EDC-5 Innovations Maine October 22, 2019

EDC-5 Weblink: https://www.fhwa.dot.gov/innovation/everydaycounts/

## Implementing

- Advanced Geotechnical Methods in Exploration (A-GaME)
- Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)
- Reducing Rural Roadway Departures
- Safe Transportation for Every Pedestrian (STEP)
- Unmanned Aerial Systems (UAS)
- Crowdsourcing for Operations
- Virtual Public Involvement

## **Institutionalized**

- Project Bundling
- Weather-Responsive Management Strategies

## **Not Implementing**

➢ Value Capture: Capitalizing on the Value Created by Transportation

# Advanced Geotechnical Methods in Exploration (A-GaME)

Baseline Implementation Stage (January 2019): Development

Goal Implementation Stage (December 2020): Demonstration

## Baseline Status:

MaineDOT has completed many projects using several of the featured technologies. MaineDOT used Borehole Optical Televiewer (OTV)/Acoustic Televiewer (ATV) on two bridge projects. Cone Penetration Test (CPT)/Seismic Cone Penetration Test (sCPT) has been used on several projects and MaineDOT performed a joint study with the University of Maine on sCPT correlation with the Presumpscot Formation. Seismic refraction has been used on numerous highway and bridge projects.

## Proposed Implementation Plan Activities:

MaineDOT plans to pilot activities that will manage risk by optimizing and improving geotechnical site characterization by appropriate use of A-GaME technologies. MaineDOT plans to do this through piloting the use of project-specific risk evaluation using CPT, Borehole ATV/OTV and/or seismic refraction. MaineDOT plans to implement this on several projects of moderate to high geotechnical risk, including on the I-395/Route 9 connector in Brewer/Eddington, a large project with complex site conditions of soft clays and proposed rock cuts. Performance will be measured by comparison of how risk-based exploration programs affect design and construction. MaineDOT will compare their A-GaME with results from previous practice and qualitatively compare the value of additional information on design sensitivity and uncertainty.

## Progress Report #1 (January – June 2019)

1. A geophysical Seismic Refraction Survey was conducted along the proposed alignment of the new Madawaska, Maine -Edmundston, New Brunswick International Bridge Crossing in Madawaska. The objective of the underwater seismic refraction survey was to obtain top of bedrock information to assist with the preliminary foundation design effort and assess the feasibility of piers constructed on shallow foundations on bedrock.

2. In May and June 2019, cone penetration tests (CPTs) and seismic CPTs were conducted to assist with the preliminary geotechnical design effort for the replacement of the Johnson Road and Bucknam Road Bridges over Interstate I-295 in Falmouth, Maine. The intent of conducting CPTs next to borings with vanes was to allow comparison of field vane shear strengths measured in the test borings and the laboratory strength and compressibility data from clay specimens, with CPT measurements, to allow for site-specific correlations.

3. CPTs were conducted to assist with the preliminary geotechnical design effort for the replacement of the Little River Bridge in Gorham, Maine. The intent of conducting CPTs was to advance an exploration in an accessible location that was not surcharged by the existing embankment, allowing assessment of clay strength and compressibility that is more

representative of conditions to be encountered along off-alignments being considered for the new bridge. The intent of the second CPT was to collect data adjacent to a conventional boring to allow for comparison of field vane shear strengths and to assess the difference in strength and compressibility profiles between the two CPT locations.

4. In May 2019 MaineDOT applied for an AID Grant to deploy exploration methods and technologies that are promoted by EDC-5 Advanced Geotechnical Methods in Exploration (A-GaME), including but not limited to: Cone Penetration Test (CPTu/SCPTu), Acoustic and Optical Televiewer (ATV/OTV), and geophysical methods such as Seismic Refraction (SR) on the Brewer-Eddington I-395/Route 9 Connector Project. This work will occur during Preliminary Engineering (PE). MaineDOT is applying for the AID funds to help demonstrate how well project-specific geotechnical risk is evaluated and what improvements to geotechnical design are realized with the enhanced site characterization process.

MaineDOT Champion:Kate MaguireFHWA Champion:Brian Lawrence

# <u>Collaborative Hydraulics: Advancing to the Next Generation of Engineering</u> (CHANGE)

## **Carried over from EDC-4**

Baseline Implementation Stage (January 2019): Assessment

Goal Implementation Stage (December 2020): Institutionalized

## Baseline Status:

MaineDOT regularly considers the need for 2D models on individual projects and uses them when 1D models are inappropriate. When used, MaineDOT uses 2D models to satisfy all modeling needs as previously met with 1D models.

MaineDOT has not hosted or led a peer exchange; but has participated in events hosted by New Hampshire DOT.

MaineDOT intends to incorporate 2D modeling policy and guidance into MaineDOT's Bridge Design Guide.

## Proposed Implementation Plan Activities:

Incorporation into MaineDOT's Bridge Design Guide is the only item keeping MaineDOT 2D modeling practice out of the "Institutionalized" status. This will be achieved by end-of-year 2020.

## Progress Report #1 (January – June 2019)

As described in the baseline report, MaineDOT uses the Sedimentation and River Hydraulics model (SRH) as appropriate and where data availability is sufficient. MaineDOT has become

comfortable with 2D modeling. Between MaineDOT's internal usage and consultant usage, MaineDOT applies 2D modeling when it makes sense. But, MaineDOT is still not at the point of documenting its use in agency policy and manuals. MaineDOT has just started an SRH model related to a stream relocation. MaineDOT is looking forward to 2-D results to guide stream channel design.

MaineDOT Champion: Charlie Hebson FHWA Champion: Maria Drozd

## **Reducing Rural Roadway Departures**

Baseline Implementation Stage (January 2019): Demonstration

Goal Implementation Stage (December 2020): Assessment

## **Baseline Status:**

MaineDOT conducts network screening in accordance with the Highway Safety Manual for all state highways and state-aid highways – these are the roads most prone to serious lane departure crashes. Currently, local roads are not part of MaineDOT's screening efforts. MaineDOT has selected the following countermeasures for identified areas of concern:

- Centerline Rumble Strips
- Edge Line Rumble Strips (outside of curve)
- Improved Curve Signing
- Improved Edge Line Striping

There are currently no plans to evaluate local roads systemically due to these locations not representing a leading road class for high rates of serious lane departure crashes.

## Proposed Implementation Plan Activities:

• Improve access to alignment information, particularly horizontal curve radii. This will facilitate systemic safety performance assessments.

- Evaluate additional risk factors and countermeasures related to lane departure crashes.
- Investigate risk factors for lane departure crashes on rural collector roads.
- Continue before-and-after review of treatments to measure effectiveness.
- Identify other problem issues for which the systemic approach may be appropriate.
- Establish Rumble Strip Asset Type for MaineDOT's asset management systems/map viewer.
- Integrate countermeasures identified with forthcoming highway corridor management plans.

#### Progress Report #1 (January - June 2019)

MaineDOT hosted an FHWA led workshop on Systemic Safety Analysis on June 20, 2019. During the workshop, MaineDOT presented on their approach to address lane departure crashes. Initially, MaineDOT presented on this topic to the Maine Engineering Council on December 14, 2017. MaineDOT has been working to finalize the analysis and begin deployment since that time.

MaineDOT has finalized design guidance on Rumble Strips on April 19, 2019 guiding the deployment of both centerline and edgeline rumble strips of the sinusoidal and standard configuration.

MaineDOT Champion: Robert Skehan FHWA Champion: Wayne Emington

## Safe Transportation for Every Pedestrian (STEP)

## **Carried over from EDC-4**

Baseline Implementation Stage (January 2019): Assessment

Goal Implementation Stage (December 2020): Institutionalized

**Baseline Status:** 

• Within each of Maine's five DOT Regions, the Engineers and Traffic Engineers are working with local communities to identify pedestrian safety concerns and needs.

• Within the state's Heads Up Pedestrian Safety Project, the state identified 21 "Focus Communities" that experienced higher than expected pedestrian crashes. Within these communities, the MaineDOT is working with municipal leaders, citizens, law enforcement, and pedestrian advocates to identify problem locations and potential solutions.

• MaineDOT has implemented a systemic safety effort that provides Rectangular Rapid Flashing Beacons (RRFBs) and Dynamic Speed Feedback Units (purchased in bulk via RFP with federal funds) to local communities at locations identified by the community and validated by MaineDOT staff. MaineDOT purchases the units while the municipality installs and maintains the units.

• MaineDOT has established and funded a pedestrian safety project to implement and evaluate various treatments to create higher visibility crosswalks.

• Currently, MaineDOT – and numerous municipalities throughout the state – regularly incorporate the following countermeasures within local and state systems: RRFBs, Road Diets, and Crosswalk Visibility Enhancements. Additionally, MaineDOT and municipalities have recently expanded their consideration, design, and implementation of Raised Crosswalks and Pedestrian Refuge Islands.

• For at least the last 3 years, MaineDOT has begun – at least within the larger municipalities – a more systemic pedestrian crash analysis. Because of the small sample size overall, the identification of high pedestrian crash locations is very limited.

• MaineDOT and the Maine Bureau of Highway Safety have incorporated and prioritized pedestrian safety efforts within the Strategic Highway Safety Plan and the Highway Safety Plan.

• MaineDOT and agencies statewide have adopted the Toward Zero Deaths philosophy.

• MaineDOT has recently updated its statewide Complete Streets Policy that was sanctioned by the Legislature's Transportation Committee in 2014.

• On October 17, 2018, MaineDOT provided a Complete Streets Implementation Workshop through a partnership with the Governor's Institute on Community Design as part of their Accelerating Practical Solutions Project. Participants included MaineDOT and FHWA staff, municipalities, transportation planning organizations, and advocates.

• In 2018, MaineDOT, with assistance from FHWA, developed a Pedestrian Safety Action Plan that included STEP and the creation of a Pedestrian Safety Countermeasure Toolbox.

Proposed Implementation Plan Activities:

• MaineDOT anticipates the creation of the Pedestrian Safety Toolbox will be completed during the first half of 2019. Once complete, the state will provide training to MaineDOT staff, consultants, and municipalities on its use and implementation.

• MaineDOT will continue to provide set-aside funding annually to implement pedestrian safety countermeasures (that include STEP) statewide.

• MaineDOT will continue to implement its Heads Up! Pedestrian Safety Program that will include the development of Pedestrian Safety Mitigation Plans for the 21 Focus Communities. These Mitigation Plans will incorporate STEP countermeasures.

• Beginning in 2020, MaineDOT anticipates expanding the Heads Up! Pedestrian Safety Program – in a streamlined and scaled-back fashion – to other communities in the state that have experienced pedestrian crashes. These communities will be prioritized based upon the number of pedestrian crashes experienced in the previous 5 years with an extra emphasis on those communities with pedestrian fatalities.

• MaineDOT anticipates the continuation and likely expansion of its Systemic Safety Program.

• MaineDOT will continue its highly popular and effective Breakfast Training Sessions for Municipalities through its LTAP Program.

• Based upon the recommendations provided in the recently completed Pedestrian Safety Action Plan, MaineDOT is working to update internal and external guidance documents to include STEP improvements as a standard practice.

• As a result of updated guidance, STEP countermeasures will be regularly deployed as part of MaineDOT's normal project development process, as appropriate.

• As part of the basic annual expectation for all of MaineDOT's Region and Traffic Engineers, they are required to complete at least three Road Safety Assessments within their region.

• MaineDOT will continue to work closely with the Maine Bureau of Highway Safety to encourage additional local police departments to participate in the state's vulnerable user enforcement program, culminating with the annual Vulnerable User Enforcement Day.

• MaineDOT will re-emphasize its technical assistance program for municipalities where MaineDOT will complete Crosswalk Reviews with municipal staff to make recommendations on crossing site and safety improvements that may include signage, RRFB, high visibility markings, ADA accommodations, or even the removal of a crossing.

• MaineDOT leadership will continue to support the Active Transportation Planner's efforts to provide guidance and technical support to other state DOTs. Conversations with other state DOTs have included Minnesota, Massachusetts, Connecticut, New Hampshire, Rhode Island and even NHTSA.

• Further education and implementation guidance will be provided to communities, pedestrian advocates, and to MaineDOT staff on the appropriate implementation of the state's Complete Streets Policy.

## Progress Report #1 (January - June 2019)

On Wednesday, February 27, 2019, FHWA and Pedestrian and Bicycle Information Center (PBIC) provided a half-day workshop to help MaineDOT continue to develop a Bicycle and Pedestrian Safety Toolbox – a resource intended to assist engineers, planners, designers, and consultants in determining the appropriate countermeasures and facility improvements within MaineDOT and municipal projects. Staff at MaineDOT continue to develop this resource and found the information provided during this training to be very helpful in the design process.

MaineDOT has identified dates/locations for upcoming training this fall provided by FHWA and PBIC. These two training sessions will be held in the greater Portland area on Tuesday, October 22 and Wednesday, October 23, 2019. The first session, "Designing for Pedestrian Safety", will include technical information training to MaineDOT engineers and consultants on the important considerations and implementation (including design) of the following pedestrian strategies:

- Pedestrian Accommodations in Work Zones
- Crossing Islands / Raised Medians (1.5 hrs)
- Pedestrian Hybrid Beacon (PHB) (1.5 hrs)
- Leading Pedestrian Interval (LPI) (1hr)
- Pedestrian Lighting (1.5 hrs)

If there is enough time, these are additional modules to be covered:

• Marked Crosswalks and Enhancements

• Curb Extensions/ Bulb outs (1 hr)

The second training session will be designed for MaineDOT staff, regional planning, Metropolitan Planning Organizations, advocates, and other interested parties in "Resources to Support Pedestrian and Bicycle Planning." This training will be designed to provide in a Trainthe-Trainer Format, an overview of the programs, processes, and resources available in Maine to help municipalities improve the walkability, bikeability, and safety of their communities.

MaineDOT Champion: Patrick Adams FHWA Champion: Wayne Emington

## **Unmanned Aerial Systems (UAS)**

Baseline Implementation Stage (January 2019): Demonstration

Goal Implementation Stage (December 2020): Institutionalized

#### **Baseline Status:**

MaineDOT has used UAS on several missions including volume calculations for Rubberized Asphalt Concrete (RAC) stockpiles and aerial photography for fleet services management. MaineDOT's Property Office owns two DJI Phantom 4 vehicles and has used licensed software for 3D volume calculations.

MaineDOT also hired a consultant which collected survey grade LIDAR for the I-295 concrete median barrier. MaineDOT has a draft UAS Policy and Standard Operating Procedures (SOPs). In addition, MaineDOT has established a UAS Technical Users Group consisting of staff from multiple Bureaus and Offices.

## Proposed Implementation Plan Activities:

• To date, flights with MaineDOT vehicles and pilots have been limited to MaineDOT owned facilities to validate SOPs.

• Refine and finalize UAS Policy and SOPs.

• Formally assign pilots, observers and coordinators in each Bureau/Office per MaineDOT Policy.

- Implement appropriate measures to track staff assignments, flights, and vehicle maintenance.
- Conduct demonstration flights along MaineDOT highway right of way.
- Visit Minnesota DOT to learn about their UAS bridge inspection program.
- Conduct demonstration flights to assist with bridge inspections.

• Conduct needs assessment, develop specifications, purchase a 6-rotor vehicle and prepare operations and safety plan for this vehicle.

• Expand UAS program to include missions that provide operational and safety improvements.

• Stay current on UAS advancements through interaction with partner organizations (AASHTO, FHWA, etc.)

Progress Report #1 (January – June 2019) Implementation Stage (June 2019): Demonstration

MaineDOT's UAS Policy and Standard Operating Procedures were finalized in April 2019.

MaineDOT is using UAS for managing Reclaimed Asphalt Pavement (RAP) stockpile volumes across the state.

MaineDOT's UAS Technical Users Group is meeting quarterly.

MaineDOT Champion: Dale Peabody FHWA Champion: Cheryl Martin

# **Crowdsourcing for Operations**

Baseline Implementation Stage (January 2019): Assessment

Goal Implementation Stage (December 2020): Institutionalized

Baseline Status:

MaineDOT is currently using WAZE as an imported layer in Map Viewer (an internal mapping tool). This particular interface is refreshed every two minutes. MaineDOT has learned that the public is more inclined to report to social media than 911. No hard documentation of this. Expectations are communicated to Transportation Management Center (TMC) operators. MaineDOT is satisfied with the interface and performance for a common operating picture. This is not required at an institutional stage, but is an improvement to traditional work processes. MaineDOT is not considering applying this to additional operations. It is intuitive and therefore sets MaineDOT up for success.

## Proposed Implementation Plan Activities:

The goal is to integrate in Advanced Transportation Management Systems (ATMS)/Compass the ability to "auto-create" events as well as end them based on credible input information. MaineDOT would like to be able to prioritize information in Map Viewer and create an alert of the event rather than have the operators create the event and alert.

## Progress Report #1 (January - June 2019)

MaineDOT has begun testing travel time signs that are run using TomTom data. The data is fed from an open Application Programming Interface (API) to MaineDOT's ATMS. Because the data is accessible for MaineDOT in this format, traffic engineers are also able to use it for other analyses and live traffic data feeds are available for MaineDOT's Traffic Management Center (TMC).

MaineDOT Champion: Colby Fortier-Brown FHWA Champion: Wayne Emington

# Virtual Public Involvement

Baseline Implementation Stage (January 2019): Development

Goal Implementation Stage (December 2020): Assessment

## Baseline Status:

MaineDOT is researching and/or piloting some of these tools. MaineDOT has a subscription with All-in-One tools of MetroQuest and MindMixer and have used them in limited areas. For some projects/studies, MaineDOT has used the digital tool of Turningpoint clickers to enhance in-person meetings. MaineDOT has piloted Project Visualizations and sees the benefit of furthering that effort. As a specific example, MaineDOT is researching the possible use of some of these methods along with do-it-yourself videos to assist with the public engagement aspect of the Section 106 of the National Historic Preservation Act process.

MaineDOT is in the early stages of developing a process of how and when to use certain VPI tools and techniques. MaineDOT will incorporate these into a revised Public Involvement Plan once they are developed.

MaineDOT has partnered with the MPOs and given them access to MaineDOT's MetroQuest subscription. MaineDOT will be working with them to develop those surveys and survey templates.

## Proposed Implementation Plan Activities:

• MetroQuest. Develop a process for using this all-in-one survey tool on specific projects and planning studies to engage and understand the views of the public earlier in the process and to reach more people than a typical public meeting. Specific examples would be for Section 106 and historic bridges, larger scale NEPA studies such as Environmental Assessments and Environmental Impact Statements.

• MindMixer. Use this tool for increasing public engagement and interaction for various projects/studies to engage the public earlier for potentially complex and controversial projects. Develop a process for using this method. Specific examples would be for Section 106 and historic bridges, larger scale NEPA studies such as Environmental Assessments and Environmental Impact Statements.

• Virtual Public Meetings. Review and pilot methods for virtual public meetings. Develop a process/policy for using a virtual component for certain types of public meetings. This could be used as an add-on to existing in-person meetings to increase participation and also as a way to include more attendance from staff and stakeholders for meetings that require travelling a long distance. MaineDOT could potentially look into piloting some virtual only meetings over time.

• Turningpoint Clickers. Increase the usage of this technology for in-person events to obtain information from all participants.

• Project Visualization. Explore tools for using project visualization that can be included within other tools to better inform and educate the public. This could include do-it-yourself videos, drone videos, and mapping visualization.

#### Progress Report #1 (January – June 2019)

MaineDOT has attended numerous webinars and is researching the various methods and the best types of projects and/or studies where they can be utilized. KACTs (Kittery area MPO) has completed a MetroQuest survey for their Long-Range Transportation Plan, while PACTS (Portland Area MPO) has one active survey and one in pre-launch status.

MaineDOT Champion: Scott Rollins

FHWA Champion: Eva Birk