



Stormwater Drainage Design and Best Management Practices with Applications to Roadways and Climate Change

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Project Objective

The objective of this project is to develop a 5-hour training course that is intended to prepare participants to describe and analyze stormwater runoff problems and select and design appropriate stormwater Best Management Practices (BMPs), with applications to roadways and climate change.

Problem Statement

Via an extensive literature review, the project recognizes four major issues. First, the urbanization has changed the natural systems and significantly impacted the water quality of ambient water bodies. There is a critical need to clarify the mechanisms behind stormwater-associated problems and evaluate the relationship between the implementation of BMPs and stormwater control. Second, the performance of many BMPs is uncertain because limited information, e.g., effectiveness, longevity, and benefits, is available. Regarding this issue, there is a great need to issue more local or national design guidance on BMPs and provide more training on how to properly select and implement BMPs on the ground among the practitioners in the land development community. Third, there is a great need for additional information and technical resources concerning stormwater management. Fourth, there is a need for the stormwater sector to engage with state programs, through ways such as providing stormwater information, technical support, and training, to help identify and meet stormwater needs. The stormwater sector also needs to engage effectively with communities and public officials to improve the public understanding of stormwater. In addition, there is a need for the stormwater sector to provide a platform, e.g., in-person training, to exchange peer-to-peer knowledge and share the experience of stormwater management.

Research Methodology

To meet the needs identified through literature review, the project proposes to design a 5-hour in-person training course that comprises of five modules. The goal of the course is to prepare participants to describe and analyze stormwater runoff problems and select and design appropriate stormwater BMPs, with applications to roadways and climate change.

Results

The project develops a 5-hour training course, which covers the following five modules:

1. Welcome, Introduction, and Administration;
2. Terms & Definitions Used in Stormwater Management;
3. Stormwater Problems and Management;
4. Site Development Principles; and
5. Course Summary and Administration

In Module 1, the instructor welcomes participants to the course, explains how instruction will take place, and provides an agenda.

In Module 2, the instructor introduces the concept of stormwater management and reviews the basic terms and definitions used in stormwater management.

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In Module 3, the instructor trains the participant to identify and analyze the problems caused by stormwater runoff and implement appropriate BMPs to control them.

In Module 4, the instructor introduces twelve general principles for stormwater design and five principles for roadway drainage design.

In Module 5, the instructor leads a short discussion to review the course goal and content. Additional information will be provided about other training opportunities.

In this designed course, Module 3 is the core part, in which the instructor leads the participants to discuss stormwater-associated problems, which helps the participants identify stormwater-associated problems. Also, the instructor introduces the categories of BMPs, as shown in Figure 1, and gives examples for each type of structural BMPs, which helps participants understand the feasibility, benefits, and limitations of each BMP. After showing the examples, the BMP selection process, as shown in Figure 2, is discussed through a detailed flow chart. Because roadways play a significant role in stormwater runoff, despite that they comprise a small portion of the whole watershed, the module discusses BMPs for roadways. Also, the instructor leads the participants in a discussion of how climate change will affect BMP selection.

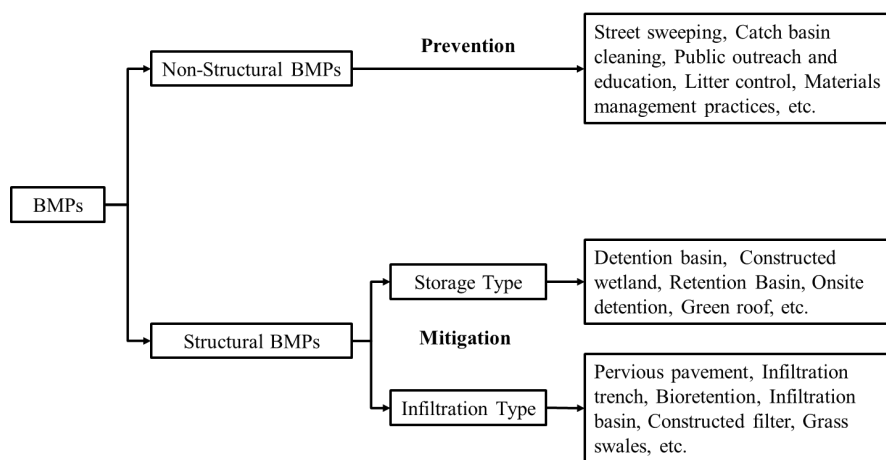


Figure 1. Types of Best Management Practices (BMPs).

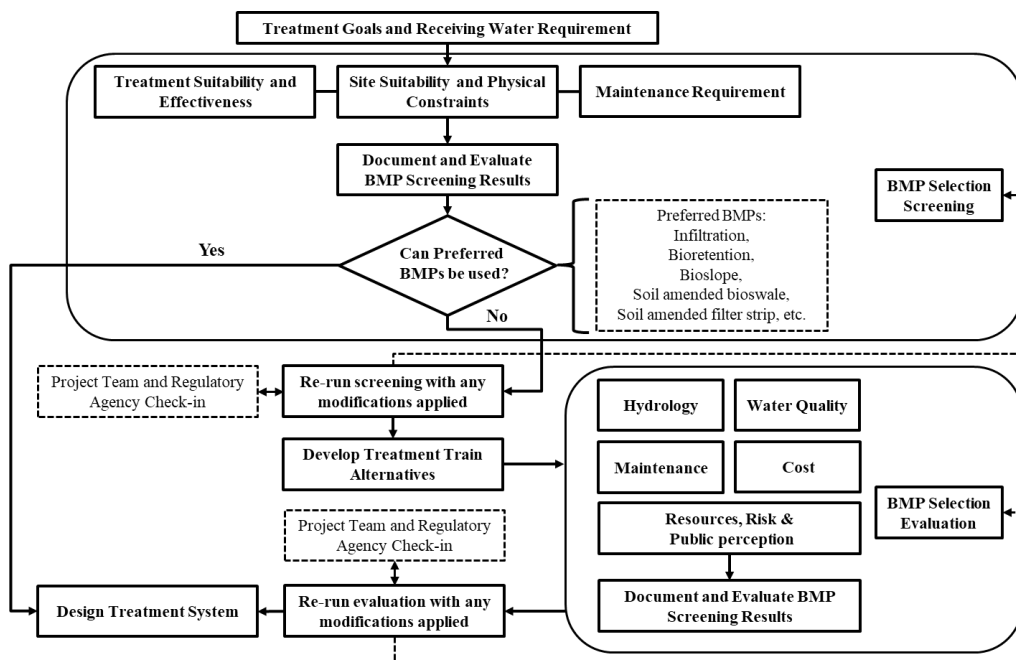


Figure 2. The process of Best Management Practice (BMP) Selection (Source: U.S. DOT, 2018, The Stormwater Practitioners Guide).