

## MINNESOTA ENGINEERING PROCEDURE

**SUBSURFACE DRAIN**

**References:** Engineering Field Handbook, Chapter 14  
Field Office Technical Guide, Section IV, Practice Standard Subsurface Drain (606)  
TR62, Standard Format for Engineering Notes  
Minnesota Drainage Guide

**Before Installation**

- A. Job investigation
1. Determine if an adequate, stable outlet exists.
  2. Look for wetlands that may be impacted.
  3. Soil type and permeability.
  4. Degree of drainage and type of system needed.
  5. Utility locations.
  6. Any cultural resource or other NEPA issues?
  7. Need for breathers or vents.
  8. Legal problems to be handled by landowner.
  9. Operation and maintenance requirements.
- B. Design Survey
1. The type of survey will depend on the type of system needed for the job. All surveys should contain the following:
    - a. At least one good bench mark.
    - b. Location, elevation, and extent of low areas, ridges, trees, pipelines, etc. that may affect design.
    - c. When existing tile are present, they must be located by the owner prior to the design survey so they can be tied in.
    - d. Include a sketch that shows the location of the subsurface drainage features. This can be done on an aerial photo or GIS layout. Note any features such as pumps or culverts that may affect the design.
  2. Additional requirements for a profile type survey.  
Profile shots no farther apart than 100 feet. Extra shots for highs and lows. Station all shots and identify any landmarks crossed.
  3. Additional requirements for a topographic survey.
    - a. Shots should be close enough to allow 1 foot contours to be drawn. Even in the flattest topography, points should normally be no more than 200 feet apart.
    - b. Take additional points to capture highs and lows.
    - c. Horizontal and vertical control should be closed if both are used.
    - d. Survey in any soil borings taken.
- C. Design  
The design shall meet the criteria found in practice standard, Subsurface Drain (606).
- D. Plan Preparation  
The plans shall contain the following information as a minimum:
1. Location of tile, structures, and appurtenances as appropriate.
  2. Gopher State One Call notification statement, MN-ENG-98.
  3. Job classification.
  4. Cooperator approval statement (for NRCS jobs).
  5. NPDES erosion control requirements.
  6. Vegetative specifications if applicable.
  7. A profile will be included for any tile line 50' or longer in length. The size and quality of each line shall be depicted. The ground profile shall be shown as well.
  8. The outlet shall be clearly shown, giving dimension(s) and elevation as appropriate.

## MINNESOTA ENGINEERING PROCEDURE

9. If a CMP outlet is used for a line, its length and size shall be indicated.
10. A cost estimate shall be prepared for the project on a separate page in the design folder.
11. The plans will contain any dates of revisions.

**During Construction**

## A. Layout

This will vary depending on the subsurface drainage features to be installed.

## 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. Photographs are recommended. Contractors should be encouraged to do layout and construction checks.

**After Construction**

## Construction Check

1. Make visual inspection of completed subsurface drainage features. Determine that adequate field survey notes, plans, specifications, and construction layout information are available and use them as a basis for comparing the completed work with the planned.
2. Record the condition of any vegetation.
3. Sign and date the construction check notes.
4. 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.
5. The depth of tile for depth and cover requirements will be checked. Sufficient grade checks shall be made to ascertain adherence to the plan.
6. Note date of installation and contractor name.

**Minimum Documentation**

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 engineering design and plan, including the vegetative establishment requirements.
3. As-built documentation, checkout survey notes, and construction certification.
4. Operation and maintenance plan.