

## EXAMPLE SPECIFICATION: VEGETATED SWALE

*The language provided in these specifications is meant to serve as a reminder and provide a generic example of the type of language that should be provided in final construction documents. This language will require modification and additional detail to fit the physical conditions of the site and the final design of the BMP.*

### TEMPORARY EROSION CONTROL

- A. Install all temporary erosion control measures (in accordance with MNDOT General Conditions 2573) prior to site disturbance.
- B. Install storm drain inlet protection to prevent clogging of the stormsewer and increases in sediment loads to downstream stormwater facilities or waterbodies.
- C. If the vegetated swale area is used for runoff conveyance during construction, it must be constructed per the specifications following construction and stabilization of the project site.
- D. Inspect erosion control measures at least once a week and after each rainfall event. Make any required repairs immediately.
- E. Silt fence fabric that collapses, tears, decomposes or otherwise becomes ineffective should be replaced within 24 hours of discovery.
- F. Remove silt fence deposits once they reach 30 percent of the height of the silt fence or silt curtain. Care should be taken to avoid undermining of the fence during cleanout.
- G. Erosion control devices shall be maintained until the site is stabilized, as determined by the Engineer.

### VEGETATED SWALE EXCAVATION, BACKFILL AND GRADING

- A. Delineate the limits of the swale grading prior to commencement of excavation. Upon approval of delineation, stakes and temporary construction fencing shall be set to maintain limits of excavation as directed by Engineer.
- B. I. If the vegetated swale is used for runoff conveyance during construction, initial grading of the swale shall be performed in conjunction with rough grading of the site. Once construction in the

## EXAMPLE SPECIFICATION: VEGETATED SWALE

contributing drainage area has been completed and the site is stabilized, re-grade and restore the swale to ensure functionality.

- II. If an alternative temporary sediment basin facility is being provided before discharge to the swale, grading and construction of the vegetated swale may not begin before the contributing drainage area has been completed and stabilized.
- C. Grading of the vegetated swale shall be accomplished using low-impact earth-moving equipment to prevent compaction of the underlying soils. Wide tracked vehicles such as back hoes, small dozers and bobcats are recommended. Excavating equipment should operate from the side of the swale to the extent feasible. If excavation leads to substantial compaction of the subgrade, the first several feet shall be removed and replaced with a blend of topsoil and sand to promote infiltration and plant growth.
- D. If an underdrain is required per the construction documents excavate the underdrain to the specified depth (elevation). All sub material below the specified elevation shall be left undisturbed, unless otherwise directed by the Engineer.
- E. In the event that sediment is introduced into the BMP during or immediately following excavation, the sediment will need to be removed from the vegetated swale or underdrain prior to initiating the next step in the construction process.
- F. Material excavated from the vegetated swale shall be disposed of on-site at locations (temporary stockpile areas) designated by the Engineer.
- G. Amended soil shall be placed in the vegetated swale to the specified depth (elevation) and shall consist of a well blended mixture of 40% semi-coarse washed sand; 30% MnDOT Grade 2 compost and 30% native topsoil by volume.
- H. Clean, washed 1 to 3-inch gravel shall be placed in the bottom of the underdrain to the depth specified in the construction documents. Gravel should be placed in lifts and lightly compacted with plate compactors. The gravel shall conform to the following requirements:

| Sieve Size | Percent Passing |
|------------|-----------------|
| 2.0"       | 100             |
| 1.5"       | 85-100          |
| 1.0"       | 30-60           |
| 0.5"       | 0-10            |

## EXAMPLE SPECIFICATION: VEGETATED SWALE

- I. Filter fabric encasing the underdrain shall have a minimum transmissivity rate of 100 gallons per minute.
- J. The perforated pipe (underdrain) shall be laid directly on the gravel bed. Grade and alignment shall not vary from the prescribed grade by more than 0.03 feet (9 mm) at any point. The joints between sections of pipe shall be connected in a fashion acceptable to Engineer. Once the pipe is in place, it shall be covered immediately with granular material as specified in the construction documents. The granular material shall be of uniform depth on either side of the pipe. Special inlets and special devices at the outlet end of the pipe shall be constructed as shown in the plans.
- K. Maximum spacing between check dams should be such that the toe of the upstream dam is at the same elevation as the toe of the downstream dam. The maximum height of the dam should not exceed 3 feet. Hand or mechanical placement required to achieve complete coverage of swale and to ensure that center of dam is lower than edges.

### NATIVE SEEDING

*Seeding native grasses and forbs (wildflowers) can be accomplished using a number of different methods. However, due to the complexity of seed sizes, textures and densities, a great deal of care needs to be taken to ensure that the site is well prepared and that seed is placed properly.*

For more information on native seeding methods and specifications see the following source:

[http://www.dot.state.mn.us/environment/seeding\\_manual/SeedingManual2003.pdf](http://www.dot.state.mn.us/environment/seeding_manual/SeedingManual2003.pdf)

### NATIVE PLANTS, PLANTING AND TRANSPLANTING

- A. Native planting shall not commence until planting areas have been properly amended and prepared per the specifications.
- B. Native planting shall not commence until the native seeding has been completed and any required erosion control blanket has been installed. The planting shall be completed within 72 hours of native seeding.
- C. The site shall be free from all weeds and invasive plant species. If weeds and invasive plant species exist onsite, they shall be removed and disposed of properly.

## EXAMPLE SPECIFICATION: VEGETATED SWALE

D. Plant material shall be spaced in accordance with recommended dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity.

E. All plant material shall be thoroughly watered within 8 hours of planting.

### **CONSTRUCTION SEQUENCE SCHEDULING**

*An implementation schedule should be included as part of the erosion control plan to identify the order of operations for construction activities. This is particularly important when constructing stormwater BMPs that are designed to infiltrate stormwater runoff. There are many construction activities which may contribute to the failure of a stormwater BMP if they are not planned for accordingly. The following items should be considered in developing an implementation schedule for a project:*

1. Perform continuous inspection of temporary construction access to ensure that it is providing adequate erosion and sedimentation control for the construction site.
2. Install silt fence along the perimeter of the site to prevent sediment from leaving the site during the construction process. Silt fence should be installed at a uniform elevation and constructed so that flow cannot bypass the ends. Install heavy duty silt fence along the perimeter of downstream waterbodies to prevent sediment pollution. Install heavy duty silt fence along the perimeter of grading-prohibited areas and all stormwater BMPs to eliminate traffic in these areas during the construction process.
3. All down gradient perimeter sediment-control BMPs (e.g. temporary outlet controls) must be in place before any up gradient land-disturbing activity begins.
4. Remove topsoil from the site and place in temporary stockpile location. Seed stockpile with temporary seed mix and mulch with weed-free straw if the stockpile is to remain in place for more than three days.
5. Install underground utilities (water, sanitary sewer, electric, telephone, etc.) taking the location and function of stormwater BMPs into consideration.
6. Rough grade the site leaving the vegetated swale area undisturbed until the contributing drainage area has been completed and the site is stabilized.
7. Seed and mulch disturbed areas on site.

## EXAMPLE SPECIFICATION: VEGETATED SWALE

8. Construct the roads in a manner that minimizes adverse impacts to the location and function of the stormwater BMPs. For example, ensure that construction access or equipment staging areas do not conflict with the final location of the vegetated swale.
9. Perform all other site improvements in a manner that minimizes adverse impacts to the location and function of the stormwater BMPs.
10. Final grade the site. Grading of the vegetated swale shall be accomplished using low-impact earth-moving equipment to prevent compaction of the underlying soils. Wide-tracked vehicles such as backhoes, small dozers and bobcats are recommended. Excavating equipment should operate from the side of the swale to the extent feasible. If excavation leads to substantial compaction of the subgrade, the first several feet shall be removed and replaced with a blend of topsoil and sand to promote infiltration and plant growth.
11. Construct check dams if specified.
12. Stabilize the site by implementing the native seeding portion of the landscaping plan.
13. Install any required erosion control blanket, ditch checks, and other semi-permanent and permanent erosion control measures.
14. Remove the temporary erosion and sediment controls after the vegetated swale is stabilized per the Engineer's approval. It is important for the swale to be stabilized before receiving stormwater flow.

### CONSTRUCTION OBSERVATION

*It is strongly recommended that the design engineer be onsite during various stages of the construction process to ensure the following:*

1. Construction documents are being adhered to.
2. Physical conditions of the site meet assumptions made during the design process.
3. Erosion control measures have been installed correctly and are being maintained during the entire construction process.