

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATION**

STREAM CROSSING (FORD CROSSINGS)

(No.)

CODE 578

CLEARING

All trees and brush shall be removed from the area before excavation starts. The foundation shall be cleared of all stumps, roots, brush, sod, and other debris. All waste materials shall be disposed of in a sightly and workmanlike manner in designated areas out of the natural floodway.

FOUNDATION EXCAVATION

All material shall be removed from the foundation of the stream crossing to the depths, widths, and lengths required by the design. Excavation may be limited to one side of the stream at a time in order to facilitate diversion of the stream. It may be advantageous to divert the stream flows around the site using a pipe or ditch or to temporarily impound the stream during construction. Trenches shall be excavated along the upper ends of entrance and exit ramps and on both the upstream and downstream sides of the stream crossing for geotextile installation.

GEOTEXTILES

A geotextile (fabric filter cloth) shall be installed under the entire crossing as well as in the toe trenches. In the

upstream toe trenches, the geotextile shall be back lapped over its own trench.

The geotextile shall be a non-woven needle-punched material with a minimum tensile strength of 120 lbs. (minimum average roll value). The geotextile shall be placed on a grade parallel to the natural streambed prior to construction.

The geotextile shall be toed into the trenches and the trenches backfilled with course stable soil or crushed stone. Longitudinal ends of the geotextile shall be lapped back over the top of the backfill toe trench a minimum of one foot beyond the edge of the trench and anchored to the fabric using anchoring pins placed on five foot centers. When more that one width of geotextile is required, the downstream panel shall be installed first. The next upstream panel shall be installed with a minimum of 18 inches overlap over the first section. Anchoring pins shall be installed on three foot centers six inches from the downstream edge of the lap. Pins shall penetrate both sections of geotextile in the lap. See Form NC-ENG-45 for typical example.

Tears should be repaired immediately by removing all surface material and soil from the tear for minimum distance

of 18 inches in all directions of the tear. Spread a new section of geotextile material over the cleared area and anchor with anchoring pins around all sides.

ANCHORING PINS

Anchoring pins shall be fabricated using No. 3 reinforcing steel or material of equivalent or greater size and durability and shaped as shown on Form NC-ENG-45. All pins shall be installed with the top width lying perpendicular (at right angles) to the direction of flow in the stream. Pins shall be driven vertically into undisturbed soil to provide maximum resistance to removal.

Anchoring pins shall be installed through all overlapped fabric and across the width of the channel bottom on approximately three foot centers. The minimum number of anchoring pins to be used shall be as shown in Table 1.

Table 1.

Minimum Number of Anchoring Pins Required

Number of Fabric Strips Across Channel	Factor Times Total Length of Crossing
1	0.85
2	1.30
Example:	Stream crossing 80 feet in total length using two adjacent strips of fabric for a crossing width of 20 feet. Minimum number of pins is 1.3 times 80 feet for a total of 104 pins. Specify 110 anchoring pins.

Care should be taken not to rip the fabric while installing pins. Pins should

be sharpened to permit easy penetration through fabric through a small opening. Fabric will fit tightly around anchoring pins with sharpened ends. If a pin must be removed for any reason, plug the opening created by the pin with a wadded ball of geotextile.

Light weight wire staples such as used to anchor mulch netting may be used to hold the geotextile in place temporarily while construction is in progress. Such staples are not adequate to provide permanent anchoring of the geotextile.

SURFACING MATERIAL

Acceptable material consisting of coarse sands and/or gravel, if present in the foundation excavation, may be stockpiled for later use in the toe trenches or on the roadway. Large washed stone or creek gravel may be used to prepare a foundation for the geotextile in unstable soils.

Coarse stone may be used as a subgrade filler between the geotextile and the surfacing material. The surface of the crossing shall consist of a layer, a minimum of 8 inches thick, of coarse aggregate meeting the approximate gradation requirements of the North Carolina DOT for ABC course aggregate. Washed stone or gravel shall be used in streams designated as North Carolina Designated Public Mountain Trout Waters and their upper tributaries.

Surfacing material will be spread such that a minimum of six inches of cover exists on the geotextile before tracked equipment is operated over it. Failure to cover the cloth with an adequate layer of stone at sites with fine sand or

non-plastic silts and clays may result in the creation of “mud bubbles” in the geotextile.

FINISH GRADES AND SLOPES

Crossings shall be no less than 10 feet and no more than 20 feet wide in upstream direction between the fence posts.

Surface runoff shall be diverted around the entrance and exit slopes to prevent erosion of the surfacing materials. Runoff shall be diverted either upstream or downstream to a point from which it cannot flow back toward the entrance or exit ramp.

The finished surfacing should be on the same grade as the natural streambed above and below the site. Failure to match the natural streambed grade may result in erosion of the surfacing materials or undesirable siltation in the crossing area.

FENCING

Fence posts along each side of the crossing shall be installed inside the area covered with geotextile and stone. When stream crossings are in pasture fields, a gate will be installed at the entrance of the crossing to prevent continuous livestock access to the stream. Fence posts with sharpened ends shall be driven through the geotextile in the center of the trenches. The wire should be placed on the downstream side of the posts on each fence line. Strands of wire should not be continuous across the crossing, but shall be cut above the normal high water line and secured lightly to the posts so that a buildup of trash will pull the wire away from the post, allowing the trash to move downstream.

JOB ORGANIZATION

All materials should be available and ready at the site to allow completion of the crossing in one working day. Materials such as the geotextile, anchoring pins, staples, pointed fence posts and surfacing stone should be at the site before commencing construction. Proper equipment should be at the site and ready for an early morning start.

CONSTRUCTION EQUIPMENT

Landowners and contractors should be advised of the use of proper equipment. Improper equipment will result in inability to properly construct the crossing and excessive cost of construction.

Experience has proved that certain types of construction equipment are more suitable for installation of stream crossing than others. Where crossings are on small watercourses with stable subsoils, equipment choice may not be critical. Where non-plastic silts and clays or unstable fine sands are anticipated in the subgrade material, the following observations should be noted:

- ◆ Tracked equipment is superior to rubber tired equipment.
- ◆ Crawler tractors with angle dozer or bulldozer blades and fixed bucket front end loaders should be avoided.
- ◆ Smaller, lighter dump trucks to deliver surfacing material will cause less damage to approaches than large trucks.
- ◆ Track mounted hydraulic excavators with reaches of 25 feet

or more provide the best and fastest installation.

- ◆ A tracked front end loader with a 4 in 1 clamshell type bucket and a large rubber tired backhoe provide the best installation if a hydraulic excavator is not available.
- ◆ A farm tractor with a scraper blade is very useful.
- ◆ A gasoline powered pump and hose should be available for pumping excess water from trenches.