

THIS ENTIRE SCOPE OF WORK FALLS UNDER SOURCE TYPE 6251

PROJECT BACKGROUND

National Pollution Discharge Elimination System (NPDES) requirements are important for the environment, but can be hard to meet within the public road right of way, especially in urbanized areas. State would like to determine the best practices to help meet these requirements without acquiring additional property. These best practices should address: cost effectiveness (including land costs); feasibility in terms of soil type, space limitations, linearity and other project factors; maintenance requirements and maintenance costs; long-term performance and reliability; effectiveness in reducing runoff pollution from particulates and nutrients; volume control; design selection strategies; aesthetics; public safety; innovative engineering and construction methods; pavement condition; alternative compliance strategies; and effective use of space.

This project will answer; Which NPDES and Watershed District permit program elements are the most challenging for cities and counties to meet in this context, and what are good strategies for cities and counties to meet the expectations of the watershed district or other water quality regulatory agency? Many reports and guidance documents have been completed that identify stormwater best management practices (BMPs) but they have not adequately addressed the issues of how to meet NPDES requirements within the existing public Right of Way (ROW) in urbanized areas on linear projects, long-term maintenance cost-effectiveness, and cost to the public agency in meeting permit requirements. This topic has been one of the top needs identified by local agencies two years consecutively. NPDES requirements have increased over time. NPDES and Clean Water Act (CWA) compliance in Minnesota is very complex and needs to be simplified and focused for local road authorities. Past research has focused more on individual BMPs, and has not kept pace with changing NPDES requirements such as volume control. Guidance has focused more on BMPs for land development, while innovative methods and cost-effectiveness for linear projects is of less general interest, and as a result current guidance does not meet the needs of cities and counties for transportation infrastructure projects. Research is needed to pull together appropriate conventional BMPs and innovative methods, develop cost-effective compliance strategies, and provide design selection strategies for transportation engineers.

Currently, there is a lack of sharing among agencies of information about successful and non-successful stormwater management practices. This may mean that mistakes or ineffective practices are being repeated across the state, with resources being wasted on strategies that don't work because agencies are not aware that others have already found them to be ineffective. There is a need for an inventory of infiltration stormwater best management practices from across the state, so that agencies learn about the strategies currently being used by others, how cities/counties are meeting the Minnesota Pollution Control Agency (MPCAs) new volume control requirements, and the long-term maintenance implications of various practices. The inventory could serve as a shared tool for sharing BMP's, leading to a more efficient use of funds and resources, better planning for long-term maintenance, and more effective information sharing.

PROJECT OBJECTIVE

This information will be used by transportation engineers to effectively meet NPDES requirements applied in urban settings. City and county project managers, designers and maintenance personnel can use this information to make cost-effective decisions.

PROJECT SCOPE

Assumptions

Contractor will look at design solutions and processes to meet post-construction stormwater regulatory standards. Designs to meet regulations during active construction must meet very different standards and regulations. Construction site erosion and sediment control during active construction is not part of this contract. Post-construction stormwater regulatory requirements are driven by:

- the Minnesota Construction Stormwater General Permit
- the Minnesota General Permit for Municipal Separate Storm Sewer Systems (MS4 Permit)
- Local ordinances & standards and watershed rules

Situation and Challenges

1. Post-construction stormwater design standards are written, promulgated, and enforced at the local level throughout Minnesota. The MS4 Permit requires that every MS4 permittee (cities, townships, counties, watershed districts, etc.) develop and implement local design standards and regulatory mechanisms. In addition, some non-MS4 watershed districts have chosen to develop and implement their own local design standards and regulatory mechanisms. These local design standards vary, sometimes significantly. For jurisdictions not covered by an MS4 permit or watershed district regulations, the State Construction Stormwater General Permit governs. There are minimum requirements written into the MS4 Permit and the Construction Permit. Local standards must be as stringent as these minimum requirements, but may be more stringent.
2. State regulations that guide the development of local design standards include limitations, restrictions, exceptions, mitigation procedures, and paths of alternative compliance. These are complex.
3. There are a number of significant and useful design guidance documents and software packages available to assist in the work of stormwater project designers. Some of these are quite new and they are all complex and serve different purposes in the process of project design. They include:
 - a. Minnesota Stormwater Manual – MPCA Website
 - b. Minimal Impact Development Standards (MIDS) Calculator – user documentation and software
 - c. Optimizing Stormwater Treatment Practices – Saint Anthony Falls Laboratory, University of Minnesota, 2013 – book and Website
 - d. National Cooperative Highway Research Program (NCHRP) Report 792: Long-Term Performance and Life-Cycle Costs of Stormwater Best Management Practices – document and software
 - e. NCHRP Report 802: Volume Reduction of Highway Runoff in Urban Areas – guidance manual and software
 - f. NCHRP Project 25-37 (no report yet): A Watershed Approach to Mitigating Stormwater Impacts – still in development
 - g. NCHRP Report 565: Evaluation of BMPs for Highway Runoff Control, 2006
 - h. Local Road Research Board (LRRB) Research Project Final Report # #2011RIC01: Decision Tree for Stormwater BMPs, 2011
 - i. NCHRP 25-51: Limitations of the Infiltration Approach to Stormwater Management in the Highway Environment, effective project date: 8/10/2015, completion date: 2/10/2018

These existing design guidance documents and software provide information on:

- BMP design recommendations
- Written for Minnesota
- Recommendations for writing specifications
- “Simple” site modeling for a wide range of new and standard types of BMPs
- Pollutant load reduction estimates – BMP performance
- Operations and Maintenance (O&M) recommendations and cost estimates
- Full life-cycle costs
- Software to estimate life-cycle costs and pollutant load reductions

	Yes	Yes	Yes	Some	Yes	Yes
		Yes		Yes	Yes	Some
	Some	Yes		Yes		
	Some		Some	Some	Some	Yes
	Some		Some	Some	Some	Yes
	Some		Some	Some	Some	Yes

4. Instead of just focusing on construction and capital costs for stormwater BMPs, road designers and project managers need to be able to factor in long-term O&M expenses and full life-cycle costs for a wide range of types of BMPs.

Audiences

There are three audiences for this Guidebook:

1. Project managers responsible for road projects, but:
 - a. Not familiar with stormwater design
 - b. Need to be able to review work by others and understand the stormwater components of the entire project work plan
2. Road designers who are not stormwater specialists but some stormwater knowledge
3. Stormwater specialists who are:
 - a. Looking for information and guidance for the newest stormwater design guidance documents
 - b. Interested in lessons learned
 - c. Seeking full life-cycle costs for BMPs

Scope Limits

This scope of work has been developed with understanding of the following limitations:

1. There are a large number of different types of BMPs that are currently being used to meet stormwater post-construction design requirements, and it is not possible to address all the different types of BMPs.
2. There are a very large number of stormwater BMPs that have been constructed and installed on road projects throughout Minnesota, and it is not possible to inventory all, or even a large percentage, of these BMPs.
3. There are a number of significant and useful design guidance documents and software packages available to guide the work of stormwater project designers, and it is not the intent of this project to write new reference guidance materials or software. The goal of this project will be to provide a practical guide and “user manual” for these existing documents and software – to make these important items more accessible and user-friendly, as well as to incorporate lessons learned from practitioners.

PROJECT TASKS

Task 1: Literature and Practice Review

- 1.1 Contractor will obtain and review existing design guidance materials and software that can be significantly useful resources for guiding the work and decisions of stormwater project designers. Contractor will consult with the members of the Technical Advisory Panel (TAP) to determine which materials and software should be included in this review. The addition of materials beyond those listed below will constitute a change in scope for this project. These materials will include the following items:
 - a. Minnesota Stormwater Manual – MPCA Website
 - b. Minimal Impact Development Standards (MIDS) Calculator – user documentation and software
 - c. Optimizing Stormwater Treatment Practices – Saint Anthony Falls Laboratory, University of Minnesota, 2013 – book and Website
 - d. NCHRP Report 792: Long-Term Performance and Life-Cycle Costs of Stormwater Best Management Practices – document and software
 - e. NCHRP Report 802: Volume Reduction of Highway Runoff in Urban Areas – guidance manual and software
 - f. NCHRP Project 25-37 (no report yet): A Watershed Approach to Mitigating Stormwater Impacts – still in development
 - g. NCHRP Report 565: Evaluation of BMPs for Highway Runoff Control, 2006
 - h. LRRB Research Project Final Report # #2011RIC01: Decision Tree for Stormwater BMPs, 2011
 - i. NCHRP 25-51: Limitations of the Infiltration Approach to Stormwater Management in the Highway Environment, effective project date: 8/10/2015, completion date: 2/10/2018

These materials will be reviewed and evaluated. The results of this review will be presented to the TAP, with proposed scope and budget changes needed if they are to be included in the project along with the items listed under Task 1.1 above. The TAP will recommend the appropriate course of action regarding these materials.

- 1.2 Contractor will obtain and review information on stormwater BMP performance and failures, with a focus on “lessons learned”. Possible sources will include:

- a. Existing reports and presentations
 - Watershed organizations (Rice Creek Watershed District, Carver County Water Management Organization, others)
 - Saint Anthony Falls Laboratory
 - University of Minnesota Water Resources Conferences presentations
 - Google searches
 - b. A list of commonly-used types of BMPs, related to types of road projects and sections (rural, urban residential, urban collector, major arterial), capital & life-cycle costs, and lessons learned from interviews with design engineers and other practitioners. Contractor will identify and list O&M requirements and costs and common types of failures. Use the Winter State Aid Meetings as an opportunity to present this project and solicit anecdotal information from practitioners. Work with the TAP to identify other possible venues (City Engineers Association of Minnesota [CEAM] Annual Meeting, American Public Works Association [APWA] Conference, etc.). Consider a short Web-based survey of practitioners, using multiple e-mail lists.
- 1.3 Contractor will obtain and review a variety of local stormwater design standards and regulatory mechanisms and attempt to classify them by type, and group them into categories.
 - 1.4 Contractor will prepare a draft Literature Review, with the results from Tasks 1.1-1.3.
 - 1.5 Contractor will meet with the TAP to discuss and review the draft Literature Review.
 - 1.6 Based on the TAP's review comments, Contractor will revise the draft Literature Review and prepare and distribute a final Literature Review.

Task 2: Site Review and Information Requirements Checklists Based on Regulatory Limitations, Restrictions, Exceptions, Mitigation Procedures, and Paths of Alternative Compliance

- 2.1 Contractor will review State and selected local regulations and collect information about limitations, restrictions, exceptions, mitigation protocols, and paths of alternative compliance, and organize the information into a usable and accessible format.
- 2.2 Contractor will develop a list of site evaluation protocols and procedures that are appropriate to be able to determine whether any of the options above should be applied to the site design or not, and develop site evaluation checklist.
- 2.3 Contractor will develop samples of the types and extent of documentation that are appropriate and acceptable for submittals to regulatory entities, and survey a sample set of regulatory entities to develop and confirm these.
- 2.4 Contractor will develop sample submittal packages for some of the relatively common types of submittals.
- 2.5 Contractor will prepare a draft Report Section and Checklists, with the results from Tasks 2.1-2.4.
- 2.6 Contractor will meet with the TAP to discuss and review the draft Report Section and Checklists.
- 2.7 Based on the TAP's review comments, Contractor will revise the draft Report Section and Checklists and prepare and distribute the final Report Section and Checklists.

Task 3: Samples of Common Types of BMPs and Lessons Learned from Prior Installations

- 3.1 Based on information collected during Task 1.2, Contractor will organize information and examples of common types of stormwater BMPs, categorized by their use for four types of road sections (rural, urban residential, urban collector, major arterial).
- 3.2 Based on information collected during Task 1.2, Contractor will organize "lessons learned" from prior installations of the common types of stormwater BMPs.
- 3.3 Contractor will prepare a draft Report Section, with the results from Tasks 3.1-3.2.
- 3.4 Contractor will meet with the TAP to discuss and review the draft Report Section.
- 3.5 Based on the TAP's review comments, Contractor will revise the draft Report Section, and prepare and distribute the final Report Section.

Task 4: Develop a Draft "Guidebook" Section for Using the Existing Design Guidance Materials

- 4.1 Contractor will develop a draft "guidebook" section on using the existing design guidance materials identified and collected as part of Task 1.1.
- 4.2 Contractor will organize materials according to four types of road sections; rural, urban residential, urban collector, or major arterial, and incorporate design and construction considerations and lessons learned from input from designers and other practitioners.

- 4.3 Contractor will address long-term O&M expenses and full life-cycle costs for a range of types of BMPs.
- 4.4 Contractor will develop a set of sample design processes for four types of road sections, with sets of common BMPs that are appropriate for each type of road section.
- 4.5 Contractor will prepare a draft “guidebook” section and sample design processes. These materials will be consistent with the Minnesota Stormwater Manual.
- 4.6 Contractor will meet with the TAP to discuss and review the draft “guidebook” section and sample design processes.
- 4.7 Based on the TAP’s review comments, Contractor will revise the draft “guidebook” section and sample design processes, and prepare and distribute the final draft “guidebook” section and sample design processes.

Task 5: Develop NPDES Stormwater Post-Construction Design Guidebook

- 5.1 Contractor will develop the draft NPDES Stormwater Post-Construction Design Guidebook, in Web-based Wiki format. The Guidebook will be comprised of the materials developed during Tasks 1-4. Sections will include:
 - a. A list of various types and examples of stormwater design standards and regulatory mechanisms
 - State NPDES stormwater permits
 - MS4 local regulations
 - Watershed regulations
 - b. The site review and information requirements checklists, based on regulatory limitations, restrictions, exceptions, and mitigation procedures
 - c. Samples of common types of BMPs and lessons learned from prior installations
 - d. Use of existing design guidance materials, with sample design processes
 - e. An Appendix, with the literature review
- 5.2 Meet with the TAP to discuss and review the draft NPDES Stormwater Post-Construction Design Guidebook.
- 5.3 Based on the TAP’s review comments, revise the draft NPDES Stormwater Post-Construction Design Guidebook and prepare and distribute the final NPDES Stormwater Post-Construction Design Guidebook.

PROJECT DELIVERABLES AND SCHEDULE

- Contractor will provide the following deliverables under this contract:
- Draft and Final Report Sections – 10 print copies, pdf file format
 - Draft and Final **NPDES Stormwater Post-Construction Design Guidebook**:
 - o In Web-based Wiki format – MediaWiki (open-source software)
 - o Similar to MN Stormwater Manual & BWSR Drainage Manual
 - o Suitable for easy & quick revisions
 - o User-friendly features
 - o Minimal distribution costs, no printing
 - Final Deliverables, completed 18 months after the beginning of the project

	2016						2017											
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Task 1	X	X	X	X	X	X	X	X	X	X	X	X						
Task 2	X	X	X	X	X	X	X	X										
Task 3	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Task 4									X	X	X	X	X	X				
Task 5																X	X	X