BSC GROUP

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Nature-Based Solutions Implementation Resource Guide

Nature-based Solution (NbS): MSCS Culvert Improvement

Project Number per matrix: **15**

PREREQUISITES

- Obtain Town or City Conservation Commission, DPW, and/or landowner approval.
- Obtain appropriate permits, e.g., Chapter 91 license for navigable waters.
- Coordinate restoration with funder (e.g., MA MVP), if applicable.

RECOMMENDED IMPLEMENTATION STEPS

- **Project Planning and Administration**
  - Conduct soil testing for infiltration, contamination, and roadside hazards/impacts.
  - Conduct flow analysis. Assess upstream flood/downstream flow impacts.
  - Assess potential erosion contamination impacts.
  - Establish standard procedures and requirements for all infrastructure and new development projects to include storm resiliency measures.
  - Hold 30% of the designs for all unimproved culverts to avoid un-funded FEMA restorations. FEMA will cover the restoration of existing conditions or approved designs for pending restorations.
  - Plan for the construction period and post-construction period environmental monitoring.
- **NbS Installation**
  - Replace standard culvert with one or more MSCS structures such as graduated weirs, widened culverts, and wildlife tunnels.
  - Reconstruct associated roadway/dam.
  - Reconstruct the stream channel.
  - Reconstruct abutting wetlands (see also construction of new wetlands).
  - Temporary diversion of flow.
  - Conduct site preparation to include erosion control and stockpile/mobilize staging area.
  - Prepare for significant traffic and soil disruption.
  - Connect to systemic drainage systems (see roadside BMPs).
  - Plant select species considered stormwater infiltration species, along with mulching, watering, and weeding during the establishment period.
- **Maintenance**
  - Support 2-year establishment period to include biannual removal of invasive plants and weeds, annual replacement of failed plantings, and watering, as needed, to naturalize plantings.
  - Annual maintenance comparable to standard roadside drainage and planting features.

NATURE-BASED SOLUTION SPECS

- Typical project size: 5’ X 30’
  - Culverts exceeding a 10’ span qualify as bridges and are subject to a different set of criteria.

BUDGET ESTIMATE

- Typical project budget (order of magnitude): $60,000, or $2,000 per foot of length under 5’ span.
- Use the BSC Group Nature-based Solutions budget tool to develop more detailed concept budgets

SCHEDULE ESTIMATE

- Varies by unit.

- 2 years of establishment and “as needed” monitoring.