FOTG IV Basics

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State Conservation Engineer
2008 ICE Training

FOTG IV

- Conservation Practice Standards
- Design Notes (state specific)
- Construction Specifications
- Operation & Maintenance Plans
- Statements of Work

What is a Conservation Practice Standard?

- Conservation practice standards establish the minimum acceptable level of quality that is required to plan, design, install, operate and maintain conservation practices
- Establish criteria
  - Limits, maximums and minimums, storm frequency, etc.

What is a Conservation Practice Standard?

- Provides criteria to judge whether a practice has been properly planned, designed and implemented

How are Conservation Practice Standards developed?

- Each state adopts the appropriate National Handbook of Conservation Practices (NHCP) standards applicable for the conservation needs in the state

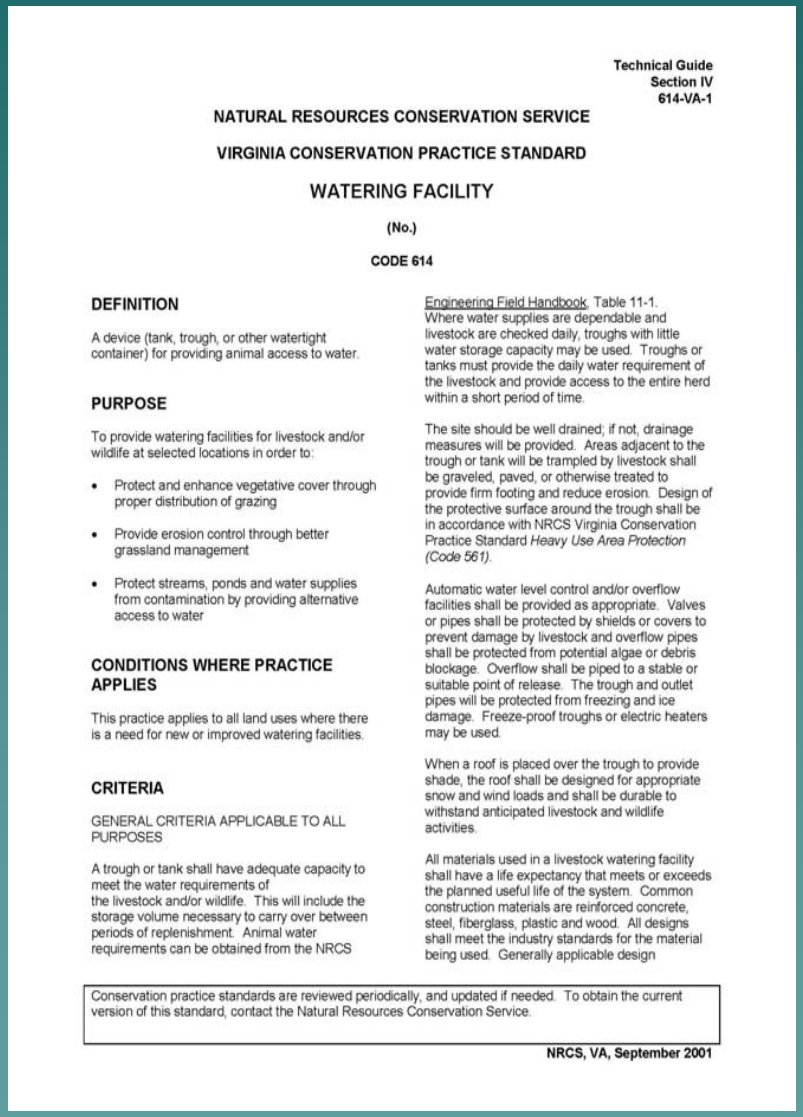
How are Conservation Practice Standards developed?

- States cannot make their standard require less than the NHCP standard
- Lead discipline is responsible for editing NHCP standard

How are Conservation Practice Standards developed?

- Lead disciplines at the state level
  - Engineering (SCE)
  - Ecological Sciences (SRC)
- Field input
- If a standard falls under engineering, engineering job approval authority is needed to plan, design and install the practice

Standard Sections



Technical Guide
Section IV
614-VA-1

NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA CONSERVATION PRACTICE STANDARD

WATERING FACILITY

(No.)

CODE 614

DEFINITION

A device (tank, trough, or other watertight container) for providing animal access to water.

PURPOSE

To provide watering facilities for livestock and/or wildlife at selected locations in order to:

- Protect and enhance vegetative cover through proper distribution of grazing
- Provide erosion control through better grassland management
- Protect streams, ponds and water supplies from contamination by providing alternative access to water

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where there is a need for new or improved watering facilities.

CRITERIA

GENERAL CRITERIA APPLICABLE TO ALL PURPOSES

A trough or tank shall have adequate capacity to meet the water requirements of the livestock and/or wildlife. This will include the storage volume necessary to carry over between periods of replenishment. Animal water requirements can be obtained from the NRCS Engineering Field Handbook, Table 11-1. Where water supplies are dependable and livestock are checked daily, troughs with little water storage capacity may be used. Troughs or tanks must provide the daily water requirement of the livestock and provide access to the entire herd within a short period of time.

The site should be well drained; if not, drainage measures will be provided. Areas adjacent to the trough or tank will be trampled by livestock shall be graveled, paved, or otherwise treated to provide firm footing and reduce erosion. Design of the protective surface around the trough shall be in accordance with NRCS Virginia Conservation Practice Standard *Heavy Use Area Protection (Code 561)*.

Automatic water level control and/or overflow facilities shall be provided as appropriate. Valves or pipes shall be protected by shields or covers to prevent damage by livestock and overflow pipes shall be protected from potential algae or debris blockage. Overflow shall be piped to a stable or suitable point of release. The trough and outlet pipes will be protected from freezing and ice damage. Freeze-proof troughs or electric heaters may be used.

When a roof is placed over the trough to provide shade, the roof shall be designed for appropriate snow and wind loads and shall be durable to withstand anticipated livestock and wildlife activities.

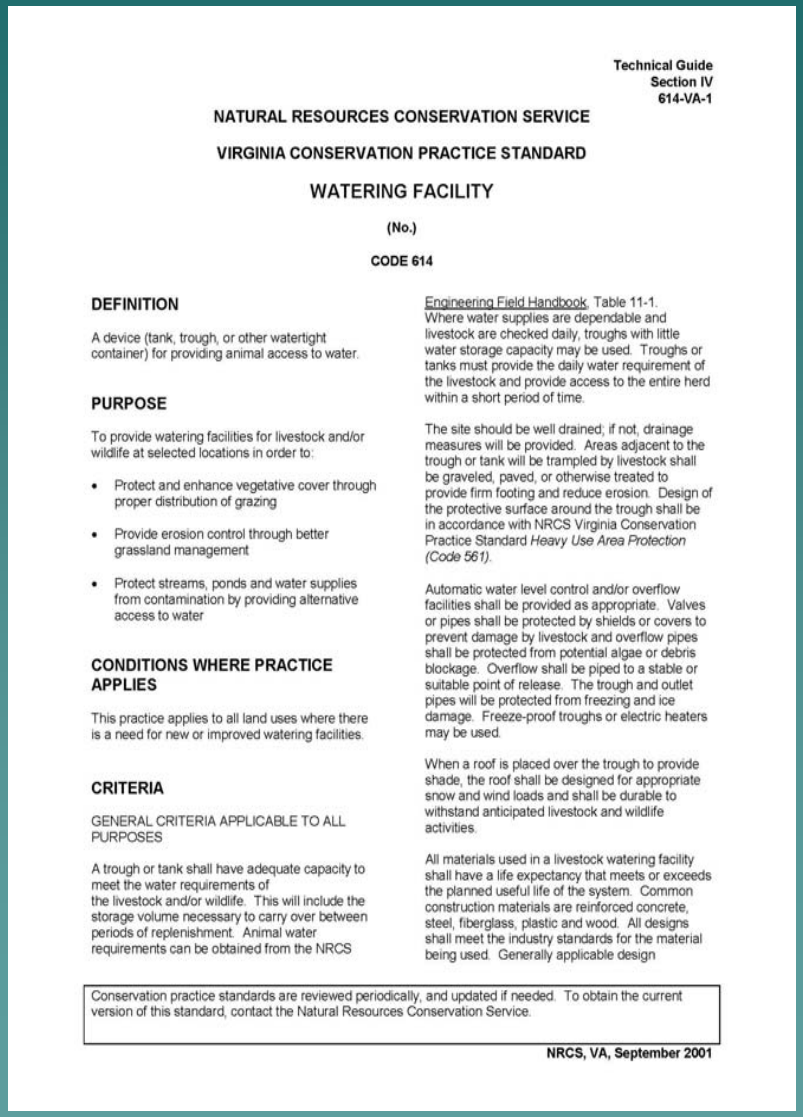
All materials used in a livestock watering facility shall have a life expectancy that meets or exceeds the planned useful life of the system. Common construction materials are reinforced concrete, steel, fiberglass, plastic and wood. All designs shall meet the industry standards for the material being used. Generally applicable design

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

NRCS, VA, September 2001

- Definition – simple explanation of the practice
- Purpose – primary conservation reasons for which the practice is applied

Standard Sections



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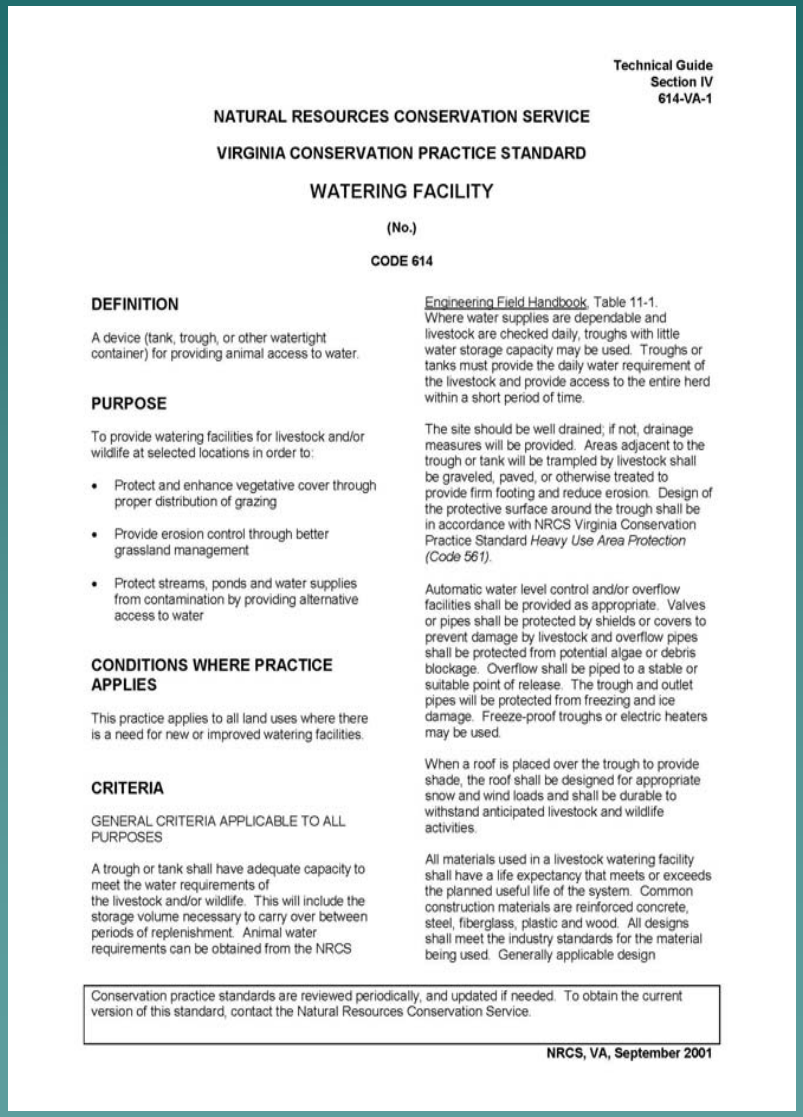
NRCS, VA, September 2001

- Conditions Where Practice Applies – details the resource concern that the practice will aid in solving

Standard Sections



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NRCS, VA, September 2001

- Criteria – addresses what is necessary to plan, design and install the practice (maximums and minimums, limits, etc.)
- Have to meet all criteria

Standard Sections

requirements and procedures can be found in the documents referenced at the end of this standard. Concrete structures shall be constructed from a concrete mix producing a minimum compressive strength of 3,500 psi at 28 days. Galvanized steel tanks shall have a minimum thickness of 16 gauge. Plastic and fiberglass structures shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight.

Used equipment tires shall be durable and free of chemical residues.

CONSIDERATIONS

This practice may adversely affect cultural resources and must comply with GM 420, Part 410.

The siting of a livestock watering facility is a function of conservation planning for the agricultural enterprise to minimize erosion from the concentration of animal traffic.

Watering facilities should be accessible to small animals. Escape ramps or protective fencing to protect small animals should be installed.

Adequate protection for livestock during the winter should be considered.

Cut-off values, removable risers, or other devices should be considered if freezing may be a problem during winter months if the water facility is not used.

PLANS AND SPECIFICATIONS

Plans and specifications for installing troughs and tanks shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the trough and/or tank is a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

Development of plans will be guided by the Engineering Field Handbook, Chapter 5, and shall be in accordance with the National Engineering Manual, Parts 541 and 542.

OPERATION AND MAINTENANCE

An Operation and Maintenance plan specific to the type of installed trough or tank shall be provided to the landowner. The plan shall include, but not be limited to, the following provisions:

- Check for debris, algae, sludge or other materials in the trough which may restrict the inflow or outflow system
- Check for leaks and repair immediately if any leaks are found
- Check the automatic water level device to ensure proper operation
- Check to ensure that adjacent areas are well protected against erosion
- Check to ensure the outlet pipe is freely operating and not causing erosion problems
- Prepare guidance for winter weather, such as adding material in the storage area to allow for ice expansion without damage

Algae and iron sludge accumulation should be addressed in areas with water quality that is known to cause problems. Chemicals such as copper sulfate and chloride can be recommended as needed, as long as local rules and regulations are followed.

REFERENCES

1. Engineering Field Handbook, USDA-NRCS.
2. National Engineering Manual.
3. Manual of Steel Construction, American Institute of Steel Construction.
4. *Timber, National Design Specification for Wood*, American Forest and Paper Association.
5. Concrete, ACI 318, American Concrete Institute.
6. Masonry, Building Code Requirement for Masonry Structures, ACI 530, American Concrete Institute.

- Considerations – details that could enhance the benefits of the practice
- Plans and Specifications – details requirements for engineering plans and specifications

Standard Sections

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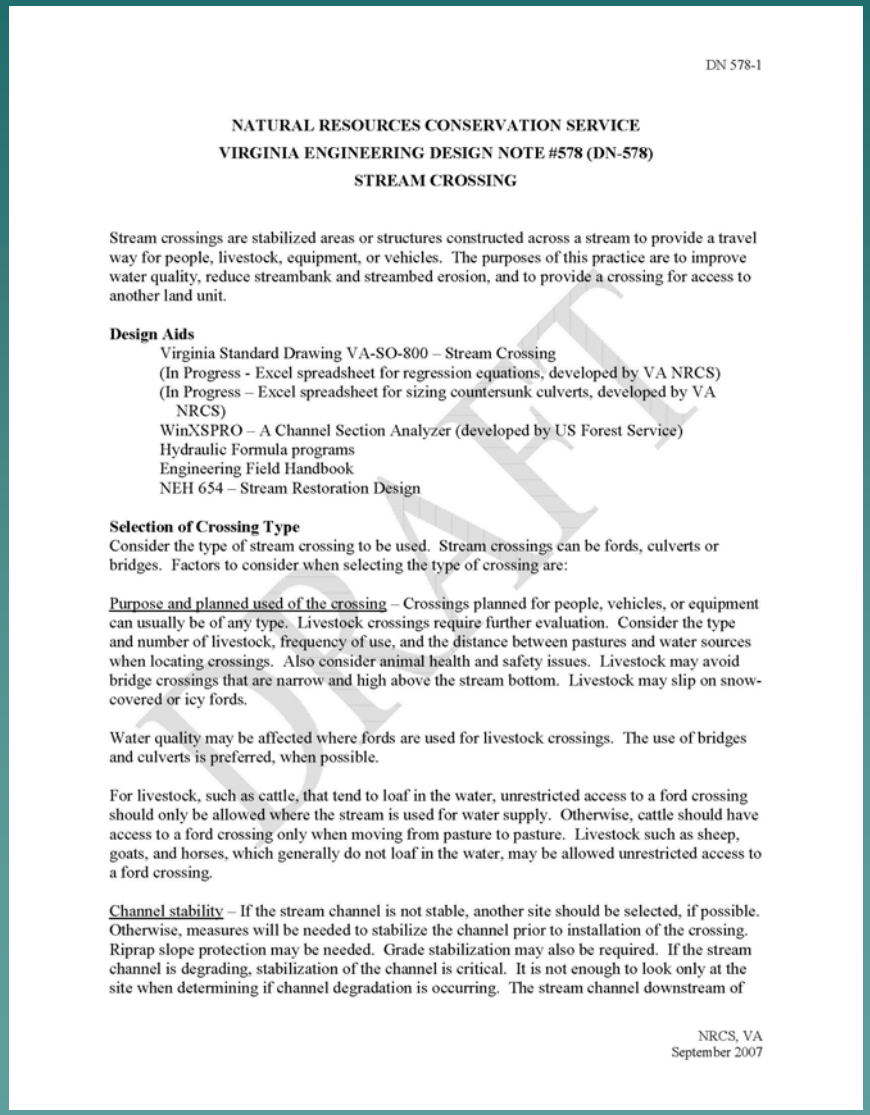
- Operation and Maintenance - details requirements for O&M
- References – list of references for planning, design or installation

What is a Design Note?

- Provide state specific “How To”
- Developed for engineering standard
- Guidance complies with standard

Design Note



DN 578-1

NATURAL RESOURCES CONSERVATION SERVICE
VIRGINIA ENGINEERING DESIGN NOTE #578 (DN-578)
STREAM CROSSING

Stream crossings are stabilized areas or structures constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles. The purposes of this practice are to improve water quality, reduce streambank and streambed erosion, and to provide a crossing for access to another land unit.

Design Aids

Virginia Standard Drawing VA-SO-800 – Stream Crossing
(In Progress - Excel spreadsheet for regression equations, developed by VA NRCS)
(In Progress – Excel spreadsheet for sizing countersunk culverts, developed by VA NRCS)
WinXSPRO – A Channel Section Analyzer (developed by US Forest Service)
Hydraulic Formula programs
Engineering Field Handbook
NEH 654 – Stream Restoration Design

Selection of Crossing Type

Consider the type of stream crossing to be used. Stream crossings can be fords, culverts or bridges. Factors to consider when selecting the type of crossing are:

Purpose and planned used of the crossing – Crossings planned for people, vehicles, or equipment can usually be of any type. Livestock crossings require further evaluation. Consider the type and number of livestock, frequency of use, and the distance between pastures and water sources when locating crossings. Also consider animal health and safety issues. Livestock may avoid bridge crossings that are narrow and high above the stream bottom. Livestock may slip on snow-covered or icy fords.

Water quality may be affected where fords are used for livestock crossings. The use of bridges and culverts is preferred, when possible.

For livestock, such as cattle, that tend to loaf in the water, unrestricted access to a ford crossing should only be allowed where the stream is used for water supply. Otherwise, cattle should have access to a ford crossing only when moving from pasture to pasture. Livestock such as sheep, goats, and horses, which generally do not loaf in the water, may be allowed unrestricted access to a ford crossing.

Channel stability – If the stream channel is not stable, another site should be selected, if possible. Otherwise, measures will be needed to stabilize the channel prior to installation of the crossing. Riprap slope protection may be needed. Grade stabilization may also be required. If the stream channel is degrading, stabilization of the channel is critical. It is not enough to look only at the site when determining if channel degradation is occurring. The stream channel downstream of

NRCS, VA
September 2007

DRAFT

- Standard specific
- Provides guidance for developing a practice design that meets the standard criteria

What is a Construction Specification?

- Explicit set of requirements to be satisfied
- Virginia NRCS specific construction specifications
  - NEH 642 Construction Specifications
- FOTG Section IV specs can be used for most conservation work and EWP

Construction Specification

CONSTRUCTION SPECIFICATION

VA-761. LOOSE ROCK RIPRAP

1. SCOPE

The work shall consist of the construction of loose rock riprap revetments and blankets, including filter layers or bedding where specified.

2. MATERIALS

Rock for loose rock riprap, filter layers or bedding shall come from sources approved by an NRCS representative and meet the size and gradation requirements shown on the design drawings. The rock shall be excavated, selected and handled as necessary to meet the quality and grading requirements of this specification and the construction drawings. Individual rock fragments shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock fragments shall be angular to subrounded in shape. The least dimension of an individual rock fragment shall be not less than 1/3 the greatest dimension of the fragment unless otherwise specified on the construction drawings.

Except as provided below, the rock shall have the following properties:

a. Bulk specific gravity (saturated surface-dry basis) not less than 2.5.
b. Absorption not more than 2 percent
c. Soundness: Weight loss in five cycles not more than 10 percent then sodium sulfate is used or 15 percent when magnesium is used.

Bulk specific gravity and absorption shall be determined according to ASTM C 127. The test for soundness shall be performed according to ASTM C 88.

Rock that fails to meet the requirements stated in a, b, and c above may be accepted only if similar rock from the same source has been demonstrated to be sound after 5 years or more of service under conditions of weather, wetting and drying, and erosive forces similar to those anticipated for the rock to be installed under this specification.

The rock shall conform to the grading limits, specified on the drawings, after it has been placed as the riprap.

3. SUBGRADE PREPARATION

The subgrade surfaces on which the riprap or bedding course is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved materials and shall be compacted to a density equal to the adjacent existing soil material.
Rock materials shall not be placed until the foundation preparation is completed and the subgrade surfaces have been inspected and approved by the NRCS representative.

4. EQUIPMENT-PLACED ROCK RIPRAP

The rock shall be placed by equipment on the surfaces and to the depths specified. The riprap shall be constructed to the full course thickness in one operation and in such a manner as to avoid serious displacement of the underlying materials. The rock shall be delivered

NRCS-VA-761-1
(9-04)

- Scope – specific work the spec covers
- Specific requirements to be met "Workmanship"
- Quality criteria – used to determine whether or not installed work meets requirements
- Provided to landowner

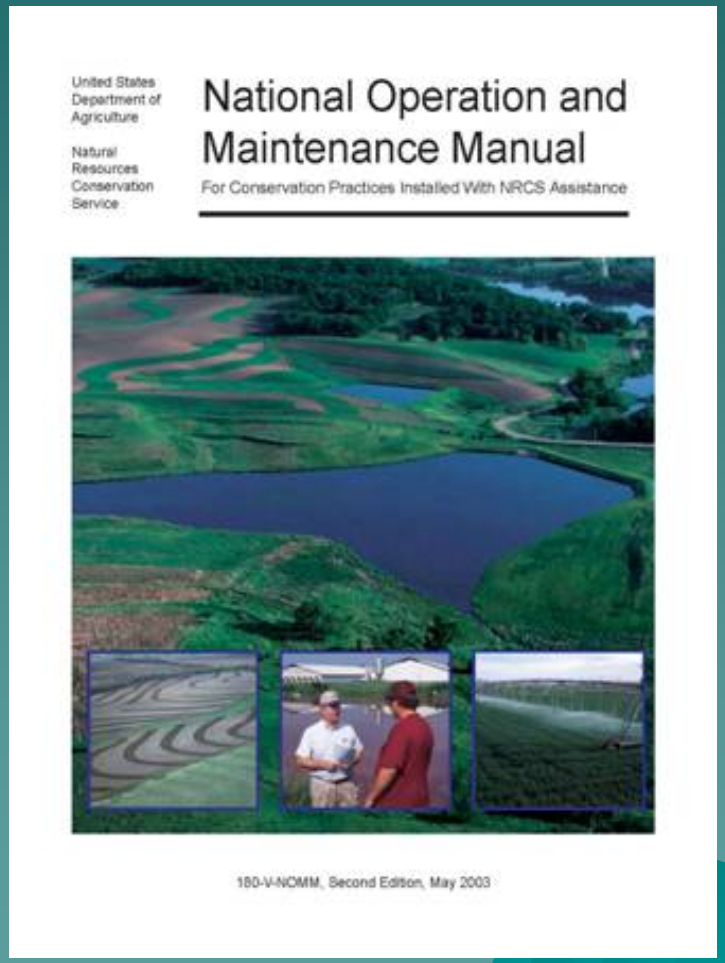
Standard vs Specification

- Separate documents
- Standard provides limits, maximums and minimums
- Specification provides explicit requirements for workmanship, technical details of constructed work

Operation and Maintenance

- National Operation and Maintenance Manual
- O&M

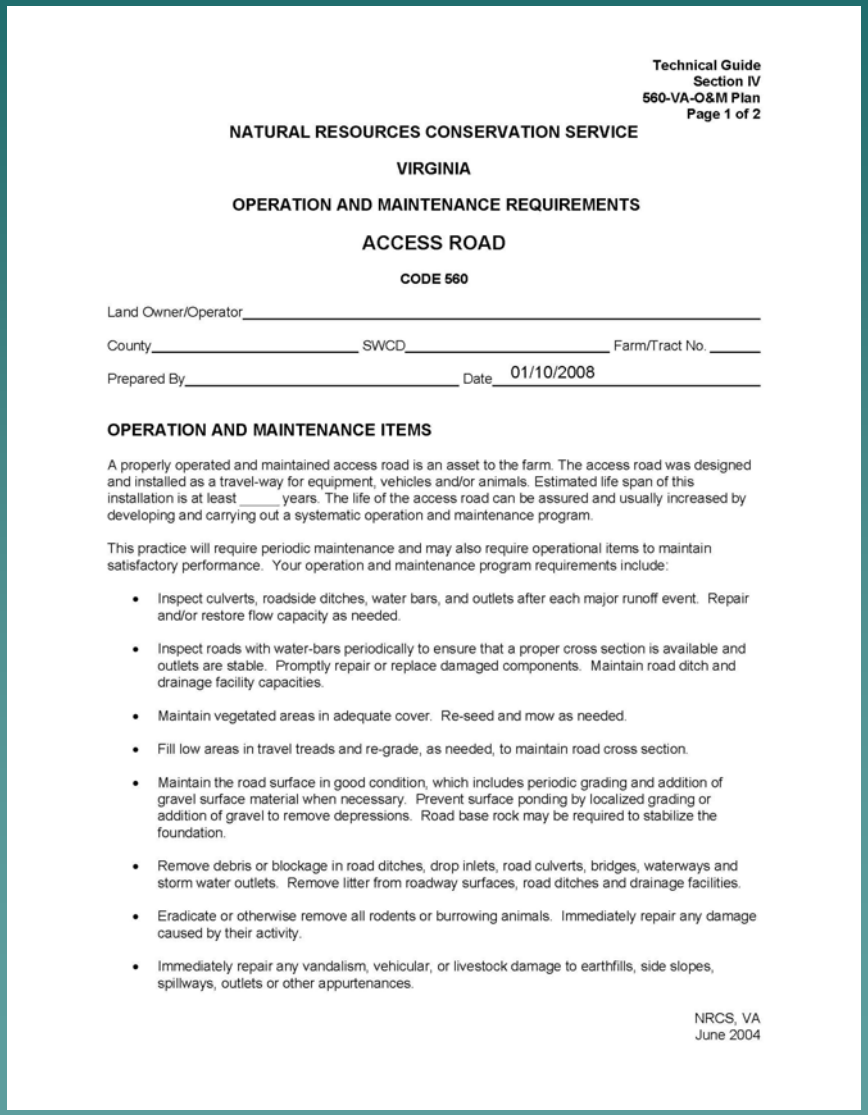
Written O&M plan required for each practice.



Operation and Maintenance

- Operation
  - Includes the administration, management, and performance of non-maintenance actions
  - Keeps practices safe and functioning as planned
- Maintenance
  - Prevents deterioration of practices
  - Repair of damage to practices
  - Replacement of practice components

Operation and Maintenance Plan



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NATURAL RESOURCES CONSERVATION SERVICE

VIRGINIA

OPERATION AND MAINTENANCE REQUIREMENTS

ACCESS ROAD

CODE 560

Land Owner/Operator_____

County_____ SWCD_____ Farm/Tract No. _____

Prepared By_____ Date 01/10/2008

OPERATION AND MAINTENANCE ITEMS

A properly operated and maintained access road is an asset to the farm. The access road was designed and installed as a travel-way for equipment, vehicles and/or animals. Estimated life span of this installation is at least _____ years. The life of the access road can be assured and usually increased by developing and carrying out a systematic operation and maintenance program.

This practice will require periodic maintenance and may also require operational items to maintain satisfactory performance. Your operation and maintenance program requirements include:

- Inspect culverts, roadside ditches, water bars, and outlets after each major runoff event. Repair and/or restore flow capacity as needed.
- Inspect roads with water-bars periodically to ensure that a proper cross section is available and outlets are stable. Promptly repair or replace damaged components. Maintain road ditch and drainage facility capacities.
- Maintain vegetated areas in adequate cover. Re-seed and mow as needed.
- Fill low areas in travel treads and re-grade, as needed, to maintain road cross section.
- Maintain the road surface in good condition, which includes periodic grading and addition of gravel surface material when necessary. Prevent surface ponding by localized grading or addition of gravel to remove depressions. Road base rock may be required to stabilize the foundation.
- Remove debris or blockage in road ditches, drop inlets, road culverts, bridges, waterways and storm water outlets. Remove litter from roadway surfaces, road ditches and drainage facilities.
- Eradicate or otherwise remove all rodents or burrowing animals. Immediately repair any damage caused by their activity.
- Immediately repair any vandalism, vehicular, or livestock damage to earthfills, side slopes, spillways, outlets or other appurtenances.

NRCS, VA
June 2004

- O&M plan
  - Expected life of the practice
  - Debris removal
  - Rodent control
  - Periodic review of the practice
  - Mowing
  - Limitation on grazing
  - Etc., Etc., Etc.
- Provided to landowner
- Contract issue

What is a Statement of Work?

- Details specific deliverables to be provided by Technical Service Providers (TSP's)
- Practice specific
- SOW

Statement of Work

United States Department of Agriculture — Natural Resources Conservation Service

STATEMENT OF WORK
Animal Trails and Walkways (575)
National Template

These deliverables apply to this individual practice. For other planned practice deliverables refer to those specific Statements of Work.

DESIGN

Deliverables:

1. Design documentation that will demonstrate that the criteria in NRCS practice standard have been met and are compatible with other planned and applied practices.
   a. Practice purpose(s) as identified in the conservation plan
   b. List of required permits to be obtained by the client
   c. Compliance with NRCS national and state utility safety policy (NEM Part 503-Safety, Subpart A - Engineering Activities Affecting Utilities 503.00 through 503.06)
   d. Practice standard criteria related computations and analyses to develop plans and specifications including but not limited to:
      i. Location/alignment
      ii. Hydrology/drainage
      iii. Construction operations
      iv. Vegetation
      v. Environmental Considerations
2. Written plans and specifications including sketches and drawings shall be provided to the client that adequately describes the requirements to install the practice and obtain necessary permits...
3. Identify fields where practice to be applied on a farm or ranch plan map.
4. Operation and Maintenance Plan
5. Certification that the design meets practice standard criteria and comply with applicable laws and regulations (NEM Subpart A, 505.03 (a) (3)).
6. Design modifications during installation as required.

Note: *State-Specific Deliverables may be added as appropriate*

INSTALLATION

Deliverables

1. Pre Installation conference with client and contractor.
2. Verification that client has obtained required permits.
3. Staking and layout according to plans and specifications including applicable layout notes.
4. Installation inspection (according to inspection plan as appropriate).
   a. Actual materials used (Part 512, Subchapter D Quality Assurance Activities, 512.33)
   b. Inspection records
5. Facilitate and implement required design modifications with client and original designer
6. Advise client/NRCS on compliance issues with all federal, state, tribal, and local laws, regulations and NRCS policies during installation.
7. Certification that the installation process and materials meets design and permit requirements.

Note: *State-Specific Deliverables may be added as appropriate*

CHECK OUT

Deliverables

1. As-Built documentation.
   a. Extent of practice units applied
   b. Drawings
   c. Final quantities
2. Certification that the installation meets NRCS standards and specifications and is in compliance with permits (NEM Subpart A, 505.03 (c) (1)).
3. Exit conference with client and contractor.
4. Progress reporting.

Note: *State-Specific Deliverables may be added as appropriate*

April 9, 2004 1

- Practice planning, design and construction documentation requirements

Questions?