Web Forum 4: Department of Transportation Stormwater BMP Maintenance and Operations

Summary

October 18, 2018, 2:00 p.m. – 3:30 pm (EST)

A web forum was held for Departments of Transportation (DOT) stormwater practitioners to discuss DOT stormwater BMP maintenance and operations that promote surface water quality protection. Following is a summary of the main points discussed by each of the presenters.

- William Fletcher, Water Resources Program Coordinator, Oregon DOT, ***State of the Practice, Stormwater BMP Maintenance and Operations***

  BMP maintenance is generally triggered by the results of inspections, with criteria available for inspectors to use to determine if maintenance is necessary. Training on how to maintain BMPs is often available or required for Maintenance workers who do the maintenance. Important for the workers is access to the BMP design documentation so they know what to expect – this helps them decide if something needs to be done. Equally important is communication back to stormwater BMP designers – if a BMP design is leading to maintenance headaches or facility failure, the engineers need to know to avoid problems next time, as well as develop a fix for the malfunctioning BMP. Usually there is some sort of formal communication from the inspectors to those responsible for performing maintenance. This is necessary to make sure the work gets done, and that those doing the maintenance know what needs to be done. Tools for tracking and reporting include use of software for tracking inspection and maintenance, asset management programs for stormwater infrastructure, and cost tracking, especially for budgeting. Efficiencies can be achieved by evaluating the inspection cycle and modifying it based on experience. This can work by increasing or decreasing the frequency. Because inspection frequency may be a permit condition, this may need to be presented to regulatory agencies as having an environmental benefit. Better integration of inspection, maintenance work, and asset management information can improve the work flow, provide better cost estimates that assist budgeting, BMP selection and design, and regulatory reporting requirements. Increased emphasis should be put on tracking individual BMP maintenance costs, as well as other factors that affect how expensive the work is. The DOT should develop criteria to optimize inspection schedules, develop metrics for tying BMP performance to maintenance training, and determine cost estimates for long-term maintenance of BMPs. BMP maintenance is important, but comes in second to maintaining the roadways, so efficiencies are important to reduce the strain on maintenance resources. Effective use of information technology and asset management can support efficiency, improve budgeting, and provide information for better BMP selection and design and documenting regulatory compliance.

- Richard Heineman, Stormwater Section Manager, Pennsylvania DOT, ***Pennsylvania DOT Stormwater Control Measure Maintenance***

  PennDOT is responsible for maintaining all state-owned roads in the Commonwealth, adding up to about 40,000 miles, 17,000 of which are located in US Census Urbanized Areas, which is the portion that is regulated under PennDOT's Individual MS4 NPDES Permit. PennDOT is obligated to inspect, maintain and document related activities of Stormwater Control Measures (SCMs). In 2015, PennDOT began compiling SCM data from plans (e.g., PCSM, Construction, E&S) from ECMS (Engineering and Construction Management System) and other sources. This was determined to be the most efficient method to develop an initial inventory of existing SCMs. The initial inventory was then provided to the Engineering Districts to review, update, and finalize for all existing SCMs. New SCMs from future projects are added to the inventory as they are constructed. Compiling the SCM data during the design phase of a project was determined most efficient. Maintenance-IQ is a web browser-based GIS application used for planning and tracking PennDOT maintenance activities across the state. The user can click on the SCM and pull up everything we know about it, including past inspection reports and maintenance items. As of the Spring of 2018, the current count of stormwater control measures that are owned and operated by PennDOT is a little over 2,200, with more coming in the next several years. PennDOT has two types of inspections, which have different purposes and levels of effort, under the newly developed maintenance program. Visual screening inspections (VSIs) are used to identify common problems. Inspections are documented using a 1-page "smart" form, including a photo log, that can be filled out on a mobile device. A condition assessment inspection (CAI) is more hands-on and can involve probing and sampling. Regular maintenance is an essential part of preserving the stormwater management functions of an SCM. Poorly maintained SCMs often function less efficiently and may cause more problems than they were intended to resolve. A quality maintenance program includes routine, preventative maintenance and timely corrective maintenance. Preventative maintenance involves routine tasks help prevent problems, maintain the intended operation and safe condition of an SCM, and can be put on a regular schedule. Corrective maintenance tasks are completed on an as-needed basis. The tasks needed are more extensive and invasive to correct a problem and restore an SCM's intended operation. Factors such as surrounding land uses, contributing drainage area, and visibility can affect these typical frequencies. The SCM information in Maintenance-IQ will note when the maintenance needs of an individual SCM deviates from the standard recommended frequencies. Many facilities will need rehabilitation due to lack of upkeep and a formal SCM operation and maintenance. Bioretention has relatively few problems, which may be attributable to design parameters (shallow ponding depths, native plants, and small drainage areas). Ponding issues are prevalent in basins designed to dry cycle. Standing water leads to other problems in SCMs. Infiltration SCM problems are all related to poor dewatering, which could be traced to both design and construction. In-depth condition assessments are needed to determine cause of ponding issues (e.g., design, construction, lack of maintenance) in SCMs designed to dry cycle. Training for construction inspectors is needed to ensure critical stages of SCM construction are observed. Department representatives perform QA/QC of as-built stormwater plan. Design and construction guidelines for infiltration SCMs must be improved. Coordination between Design, Construction, and Maintenance on SCM selection and implementation must be facilitated.

- Andrew McDaniel, Manager, Highway Stormwater Program, North Carolina DOT, ***North Carolina DOT's BMP Inspection and Maintenance Program: Past, Present, and Future***

  NPDES permit requirements include maintaining a BMP inspection and maintenance manual, implementing a BMP inspection and maintenance program, and evaluating inspection and maintenance needs for new BMP types, and annual training. A 2006 BMP inventory survey of division and central office design staff revealed about 410 BMPs. We have a BMP inspection and maintenance manual with 15 chapters, inspection checklists, and BMP naming conventions. There are five level of service (LOS): A – no maintenance needs, B – minor maintenance needs C – moderate maintenance needs, D – major maintenance needs, and F – BMP not functional. North Carolina DOT also has the Stormwater Control Management System (SCMS), which is an authenticated web-based application. There are about 1,900 BMPs in the SCMS database. SCMS stores both inspection and maintenance data for individual BMPs. Present accomplishments and challenges include inspection and maintenance optimization (preformed scour holes, swales, and dry detention basins); training and recordkeeping; and inspection and maintenance manual upkeep. Regarding inspection and maintenance optimization for preformed scour holes, swales, and dry detention basins, the following factors have been observed. Preformed scour holes are difficult to access and often located at the bottom of a fill slope. The solution is proper siting and construction, and optimized inspection and maintenance frequency. It is resource intensive to inspect swale conditions due to the considerable number of swales across the state, and not all swales sited are within the routine roadside mowing pattern. The goal for swales is to develop an optimized inspection and maintenance policy and siting guidance to take advantage of routine roadside mowing. Dry detention basins are currently being researched by North Carolina State University. Regular vegetation management is required but not typically performed by routine roadside mowing operations. The goal is to develop an optimized inspection and maintenance policy for dry detention basins. Future goals and challenges include improving cost tracking; piloting an inspection and maintenance outsourcing model for inspections initially and maintenance ultimately; and increasing training options by leveraging university inspection and maintenance certification programs and on-demand video training.

- Kiona Leah, P.E., Drainage and SWM Assets Manager, Maryland DOT State Highway Administration (SHA), ***Managing Maryland's Stormwater – One Road at a Time: An Overview of the Maryland DOT State Highway Administration Drainage and Stormwater Assets Management Program***

  As of June 30, 2018, Maryland DOT SHA manages nearly 8,500 permanent stormwater management facilities and ESD practices; nearly 168,500 hydraulic structures; and over 141,000 conveyance features (over 9 million linear feet) statewide. The Maryland DOT SHA program operation includes a) planning, inspections and inventory, performance rating, and data management; b) engineering remediation rating, work order generation, and retrofit design; c) construction area wide contracts, bid -build contracts, design build contracts, memorandums of understanding (MOUs), and immediate response; d) operations, minor maintenance, and routine maintenance procedures; and e) future focus, business process improvements, and additional program support. Program planning includes inspections and inventory that are triennial in NPDES counties, occur regularly in all others, and consist of evolving technology and efficiency. Program planning includes BMP inspections and inventory. There are 33 inspection parameters

for triennial inspections and inventories. Performance ratings include "A" – No Issues – The SWM facility is functioning as designed with no adverse conditions identified; "B" – Minor Problems – The SWM facility is functioning as designed but minor issues are observed that may worsen to the next rating level if not repaired; "C" – Moderate Problems – The SWM facility is functioning as designed but efficiency, performance, and function are at risk; "D" – Major Problems – The SWM facility no longer functions as designed, and efficiency has been compromised; and "E" – Severe Problems – The SWM facility no longer functions as designed and efficiency as well as several critical parameters have been significantly compromised. Data management is performed using an extensive and complex SQL database that is viewed primarily through Esri tools, both internal and external. Collector and Survey 1-2-3 are used for inventory and inspections, including SWM facilities, video pipe inspection, and outfall inspection. ArcGIS Online tools often create the interface from field tools to office planning tools. Enterprise geographic information system (eGIS) is used for internal operations and to interface with data. For program engineering, a remediation (action) rating system is used: I – No Action– schedule for annual maintenance in next cycle; II – Routine Maintenance – attention needed to sustain BMP performance- vegetation management, mowing, trash removal, minor sediment removal, wildlife control (beaver issues); III – Remediation Work Order – is needed to return the site to original functionality within the existing footprint of the facility. Structural defects include excess brush and trees, excess sediment dredging, infiltration media replacement, outfall failure or blockage. Historically also slope erosion, structural damage; and IV – Retrofit/Enhancement Design – is required on-site or at another location, since BMP cannot be returned to its original functionality by maintenance or remediation activities; typically, BMP type is changed and functionality upgraded to meet current standards. Work orders are generated via traditional reporting methods as prescribed for traditional permit requirements. About 100 facilities are maintained annually. Work order generation is done through the Maryland Department of Environment (MDE) environmental permitting and the MDE pilot program. Retrofit design consists of DBOM (design/build/operations and maintenance contracts). TMDLs have been added to the retrofit list, and contractor feedback indicates this is easier for them. Program construction consists of area wide contracts, bid build contracts, design build contracts, memorandum of understanding (MOU), and immediate response. Program operations entail coordination with other offices, minor and routine maintenance, and manual development.

After the presentations, the panelists addressed the questions submitted by the attendees.

List of Attendees

	First Name	Last Name	Agency/Company	E-mail
1.	Jenni	Woodworth	A.D. Marble	jwoodworth@admarble.com
2.	Eric	Kopinski	AASHTO	ekopinski@aashto.org
3.	Melissa	Savage	AASHTO	msavage@aashto.org
4.	Eileen	Dunn	Arizona DOT	edunn@azdot.gov
5.	David	Mack	Arizona DOT	dmack@azdot.gov
6.	Michael	Schmidt	California DOT	michael.schmidt@dot.ca.gov
7.	Con	Kontaxis	California DOT	constantine.kontaxis@dot.ca.gov
8.	Bridger	Morrison	City of Chubbuck	bmorrison@cityofchubbuck.us
9.	Francesca	Maier	Fair Cape Consulting LLC	ches@consultfaircape.com
10.	Jeffery	Lewis	FHWA916599	jeff.lewis@dot.gov
11.	Fred	Noble	Florida DOT	fred.noble@dot.state.fl.us
12.	Carlton	Spirio	Florida DOT	carlton.spirio@dot.state.fl.us
13.	Dawn	Perkins	FWHA	dawn.perkins@dot.gov
14.	Wendy	Terlizzi	Idaho DOT	wendy.terlizzi@itd.idaho.gov
15.	Chuck	Heisler	Idaho DOT	chuck.heisler@itd.idaho.gov
16.	Alissa	Salmore	Idaho DOT	alissa.salmore@itd.idaho.gov
17.	Bill	Frost	KCI Technologies	bill.frost@kci.com
18.	Randy	Cole	KCI Technologies	randy.cole@kci.com
19.	Phil	Potter	Kennedy/Jenks Consultants	philpotter@kennedyjenks.com
20.	Tyler	Bazan	Maryland DOT SHA	tbazan@sha.state.md.us
21.	Alicia	Brandys	Maryland DOT SHA	abrandys@sha.state.md.us
22.	Garvin	Guide	Maryland DOT SHA	gguide@sha.state.md.us
23.	Kiona	Leah	Maryland DOT SHA	kleah@sha.state.md.us
24.	Franklin	Miller	Maryland DOT SHA	hmiller3@sha.state.md.us
25.	Cornelius	Barmer	Maryland DOT SHA	cbarmer@sha.state.md.us
26.	Nafiseh	Bozorgi	Maryland DOT SHA	nbozorgi@sha.state.md.us
27.	Frank	Brown	Maryland DOT SHA	fbrown1@sha.state.md.us
28.	Samuel	Kane	Maryland DOT SHA	skane1@sha.state.md.us
29.	Henry	Barbaro	Massachusetts DOT	henry.barbaro@state.ma.us
30.	Gyujong	Yoo	Massachusetts DOT	gyujong.yoo@state.ma.us
31.	Scott	McGowen	Michael Baker International	scott.mcgowen@mbakerintl.com
32.	Nick	Tiedeken	Minnesota DOT	nick.tiedeken@state.mn.us
33.	John	Taylor	Mississippi DOT	jtaylor@mdot.ms.gov
34.	Melissa	Scheperle	Missouri DOT	melissa.scheperle@modot.mo.gov
35.	Ronald	Poe	Nebraska DOT	ronald.poe@nebraska.gov
36.	Ann	Scholz	New Hampshire DOT	ann.scholz@dot.nh.gov
37.	Amanda	Barber	New York State DOT	amanda.barber@dot.ny.gov
38.	Ellen	Kubek	New York State DOT	ellen.kubek@dot.ny.gov
39.	Andrew	McDaniel	North Carolina DOT	ahmcdaniel@ncdot.gov
40.	S.	Giannantonio	NTM Engineering, Inc.	sgiannantonio@ntmeng.com

	First Name	Last Name	Agency/Company	E-mail
41.	Michelle	Oakley	NV5	michelle.oakley@nv5.com
42.	William	Fletcher	Oregon DOT	william.b.fletcher@odot.state.or.us
43.	Richard	Heineman	Pennsylvania DOT	rheineman@pa.gov
44.	Winnie	Okello	Pennsylvania DOT	wokello@pa.gov
45.	Alisa	Richardson	Rhode Island DOT	alisa.richardson@dot.ri.gov
46.	John	Oliver	STV Inc.	john.oliver@stvinc.com
47.	Adrienne	Boer	Texas DOT	adrienne.boer@txdot.gov
48.	Madison	Burke	FHWA	madison.burke@dot.gov
49.	Gene	Kaufman	FHWA	gene.kaufman@dot.gov
50.	Brian	Nevins	FHWA	brian.nevins@dot.gov
51.	Rhonda	Thiele	Utah DOT	rhondathiele@utah.gov
52.	Peter	Fillipi	Wisconsin DOT	peter.fillipi@dot.wi.gov
53.	Patricia	Trainer	Wisconsin DOT	patricia.trainer@dot.wi.gov
54.	Elizabeth	Saunderson	WisDOT	elizabeth.saunderson@dot.wi.gov