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 the start of any construction operation that may cause any sedimentation or siltation at the site.

B. Install storm drain inlet protection to prevent clogging of the storm sewer and sediment loads to downstream stormwater facilities or waterbodies.

C. If the stormwater BMP is being designed to serve as a temporary sediment basin, grade the BMP to within three (3) feet of final grade to protect the underlying material from clogging. Once construction in the contributing drainage area has been completed and the site is stabilized, excavate the raingarden to final grade and complete construction of the raingarden.

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 the height of the silt fence or silt curtain. Care should be taken to avoid undermining the fence during cleanout.

G. Erosion control devices shall be maintained until the site is stabilized, as determined by the PROJECT ENGINEER.

RAINGARDEN EXCAVATION, BACKFILL AND GRADING

A. *If the raingarden is used as a temporary sediment basin* – Initial grading of the raingardens, for use as temporary sediment basins, shall be performed in conjunction with rough grading of the site. Grade the BMP to within three (3) feet of final grade to protect the underlying material from clogging. Once construction in the contributing drainage area has been
completed and the site is stabilized, excavate the raingarden to final grade and complete construction of the raingarden.

B. *If alternative temporary sediment basin facilities being provided* - Grading and construction of the raingarden(s) shall not begin until all construction in the contributing drainage area has been completed and the site is stabilized.

C. Grading of the raingardens shall be accomplished using low-impact earth-moving equipment to prevent compaction of the underlying soils. Small tracked dozers and bobcats with runner tracks are recommended.

D. Excavate the raingarden to the specified depth (elevation). All sub material below the specified elevation shall be left undisturbed, unless otherwise directed by the Engineer.

E. Grade to the depth (elevation) specified in the construction documents unless otherwise directed by the Engineer.

F. In the event that sediment is introduced into the BMP during or immediately following excavation, this material will need to be removed from the raingarden prior to initiating the next step in the raingarden construction process. This is especially important if the raingarden has been designed to infiltrate stormwater: sediment that has been washed into the raingarden during the excavation process can seal the permeable material significantly reducing the infiltration capacity of the soils.

G. Material excavated from the raingarden(s) shall be disposed of on-site at locations (stockpile areas) designated by Engineer.

H. Clean, washed 1 to 3-inch gravel shall be placed in the bottom of the raingardens to the depth specified in the construction documents. Gravel should be placed in lifts and lightly compacted with plate compactors.

I. 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.
J. Raingardens shall be over-excavated to a specified depth and back filled with a filter media. The recommended depth of the prepared soil is 30”.

K. Raingarden soil medium / filter media shall consist of a well blended, homogenous mixture of 60-70% construction sand; 10-20% top soil; and 20-30% organic leaf compost:
   - Sand: Provide clean construction sand, free of deleterious materials. AASHTO M-6 or ASTM C-33 with grain size of 0.02”-0.04”
   - Top Soil: sandy loam, loamy sand, or loam texture per USDA textural triangle with less than 5% clay content
   - Organic Leaf Compost: Mn/DOT Grade 2

L. Portions of raingardens to be planted shall be top-dressed with 2” - 3” of woodchip mulch (MnDOT Type 6). Non-dyed, double-shredded varieties are recommended.

M. Portions of raingardens to be seeded shall be mulched with clean grain straw (MnDOT Type 3) at a rate of 2 tons per acre. **Note: Due to the inherent difficulties associated with establishing quality vegetated cover from seed in areas of ponding and/or flowing water it is highly recommended that raingardens be planted.**

N. Seeding and installation of erosion control blanket shall be completed within 48 hours of final grading.

**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:


**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 after the native seeding and erosion control blanket (if used) have 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.

D. Space plant material 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 inspections 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 on the contour 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 no-grading areas and all stormwater BMPs to eliminate traffic from driving 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.

5. Install underground utilities (water, sanitary sewer, electric, phones, etc.) taking the location and function of stormwater BMPs into consideration.
For example, do not backfill utility areas with high clay content (low permeability) soils if raingardens designed for infiltration are going to be constructed in the same location.

6. Rough grade the site. If the raingardens are going to be used for temporary sediment control, grade the raingardens to within three (3) feet of final grade to protect the underlying soils from clogging. Once construction in the contributing drainage area has been completed and the site is stabilized, excavate the raingarden to final grade and complete construction of the raingarden

7. Seed and mulch disturbed areas on site.

8. Construct the roads taking the location and function of stormwater BMPs into consideration. For example, make sure that construction access or equipment staging areas do not conflict with the final location of the raingarden.

9. Perform all other site improvements taking the location and function of the stormwater BMPs into consideration.

10. Final grade the site.

11. Stabilize the site by implementing the native seeding portion of the landscaping plan.

12. Install erosion control blankets, ditch checks, and other semi-permanent erosion control measures.

13. Stabilize the site by implementing the native planting portion of the landscaping plan.

14. Remove the silt fence after the site is stabilized per PROJECT ENGINEER approval.

Construction Observation

It is strongly recommended that the design engineer be on-site during various stages of the construction process to ensure the following:

1. Construction documents are being adhered to; and
2. Physical conditions of the site meet assumptions made during the design process.