

## MINNESOTA ENGINEERING PROCEDURE

**Grassed Waterways**

References: Engineering Field Handbook, Chapters 2 and 7  
Field Office Technical Guide, Section IV, Grassed Waterway (412) Standard  
TR-62, Standard Format for Engineering Notes  
See the Minnesota NRCS Website at [www.mn.nrcs.usda.gov](http://www.mn.nrcs.usda.gov) for recommended software.

**Before Construction****A. Job Investigation**

1. Determine if there is an adequate, stable outlet. If not a grade stabilization structure is required.
2. Is erosion in the watershed controlled to tolerable levels?
3. Check approximate drainage area and waterway grade. Determine if the area may be treated as a “Critical Area Planting”, if the simple waterway procedure can be used, or if a more detailed design is needed.
  - a. The critical area planting criteria can be used for waterways with a drainage area less than 7 acres and a grade greater than 2 percent.
  - b. Simple waterways are defined as those with a drainage area less than 150 acres and a grade greater than 2 percent.
4. Can a good sod be established? Determine the need for salvaging and spreading topsoil or if a support tile will be needed to provide drainage.
5. Determine maintenance requirements.
6. Any cultural resource, wetland, or other NEPA issues?
7. Utility and tile locations.
8. Determine engineering job classification.

**B. Design Surveys**

1. Lay out the centerline of the waterway with white or fluorescent pink flags or lath.
2. Include a sketch that shows the location of the waterway and drainage area. This can be done separately on an aerial photo. Note any restrictions such as culverts that will provide temporary storage and may reduce the design capacity.
3. Determine the waterway slope. ***A hand level or slope meter may be used to obtain grades for waterways that meet Critical Area Planting or simple criteria.*** For all other waterways, an engineer's level, or equivalent instrument must be used to survey the full length of the waterway. All surveys must be closed except when using a hand level. Pacing may not be used for waterway stationing when support tile are included in the plan.
4. For drainage areas greater than 10 acres, determine existing cross section at a spacing not to exceed 500 feet. ***Hand level cross sections are acceptable for simple waterways.***
5. When existing tile are present, they must be located by the owner prior to the design survey so they can be tied in.
6. Document the waterway outlet conditions and verify the adequacy of the outlet for support tile if used.

**C. Design**

1. The design shall meet the criteria found in the Field Office Technical Guide, Section IV, Grassed Waterway (412) Standard.
2. Compute peak discharge using the procedure in Chapter 2 of the Engineering Field Handbook or other acceptable method.
3. Determine the waterway cross section using the procedure in Chapter 7 of the Engineering Field Handbook.

4. MN-ENG-403, Trapezoidal Grassed Waterway drawing, or equivalent will be used to document the design.

#### D. Plan Preparation

The plans shall contain the following information as a minimum:

1. Waterway location
2. Waterway grade, length, and cross section for each reach
3. Appropriate construction notes or a separate waterway construction specification as needed.
4. Plotted cross-section and profile (*except for simple waterways*).
5. Support tile details if included.
6. Vegetative specifications.
7. Gopher State One Call notification statement, MN-ENG-98.
8. Job classification
9. Cooperator approval statement (for NRCS jobs).
10. NPDES erosion control requirements.

### **During Construction**

#### A. Layout

Set cut stakes and indicate top width (not to exceed 200 foot intervals) when the slope of the waterway is less than 2 percent or the cut is not uniform throughout the length of the waterway.

#### B. Supervision of Construction

NRCS staff will verify construction to the extent possible. Field notes and conservation assistance notes will be used to document construction checks. Contractors should be encouraged to do layout and construction checks.

### **After Construction**

#### Construction Check

1. Make visual inspection of completed waterway.
2. Survey cross sections to verify proper shape and depth. Cross sections should be taken at approximately the same location as they were during the design survey. Take at least one cross section per reach. Cross section spacing should not exceed 500 feet. Follow the format in TR-62. The more complex the waterway is, the more detailed the construction check should be.
3. Record grade, constructed length, and method used to measure the length.
4. Record seeded top width.
5. Record condition of vegetation.
6. Sign and date the construction check notes.
7. Construction documentation submitted by persons other than NRCS employees must contain the statement, "To the best of my knowledge and belief, this practice is constructed according to the requirements of the approved plan" along with the date and signature of the person submitting the construction check. Worksheets for MN-ENG-40, Critical Area Planting Waterways and MN-ENG-402, Simple Waterways may be used to document this.

**Minimum Supporting Data**

As a minimum, the following supporting data must be documented in the case file. The data should be sufficient to show that the installation meets standards and specifications.

1. Design survey and outlet information.
2. A copy of the required engineering design and plan, including vegetative requirements.
3. As-built documentation, checkout survey notes, and construction certification.
4. Operation and maintenance plan.