

**U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK CONSERVATION PRACTICE GUIDELINE**

DIVERSION

(FEET)

362

REFERENCE

National Handbook of Conservation Practices-Code 362 - Diversion.

Commonly Associated Processes or Practices

The following conservation practices are commonly used in conjunction with this practice to address natural resource concerns and opportunities in New York. This does not imply that any or all of the listed practices must be included or that others may not be included in a conservation management system (CMS). Consult Section III of the Field Office Technical Guide for assistance in developing CMS.

Note: To determine whether a National or New York Conservation Standard applies to this and any other associated practices, check the following website: www.ny.nrcs.usda.gov. Click on the Technical Resources button, and look in the left-hand column for "eFOTG" on the next screen. Next, click on the "eFOTG" link, and look for the Conservation Standards in Section IV.

Table A: Commonly Associated Practice Standards or Processes

Number	Name	Job/Engineering Sheets
328	Conservation Crop Rotation	
329A	Residue Management, No-till and Strip Till	NY Jobsheets 21 and 22
329B	Residue Management, Mulch Till	NY Jobsheets 21 and 22
329C	Residue Management, Ridge Till	
340	Cover Crop	NY Jobsheet 16
344	Residue Management, Seasonal	
NY393s	Filter Strip — Strip	NY Jobsheets 17 and 19
412	Grassed Waterway	NY ENG 24 and 25, and/or 24A and 25A
468	Lined Waterway or Outlet	
585	Stripcropping	
590	Nutrient Management	
595	Pest Management	
600	Terrace	
606	Subsurface Drain	NY ENG 28 and 29
620	Underground Outlet	NY ENG 28 and 29
633	Waste Utilization	
638	Water and Sediment Control Basin	

Conservation practice guidelines are reviewed periodically, and updated if needed. To obtain the most current version of this practice guideline, contact the Natural Resource Conservation Service.

**NRCS-NY
June 2003**

NY707	Barnyard Water Management System	
EFH-2	Estimating Runoff	NY ENG 20 or EFH-2 Worksheets 1 and 2

OTHER REFERENCES

Engineering Field Handbook, Chapters 1-Engineering Surveys, 2-Estimating Runoff, 7-Grassed Waterways, and, 9-Diversions.

NY Plant Materials Technical Reference No. 11 "A Guide to Conservation Plantings on Critical Erosion Areas".

Technical Release 62, Engineering Layout, Notes, Staking, and Calculations.

NYS Consolidated Laws, Environmental Conservation Title 10, Water Pollution Control, Section 17-0803, SPDES Permits; Application.

Article 17 Environmental Conservation Law, 6NYCRR, Part 750, State Pollution Discharge Elimination System (SPDES).

<http://www.dec.state.ny.us/website/dow/PhaseII.html>

CULTURAL RESOURCES

Cultural resource reviews will be conducted for all ground disturbing practices, components, or other activities, as per the State Level Agreement between NRCS and the New York State Historic Preservation Officer.

INVENTORY AND EVALUATION

1. Determine if the diversion is suitable for the farm operation and the changes it could introduce into management.
2. Evaluate the drainage patterns of the watershed.
3. Locate a suitable outlet and determine stability, safety, and property rights. Check the downstream area for the possibility of negative effects. Consider the necessity of permission for using the selected outlet. All easements and rights-of-way are the responsibility of the landowner. Under no circumstances should water be diverted out of its natural watershed, even if the "new" watershed is on the same property.
4. If a waterway is planned to serve as an outlet for the diversion, insure that the established vegetative cover of the waterway will be suitable to safely discharge the additional flows from the planned diversion.
5. Conduct random soil borings to determine depth of the soil profile and identify potential restrictive layers (fragipans or other restrictive subsurface layers such as dense basal till, or bedrock regardless of fracturing).
6. Locate proposed culverts for farm crossings or bridges as needed.
7. Field Survey and Layout:
 - 7.1. The survey notes are to be compiled as outlined in the EFH, Chapter 1 and Technical Release 62.
 - 7.2. Establish a temporary benchmark (TBM) that will be serviceable throughout the construction period

Conservation practice guidelines are reviewed periodically, and updated if needed. To obtain the most current version of this practice guideline, contact the Natural Resource Conservation Service.

NRCS-NY
June 2003

- 7.3. Establish the initial baseline (normally with flags) for the diversion using a level, clinometer, or equivalent instrument. Make the apparent adjustments on the baseline to effectively straighten out the alignment. The general rule is to move stakes or flags UPSLOPE ONLY when straightening the channel baseline.
- 7.4. Stake out and survey the proposed centerline (typically at 50 foot intervals) of the diversion channel and cross sections at anticipated design grade changes, planned culverts, road crossings, and other pertinent features, i.e., buildings, roadways, etc. These cross sections should be spaced so as to reflect changes in topography and at a maximum of 200 feet.
- 7.5. The grade variation may range from 0.25 to 2.0 percent, although steeper grades may be considered if the permissible velocity is not exceeded using grassed waterway dimensions (see EFH Chapter 7, pages 7-29 through 7-47).

DESIGN PROCEDURE

NOTE: *This design procedure does not include diversions with storage function and an underground outlet.*

1. Determine the drainage area and identify the soil types and land uses. Complete Worksheet 1 of EFH-Chapter 2.
2. Complete Worksheet 2, Chapter 2 of EFH to determine the peak flow or design capacity (Q). Consult the Diversion Conservation Practice Standard (362) for the selection of the storm frequency for design. Consider the impact of other conservation practices on your design capacity, i.e., waterways, underground outlets, etc.
3. Determine the appropriate seeding for the soil type and quantity of flow (Q). Select seeding mixture from Plant Materials Technical Reference #11, "A Guide to Conservation Plantings on Critical Areas". Complete the job seeding requirements on the back of Form NY-ENG-23 or on NY-ENG-17, Seeding Grasses and Legumes.
4. Refer to Table 1 from Standard No. NY362, and determine the permissible velocity based on soil texture conditions. Record the value on Form NY-ENG-22-Design and Performance Record. Refer to Table 9-1, EFH, page 9-8 to determine the appropriate retardance (typically "D" in New York), and record on Form NY-ENG-22.
5. From the survey notes, plot the profile along the centerline and cross-sections to determine the preliminary design grade and depth of cut for each section.
6. When designing a Diversion, there are two critical analyses of the proposed design section. One is the stability analysis, while the other is the capacity analysis. The analyses are based on a retardance value. The stability analysis uses a retardance value typically characterized by a newly established or recently mowed vegetative condition, and is identified as condition "D" as found in EFH Exhibit 7-2, page 7-18. For this analysis, the important design result is the velocity (V_1) which must be less than or equal to the permissible design velocity. The capacity analysis uses a retardance value that is typically characterized by the vegetation in a mature state and/or at full growth, and is identified as either "B" or "C" for most field conditions found in New York. Refer to EFH Exhibit 7-2, page 7-18. The important design result for this analysis is the capacity or peak flow rate. This value provides you with the dimensions of the waterway (Top Width —T, Depth —D, and Velocity - V_2).
7. For the design of a parabolic shape diversion, refer to EFH Exhibits listed below. Go to the sheet with the design Retardance Values (D and C or D and B) and preliminary grade. Find the peak flow (Q-cfs) on the left side of the chart and the permissible velocity (V_1) at the top of the chart and find the appropriate design dimensions (T, D, and V_2) for all preliminary

grades. Repeat process for all proposed grades. These tables do not include a factor for extra depth for freeboard or sedimentation of the channel.

For a parabolic cross section, design the channel from EFH using:

Exhibit 9.0 — Page 9-14.5 to 9-14.16 (Green Pages)

Or

Exhibit 9-1 — Pages 9-17 to 9-20 and Pages 9-21-9-44 (White Pages)

Or

Exhibit 9-2.1 — Pages 20.5 to 9-20.10 (Green Pages)

For “V” or trapezoidal cross section, with “D” retardance, design the channel from EFH using:

Exhibit 9-3 — Pages 9-45-46 (White Pages)

For “V” or trapezoidal cross section, with “C” retardance, design the channel from EFH using:

Exhibit 9-4 — Pages 9-47-48 (White Pages)

Note: Refer to the criteria from the Standard to determine if freeboard is required. The depth values listed in the EFH references (above) require the addition of freeboard and/or settlement to be added to the design depth.

Tips:

1. Maintain a constant and compatible design cross-section, despite variable grades.
2. Design for 0.5 fps less than the permissible velocity to allow an alternate design cross section at the maximum permissible velocity.
8. Complete Forms NY-ENG-22-Design and Performance Record and NY-ENG-23-Construction Data and Specifications.
9. Finalize proposed grade and plot proposed centerline and cross-sections considering depth and left and right bank elevations. Use the planned diversion dimensions to calculate the cut and fill quantities. Plotted cross-sections will assist with spoil placement, and to confirm water flow confinement.
10. Design the level lip spreader, if required. Refer to EFH, Page 9-35-36 (yellow), Table 9.3.
11. Design culverts or farm crossings, as needed. Information for culvert design can be found in EFH Chapter 3-Hydraulics.
12. A statement requiring landowner/contractor to notify **Dig Safely NY** for proper utility notification is **REQUIRED** on the plan view drawing.
13. Determine your level of Job Approval Authority for the design class of this project, obtain approval from appropriate individual, if not qualified.
14. Assemble a complete design drawing package.
15. Develop an Operation and Maintenance Plan (O&M) for the practice.

PERMITS AND NOTIFICATIONS

All permits, easements, and rights-of-way are the responsibility of the landowner as advised by their Technical Professional. **Dig Safely NY** (formerly the Underground Facilities Protection

<p>Conservation practice guidelines are reviewed periodically, and updated if needed. To obtain the most current version of this practice guideline, contact the Natural Resource Conservation Service.</p>

NRCS-NY
June 2003

Organization, or UFPO) will be contacted according to the time required before construction to mark all applicable facilities in the construction area. This is the responsibility of the landowner and contractor.

Identification and the location of all underground or overhead facilities not covered by **Dig Safely NY** is the responsibility of the landowner.

CONSTRUCTION LAYOUT

1. Provide copies of NY-ENG-23, construction specifications and drawings to the landowner. Explain all aspects of the job before a contractor is secured. Review the O&M plan with the landowner, to assure proper maintenance of the completed practice.
2. Thoroughly review the job with the landowner and contractor prior to construction. Insist on a follow-up on informing the utilities of the proposed construction. The landowner/contractor must call **Dig Safely NY** (formally UFPO) at least 2 working days prior to any ground disturbance.
3. Schedule the construction start with the landowner and contractor. Initial input on a project is important at the start. Plan the start of construction such that the completion time will permit optimal establishment of vegetative cover.
4. Mark the centerline stations with proposed cuts, set and mark offset grade stakes if needed, set slope stakes or flags for width of cut to show designed top width and depth.
5. Refer to the design depth of the channel and side slopes of the proposed design, calculate the distance to the centerline of the berm, and drive a wood stake on the centerline of the berm. The berm stake can be marked for the height of the berm and offset cut to the ditch bottom. (This reference system is optional, although some method of maintaining control should be used.)

CONSTRUCTION INSPECTION

1. Make random construction checks during implementation. The checks should include:
 - 1.1. Adherence to the design grade;
 - 1.2. The cross-section width at design depth at each design section change, and at any other design feature;
 - 1.3. Side slopes;
 - 1.4. Level lip spreader construction (if applicable), and,
 - 1.5. Height of ridge (additional for freeboard or settlement, as indicated in design).

During the final construction check, assure that the

- 1.6. Outlet is stable and free of spoil and debris;
- 1.7. Construction spoil and debris are properly disposed of;
- 1.8. Completed earthwork is suitable for seeding establishment; and,
- 1.9. Final seeding requirements have been installed in accordance with the seeding plan.

Document the progress of the construction in the Cooperator Assistance Notes (NRCS-CPA-6/6A) or a similar job log. In addition, photographs documenting construction progress are useful, although not required.

FINAL DOCUMENTATION REQUIREMENTS

All properly planned, designed, and installed conservation practices require documentation in the appropriate case file. Documentation must be sufficient to show:

1. The design conforms to the applicable standard;
2. The prepared construction drawings and specifications accurately reflect the design;
3. The installed practice meets the requirements of the construction drawings and specifications, and,
4. The "As Built" condition of the practice. All drawings shall be identified "As Built" as drawn in red, and all changes shall be made in red.

REPORTING

Enter all documentation on the Conservation Plan (NRCS-CPA-68), Conservation Assistance Notes (NRCS-CPA-6/6A) and the contract document (NRCS-LTP-11), if applicable.

Report the practice and applicable components in the NRCS progress reporting system. Be sure to report benefits to all applicable resources and resource concerns as allowed in the NRCS progress reporting system.

OPERATION AND MAINTENANCE

Facilities, structures, and practices must be operated and maintained to ensure proper function and longevity. Periodic follow-up with the landowner is essential to ensure that all operation and maintenance (O&M) requirements are understood and followed. Refer to the practice standard for specific information.