](#) (AIDPT) program, which is a pool-funded program that includes PennDOT as a contributing partner. The program provides \$40 million to supplement project construction, instrumentation, or consultation. Moreover, the program offers up to 100 hours of technical support to evaluate new technology. PennDOT proposed Hot Pour Mastics for participation in the AIDPT program, with Halley Cole as the technical contact. The [Advanced Transportation Technology and Innovation](#) (ATTAIN) program was created under the BIL, but a similar program existed previously under a different name. The ATTAIN program provides competitive grants to deploy, install, and operate advanced transportation technologies to improve safety, mobility, efficiency, system performance, intermodal connectivity, and infrastructure return on investment. To apply for ATTAIN grants, PennDOT must apply under a partnership with other public or private agencies. Total funding for the program includes \$60 million per year, with five to 10 projects selected per year.

The [Technology Transfer](#) (T2) solicitation deadline is Nov. 18, 2022. PennDOT has successfully utilized T2 funding in the past. T2 is a small program and typically prioritizes projects that are less than \$10,000. Last, Mr. Yatheepan stated that EDC-6 final reports and STIC Incentive Program status reports are due on Jan. 31, 2023.

STIC Incentive Program Project Update: PennSTART

Ms. Walker encouraged questions from both physically present and online attendees, and introduced Mark Kopko, PennDOT Office of Transformational Technology, to provide an update on the PA Safety Transportation and Research Track (PennSTART) project, which received STIC Incentive Program funding in 2017 and 2018. Mr. Kopko indicated that the vision of the project was to explore and advance a state-of-the-art training and testing facility to address the transportation safety and operational needs of Pennsylvania and the surrounding region. He emphasized the desire to meet the needs of communities inside and outside the state and allow the project to serve as a regional economic development opportunity. The purpose of the project is to facilitate safety, and foster growth and impact of the industry to attract companies, jobs, and investments. Additionally, Pennsylvania lacks facilities for first responder training, with 54,500 total responders needing to be trained in Traffic Incident Management (TIM). Furthermore, there are more than 50 transportation technology companies and research intuitions that need such a facility for education and testing. The proposed focus areas of PennSTART include connected and automated vehicle testing, tolling and intelligent transportation system technology testing, and safety testing and training.

The PennSTART project originated in 2014, with a PA Transportation Advisory Committee Study that examined the need for a first responder training facility. The scope of the project grew as PennDOT explored other uses of such a facility. A partnership was formed between PennDOT and the Regional Industrial Development Corporation (RIDC) of Southwestern Pennsylvania to develop the project, and RIDC also partnered with Carnegie Mellon University and Westmoreland County. A Letter of Understanding was signed in February 2022, and the signing of a Legal Agreement is underway between RIDC, PTC, and PennDOT. The facility is proposed to include a high-speed test loop, a helipad, a vertiport, different types of intersections, a bridge, highway-rail crossings, classrooms, and other elements. The buildout of the facility will include four phases: Phase 0 includes repurposing existing parking lots and the development of training space within an existing Westmoreland County Community College building (Early 2023); Phase 1 includes construction of an open area (2023); Phase 2 includes construction of the high-speed section of the test track (2024); and Phase 3 includes construction of the other sections of the test track (2025). The proposed site for the facility offers the potential for western expansion, if needed.

STIC Incentive Program funding was used for various tasks, including systems engineering documentation updates. The project was initially planned in State College, and revisions to the documentation must be made accordingly for the new location. A stakeholder meeting was held on October 24, 2022, and information from that meeting is also being used in updates. Workshop meetings for the project are planned in December, with a draft and final Concept of Operations planned for release in early 2023. RIDC has involved a variety of stakeholders who have requested a rain simulator/environmental simulator, open space for line-of-sight testing of unmanned aerial vehicles, and landing zone variations for heavy drones. The overall project vision sees the facility as an anchor for a smart corridor from Westmoreland

to Mill 19 (Pittsburgh), which could include different stages of testing/development for new technologies.

John Becker, P.E., American Concrete Pavement Association of PA (ACPA/PA), asked if different pavement testing areas are being considered along environmental simulators at the high-speed test loop and if the pavement industry is involved in project planning. Mr. Kopko replied that the facility is intended to evaluate different road surfaces and other products and techniques, including in areas such as stormwater management. Mr. Kopko indicated that the project team has spoken with the Pennsylvania Asphalt Pavement Association (PAPA) and other groups, and more formal outreach will be conducted during the design phase in 2023. Mr. Becker expressed ACPA/PA's interest in being involved. Danielle Klinger-Grumbine, PennDOT BOI, inquired about how the STIC Incentive Program funding supported the project. Mr. Kopko stated that the funding was used for systems engineering work, to develop a concept of operations and facility requirements, and to lay a foundation for project development. Bert Lahrman, North Central Pennsylvania Regional Planning and Development Commission questioned whether the project team has considered training facilities for different types of rescue incidents, such as mines, airplane crashes, or mountain scenarios. Mr. Kopko responded that the project team has considered an airplane crash training area and has discussed with the Federal Aviation Administration (FAA) plans to have an aircraft simulation fuselage at the facility for practicing fires or passenger extraction incidents. Other types of rescues could be added to the facility later, as requested by stakeholders.

ED-6 Update: Next Generation TIM and Crowdsourcing

Ms. Walker introduced Ryan McNary, PennDOT Bureau of Operations, to provide an update on the EDC-6 innovations, Next Generation Traffic Incident Management (TIM) and Crowdsourcing for Advancing Operations. Mr. McNary indicated that the existing traditional Transportation Systems Management and Operations (TSMO) analytics database includes crash records, road condition reporting, weather stations, maintenance database information, traffic counter/weigh-in motion data, and dynamic message signs history. PennDOT has partnered with Waze to receive traffic data and with INRIX to receive traffic speed data to supplement this traditional TSMO analytics database and create a data-driven TIM tool.

Mr. McNary presented visuals from the tool showing incident statistics by region, county, or municipality and a map of statewide incident clearance times. Additionally, PennDOT has developed a probability model for how the likelihood of a crash increases during different hazardous winter conditions, including low visibility, high wind, freezing surfaces, freezing rain, and slippery surfaces. Probabilities of a crash increased between 1.2 to 3.2 times for non-commercial vehicles, and 1.8 to 7.4 times for commercial vehicles, depending on the type of condition. This model was developed using data from previous winter storms, and the model can allow PennDOT to preemptively post warnings at dynamic message signs near weather stations detecting potential storm activity. The conditions developed for the probability model were also used to analyze where the most whiteout traffic incidents occur around the state.

Mr. McNary stated that PennDOT has been searching for a platform that allows video sharing with PennDOT's TIM responders at a reasonable cost. Recently, through a partnership with the Maryland Department of Homeland Security, PennDOT has gained access to a video sharing platform known as MView. MView is a secure, web-based video sharing portal for first responders and public safety personnel to view live regional video from over 15,000 cameras from more than 200 agencies, including Maryland, Virginia, Washington D.C., Baltimore City, National Park Service, and Johns Hopkins University. Furthermore, MView allows users to create a virtual video wall to track incidents or storms over an area. More than 1,000 PennDOT cameras have now been made available to external TIM partners, and an internal/external TIM partner rollout is underway, with 1,000 users outside of TSMO using the system daily, including maintenance staff, Pennsylvania State Police (PSP), and 911 centers. The goal with MView is to continue growing video source partnerships with other traffic management partners, such as municipalities, entertainment complexes, and first responders. The PennDOT resource account email for MView is ra-pdmview@pa.gov.

Mr. McNary transitioned to a discussion on crowdsourcing for advancing TSMO. Crowdsourcing is conceptual within PennDOT and has not been deployed, but it can enable tools such as the data-driven congestion pie chart, which analyzes the source of congestion in selected areas. An example image of the tool was presented by Mr. McNary, depicting the

largest source of congestion along I-95 in Philadelphia as “Recurring” at 44%, followed by “Roadwork” at 17% and “Crash” at 15%. This data empowers PennDOT to understand what is causing congestion issues and use the information for queue protection. PennDOT worked with its Advanced Traffic Management System vendor to develop a pilot solution along more than 10 congested corridors that could automatically post slowdown warnings to motorists. It has been piloted over the last year, and PennDOT District 11 used this functionality to save \$250,000 on a construction project along I-79. This automated queue protection is planned to be rolled out to more locations. Crowdsourcing data informed PennDOT that in 2021, 40% of work zone congestion crashes occur two plus miles from the start of the work zone, which may be preventable by posting warning messages, proving the importance of these types of initiatives. PennDOT plans to allow anyone doing business for PennDOT to have access to origin and destination data through an operations partnership with the Program Center. This data can be used in numerous ways for planning, design, operations, TIM, and multimodal purposes. Mr. McNary showed an example of this origin and destination data being used along U.S. 219 South and the PTC in Somerset County, demonstrating that 47% of motorists were following the suggested route to the PA Turnpike in the area, compared to 53% taking a shorter route.

Mr. McNary stated that PennDOT is working on building out the 511PA application to create crowdsource users, allowing AM radio advisories to be retired. If geofenced push notifications with voice functionality were added to the 511PA application, this could serve a similar function and replace the radio advisories. Mr. McNary hopes to pilot the technology this winter. Another pending development is the expansion of data sharing and collection through a data lake, currently pursued through a partnership with FHWA as part of lane reservation system creation. A data lake uses cloud technology to upload and analyze, store, or output data to applications such as 511PA, Google Maps, or Waze. A data lake could work seamlessly with connected and automated vehicles, and PennDOT has met with automobile manufacturers to explore this functionality. Moreover, a data lake would make partnerships and data sharing easier and could be accessed by research institutions.

Secretary Gramian asked Mr. McNary if the geofenced notifications for low roadway clearances were available yet. Mr. McNary replied that the feature was not available yet, but the data is publicly available. Discussions with Google indicated that Google was not interested in adapting their navigation applications to include data relevant for commercial vehicles. Secretary Gramian also inquired how decisions on systems changes are made and whether artificial intelligence (AI) is involved. Mr. McNary indicated that him, another member of his staff, and a team of three data scientists make decisions on TSMO analytics and its relation to operations. No AI is involved. Brian McNulty, PennDOT District 1, asked whether maintenance and county staff are aware of the video sharing platform. Mr. McNulty stated if they were not, he would like them to be aware and to utilize the platform.

STIC New Innovation: Air Foil

Ms. Walker introduced Aaron Raible, PennDOT District 10, to present the new Maintenance TAG innovation – Air Foil – and solicit feedback from attendees. Mr. Raible stated that Air Foil was piloted by Oregon Department of Transportation (DOT) between 2015 and 2017 and was presented at Clear Roads training in 2017. The Air Foil is essentially a spoiler/air dam that attaches to the back of salt trucks, redirecting air flow around the back of the truck and keeping it in better condition during winter maintenance activities. Since 2017, Oregon DOT has implemented the Air Foil on all similar style trucks and estimated an 85% success rate in crash reduction and cleanliness. Mr. Raible indicated that maintaining this cleanliness improves motorists’ ability to see the back of the truck during winter storms. This has issue been observed in Pennsylvania. In 2020, there were 43 “hit from behind” incidents with PennDOT vehicles, and 21 of those were during an active snow event. This trend continued in 2021, where 45 “hit from behind” incidents occurred, with 24 during an active snow event.

Additionally, the Air Foil can reduce the amount of time needed to clean the trucks. It can also increase the longevity of vehicle parts and equipment, such as lights. Mr. Raible has received drawings and design documentation on Air Foil from the Oregon DOT, and he is continuing to work with them regarding design and placement on trucks. Drawings have been sent to a machine shop, and preliminary cost estimates for Air Foil are about \$250-\$300 per truck. The design of Air Foil

could be adjusted to use and repurpose existing brackets from hang-on brine tanks, reducing the cost. The ongoing maintenance cost of Air Foil would be low, and they could be removed when winter maintenance is no longer being conducted. Mark Compton, PTC, asked if any downsides of Air Foil have been identified. Mr. Raible answered that there are potential concerns that Air Foil's effect on air flow behind the truck could decrease visibility for motorists, but this could be mitigated by adjusting the angle and placement of the Air Foil on the truck. PennDOT Acting Executive Deputy Secretary Melissa Batula clarified that motorists would still be able to see the trucks and lights better, and Mr. Raible agreed. Rich Roman, PennDOT District 4, inquired if Oregon DOT has the Air Foil on all their trucks. Mr. Raible responded that since 2017 they do have it on all their trucks. However, Oregon uses a V-box style truck while PennDOT uses a traditional hang-on spreader style, which will require adjustments in design and placement.

Innovation in Motion: Variable Speed Limit Signs

Ms. Walker introduced Daniel Farley, P.E., PennDOT Bureau of Operations, to discuss the Variable Speed Limit Signs (VSLs) Weather Pilot Study. Mr. Farley indicated that the concept of VSLs is not new, but this study examined applications to influence driver behavior during winter weather events. A study of this type of VSLs usage was completed by the National Operations Center of Excellence and Ohio DOT along I-90, and it identified a 22% reduction in total crashes and a 42% reduction of crashes during snow events. Mr. Farley demonstrated that even within local areas there can be vastly different roadway conditions. Furthermore, the multi-vehicle crash that occurred along I-81 last year showed how poor visibility can develop quickly into a major roadway incident and how important it is to get drivers to respond appropriately to these conditions.

PSP Troop C in Clearfield County initially asked about deploying the VSLs. A pilot program was developed in response and deployed in Clearfield County along a 39-mile section of I-80, with 14 VSL signs at 12 locations. Initial results were positive and showed that drivers responded to the VSLs. The pilot program used work zone trailers with solar power to enable placement of the VSLs. The pilot has been expanded to 63 locations, including 27 VSL signs along I-80 in Clinton, Clearfield, Jefferson, and Venango counties, as well as 36 VSL signs along I-81 from I-78 to I-80, through Lebanon, Schuylkill, and Luzerne counties. VSL signs were strategically located in areas where low visibility or winter weather concerns exist, and they were placed near existing permanent speed limit signs. These permanent signs were covered during deployment of the VSLs. Posted speed limits were displayed, unless weather or visibility required lowering the speed limit, as requested by Traffic Management Centers (TMCs) monitoring the weather and approved by Statewide TMC and Area Command. PennDOT is evaluating expanded use of VSLs at different types of areas, including a full corridor over three districts, strategic areas where there is a history of visibility or weather-related crashes, and significant river crossing areas.

It was also requested that Mr. Farley provide a brief update on FREEVAL-PA, PennDOT's freeway analysis and work zone impact prediction tool, which is a previously deployed STIC innovation. The tool is used to plan work zones, manage liability, and create TSMO strategies. PennDOT has utilized FREEVAL-PA for about one and a half years, and quarterly user group meetings are held with PennDOT staff and industry partners to solicit feedback. A recent suggestion requested that FREEVAL-PA accommodate more complicated work zone scenarios, such as different work zone configurations depending on the time of day. This enhancement is currently being developed.

Mr. Roman asked Mr. Farley if any changes in law were needed to place VSL signs. Mr. Farley responded that typically the VSL is used when weather conditions are poor and PSP handheld speed radars are not effective, and VSLs are used as a precautionary measure to influence driver behavior. Within the Pennsylvania Vehicle Code, enforcement requires a half mile spacing between VSL signs, which is typically not achieved for congestion or winter weather protection purposes. Acting Executive Deputy Secretary Batula inquired whether the VSL signs along the Schuylkill Expressway in District 6 are enforceable, and Mr. Farley stated that they were. Mr. Farley specified that VSLs are typically enforceable down to 55 mph speed limits, but enforcement is challenging at 45 mph speed limits. Mr. Becker asked about using VSL signs in work zones. Mr. Farley answered that use in work zones was piloted along I-83 in Harrisburg, and further use in work zones is being explored. Mr. McNulty asked if there are known difficulties in implementation of VSLs in work zones. Mr. Farley believes

that there are legal and legislative challenges, as a half mile spacing is excessive. Virginia DOT utilized one mile spacing along deployment of VSLs along I-95. Mr. Lahrman asked if anything can be done to identify VSL signs to differentiate them from work zone signs. Mr. Farley started that in the pilot program a yellow line was placed on top of the sign, and now, typically the units are PennDOT yellow. Secretary Gramian asked what the difference is between FREEVAL-PA and other traffic models used by PennDOT. Mr. Farley stated that FREEVAL-PA uses the same principles as other applications, such as the Highway Capacity Manual, but it also incorporates other data sources, such as PennDOT's roadway management system, to be predictive.

Communications Update

Ms. Walker encouraged attendees to continue checking the [STIC website](#) and provide BOI with any suggestions for website content. Furthermore, Ms. Walker indicated that the STIC is hosting *Innovation in Motion* webinars as part of the STIC's 10th Anniversary celebration, and the last webinar, on digital delivery in transportation, is scheduled for 10 a.m. on Dec.14. The webinar will be open to PennDOT staff and interested external parties, with no registration required. Additional attendance information will be released soon. The STIC's [10th Anniversary page](#) also has articles and a podcast series, with the last podcast in the series anticipated to feature interviews with Secretary Gramian and Administrator Nolan. The podcast will be released through the [STIC e-newsletter](#). Ms. Walker applauded the efforts of current and former TAG leaders in leading innovation.

STIC 10th Anniversary Innovation Spotlights

Ms. Walker introduced Jeff Bucher, P.E. PennDOT Bureau of Design and Delivery, for an update on the EDC-2 innovation, Intersection and Interchange Geometrics, which included Roundabouts and Diverging Diamond Interchanges (DDI). Mr. Bucher stated that PennDOT constructed its first roundabout in 2005, and now has 77 open to the public on State Routes (SR). [Roundabouts](#) reduce speed and conflict points compared to traditional four-way intersections. Based on PennDOT data from 36 roundabouts, roundabouts decreased incidents causing serious injury by 76% and the number of crashes by 9% compared to previous stop or signal controlled intersections. Moreover, roundabouts carry about 30% more vehicles, reduce delay during off-peak conditions, and reduce vehicle emissions. In one example, at a roundabout constructed at the intersection of SR 34 and Sunnyside Drive in Sterretts Gap, Cumberland and Perry counties, average speeds between adjacent intersections increased by about 15 mph during peak times, significantly reducing travel delays. The [Intersection Control Evaluation Policy](#) was released by PennDOT in September 2018 to help determine the optimal intersection type at a location. Regarding DDI, Mr. Bucher recommended them for interchanges with large left-turn movements. The benefits of DDI include the need for only two-phase signals, fewer conflict points, and the small area needed for construction, often within the existing right-of-way. Three DDIs have been constructed by PennDOT, one is currently in construction, and five more are in the design phase.

Mr. Becker commented that PennDOT Roadway Construction Standards for roundabouts contain details for constructing the apron, inside island, and driving surface with concrete, which is being completed in multiple PennDOT districts. Concrete can also be used as part of DDI construction, and Mr. Becker appreciated working with Mr. Bucher's staff to create these standard drawings. Mr. Bucher confirmed that both could be constructed using concrete. Stan Caldwell, Carnegie Mellon University, stated that roundabouts are being constructed in his community in smaller residential areas, and asked if Mr. Bucher had any data on roundabout usage in these areas. Mr. Bucher only had data for roundabouts on SRs and did not have data for smaller municipal roads but indicated that mini-roundabouts were recently constructed along Second Street in Harrisburg. Smaller communities often use traffic circles as well, which are not considered roundabouts. Ms. Walker inquired about whether PennDOT has any turbo-roundabouts and what constitutes one. Mr. Bucher defined a turbo-roundabout as a hybrid multi-lane roundabout where motorists enter at more of a 90° angle, and the roundabout is shaped like a turbocharger. PennDOT does not have any turbo-roundabouts. Karl Singleton, City of Harrisburg, asked about the term mini-roundabout and whether it applies to the city's roundabouts. Mr. Bucher indicated that the smaller roundabouts constructed along Second Street are mini-roundabouts due to the diameter, but that the one on Seventh Street is closer to a standard roundabout. Mr. Singleton noted the success of these roundabouts in the city and the congestion relief they

have provided, and Mr. Bucher agreed and commented that the raised crosswalks are also effective in traffic calming. PennDOT Acting Deputy Secretary for Highway Administration Mike Keiser praised the effectiveness of the Second Street mini-roundabouts as well. Carrie Fischer, Women's Transportation Seminar (WTS), asked if data was being collected about the effectiveness of the DDI. Mr. Bucher stated that crash data is collected every year, but specific operational data is not being collected at this time. Ms. Fischer questioned whether roundabouts or DDI would pose a problem for autonomous vehicles. Mr. Bucher did not believe so but stated that he was not an expert on autonomous vehicles. Acting Executive Deputy Secretary Batula added that a roundabout is proposed for autonomous vehicle testing at PennSTART and that she appreciates the City of Harrisburg's eagerness to install roundabouts. Mr. Bucher agreed and indicated that there is often initial resistance to roundabouts, but once they are in place and the public grows accustomed to them, they are welcomed.

Ms. Walker introduced Halley Cole, PennDOT Bureau of Operations, to present an update on Hot Pour Mastics (HPM), which was an innovation originally introduced in 2018 by the Maintenance TAG. Ms. Cole identified HPM as a hot applied pourable self-adhesive asphalt binder containing selected aggregate for load bearing and skid resistant characteristics. It has three components needed for application, a mastic melter, polymer modified asphalt binder, and specially selected aggregate. Ms. Cole indicated that the required specific mastic melting kettle costs around \$55,000, or about \$700 a day to rent. The asphalt binder and aggregate packages can be placed directly in the kettle, and the mix is dropped via gravity flow into the repair area. HPM can be utilized on asphalt or concrete, and can be applied to fill cracks, cuts, or joints, as well as to correct rough driving surfaces or level bridge approaches. HPM usage has grown to 780,300 lbs. in 2022, to date.

Approved HPM products were published in PennDOT Bulletin 15, and guidelines for use were published in PennDOT Publication 113 (Highway Foreman Manual). A policy for HPM has been approved and will be published in PennDOT Publication 23 (Maintenance Manual). Ms. Cole stated that PennDOT is looking to develop a construction specification for HPM and is examining use of newer kettle technology, such as larger kettles, that can increase efficiency. Acting Executive Deputy Secretary Batula asked if there have been any challenges in deployment of HPM. Ms. Cole replied that there was some initial hesitancy to accept a new maintenance method, as with any new technology, but PennDOT county maintenance offices have generally been happy with HPM. There were a few instances of HPM peeling up after it was applied, but those resulted from incorrect application methods and have been resolved. Ms. Walker indicated that an online attendee asked about the expected service life of HPM. Ms. Cole responded that it remains to be seen, as it has only been applied by PennDOT since 2019, but she expected a longer service life than traditional crack sealing material due to the thickness and aggregate in HPM. Ms. Cole estimated a service life of around seven years. Ms. Walker questioned if any municipalities were using HPM, and Ms. Cole was not aware of any.

STIC Innovation Update: Bridge Deck Link Slabs

Ms. Walker introduced Mark Nicholson, P.E., PennDOT District 1, to present on Bridge Deck Link Slabs, an innovation introduced by the Design TAG. Mr. Nicholson indicated that a bridge deck link slab involves replacing existing joints on a bridge with reinforcing steel and Ultra-High Performance Concrete. Benefits of the bridge deck link slab include easier bridge maintenance and a watertight connection between deck spans, which prevents deicing materials from encountering underlying bridge components. Within District 1, three pilot projects have been constructed that utilize bridge deck link slabs. Construction of the bridge deck link slabs was bid by linear foot, with the cost estimated to be around \$400 to \$650 per foot. Mr. Nicholson warned that placement of a bridge deck link slab changes the original design configuration of the bridge and the longitudinal forces that act on it. This change created the need for a tool that could evaluate whether a bridge deck link slab would be successful on a specific bridge design. The tool was created as an Excel spreadsheet for simplicity and to maximize availability. Mr. Nicholson introduced an example project, a three-span bridge over I-90 in Erie County. The bridge had expansion joints over the first and third piers of the bridge, and the project engineer wanted to evaluate whether bridge deck link slabs could be used in place of the joints. This necessitated moving the expansion and contraction of the bridge to the abutments. Mr. Nicholson presented the Excel spreadsheet tool for this example project, showing the necessary data inputs and the results. Mr. Nicholson anticipated continued testing and evaluation of the tool on actual bridge projects. Once the tool is finalized, it will be made available as a design spreadsheet on PennDOT's

website. The tool will help engineers quickly and accurately evaluate the possibility of using bridge deck link slabs. Secretary Gramian asked if use of a bridge deck slab would also require new bearings. Mr. Nicholson responded that in some cases you would need to change the bearings, but in the example bridge over I-90 the bearings did not need to be changed over the piers, but they would need to be changed over the abutments. Ms. Klinger-Grumbine inquired if municipalities would be able to use the tool, and Mr. Nicholson confirmed that they would. Mr. Yatheepan asked about the width of bridge deck link slabs. Mr. Nicholson replied that with the Ultra-High Performance Concrete, PennDOT has used a width of 2.5 to 3 feet. Traditional concrete can be used as well, but it is not as strong, requiring a much larger width. Furthermore, Ultra-High Performance Concrete sets up relatively quickly, in around seven hours, making it viable for use in high traffic areas. Mr. Nicholson indicated that PennDOT has previously closed the bridge to traffic during the pour, but it could theoretically be done with half-width closures.

Ms. Walker thanked all meeting participants for attending.

The next STIC Business Meeting will be held in March 2023. The meeting adjourned at approximately 4 p.m. No follow-up tasks were identified.

Attendance List

STIC Members in Attendance:

- Yassmin Gramian, P.E., PennDOT
- Alicia Nolan, FHWA
- John Becker, P.E., ACPA/PA
- Rodney Bender, P.E., PUC
- Nicholas Burdette, P.E., ACEC/PA (Remote)
- Stan Caldwell, Carnegie Mellon University
- John Caperilla, EIT, ASHE
- Mark Compton, PTC
- Eric Donnell, Ph.D., Penn State
- Melissa Gates, CCAP (Remote)
- Brad Heigel, P.E., PTC
- Bert Lahrman, NCRPDC (Remote)
- Katie Lizza, PSATS
- Carrie Fischer, Meng, P.E., WTS
- Karl Singleton, City of Harrisburg
- Joseph Szczur, P.E., Univ. of Pittsburgh
- Alfred Uzokwe, P.E., DCNR

Absent STIC Members:

- Susan Armstrong, PACA
- Michael Boyer, DVRPC
- Mike Davidson, P.E., PTOE, MASITE
- John Gibble, USACE
- John-Thomas Graupensperger, PAEP
- Aaron Hoover, APC
- John Kibblehouse Sr., PAPA
- Domenic Rocco, P.E., DEP
- Ronald Seybert Jr., P.E., APWA
- John Shuttsa Jr., PAAMA
- Amy Sturges, PML
- Ed Troxell, PSAB

PennDOT Leadership:

- Melissa Batula, P.E., Acting Executive Deputy Secretary
- Mike Keiser, P.E., Acting Deputy Secretary for Highway Administration
- Michelle Jennings, Acting Deputy Secretary for Administration
- Brian McNulty, P.E., District Executive, District 1
- Tom Zurat, P.E., District Executive, District 2
- Eric High, P.E., District Executive, District 3
- Rich Roman, P.E., District Executive, District 4
- Mike Rebert, P.E., District Executive, District 5
- Louis Belmonte, P.E., District Executive, District 6
- Chris Kufro, P.E., District Executive, District 8
- Thomas Prestash, P.E., District Executive, District 9
- Brian Allen, P.E., District Executive, District 10
- Cheryl Moon-Sirianni, P.E., District Executive, District 11
- William Kovach, P.E., District Executive, District 12

FHWA Leadership:

- Yathi Yatheepan, FHWA