

## DOCUMENTATION REQUIREMENTS

### Pond - 378

#### Excavated

#### I. Reference Materials

The following reference materials will be used for the planning, design, and construction of excavated ponds.

- a. Technical Guide, Section IV, Practice Standard 378, Ponds
- b. Engineering Field Manual (EFM), Chapters 1, 2, 3, 4, and 11.
- c. ND Supplement to Engineering Field Manual (NDSEFM), Chapters 2, 3, 4, 11
- d. Agricultural Handbook 590, Ponds - Planning, Design, Construction
- e. Hydrology Manual for ND
- f. County Soil Survey Report
- g. ND Construction and Material Specifications for Conservation Practices
- h. Technical Release 62, Engineering Layout, Notes, Staking, and Calculations
- i. Suitable Computer Software:
  - Watershed Hydrology (e.g. EFM2, EFH2, TR55)
  - Excel Spreadsheet Hydrology (e.g. ND-ENG-12e)
  - Excel Spreadsheet Yardage (e.g. ND-ENG-1e)

#### II. Site Investigation/Data Collection

The following information shall be obtained:

- a. Purpose (livestock, wildlife, irrigation, etc.)
- b. Pond size, volume, depth, etc. requirements
- c. Watershed characteristics
  1. Drainage area
  2. Watershed slope, flow length, T<sub>c</sub> (Time of Concentration)
  3. CN (Soil - Cover Complex Number)
  4. Base flow conditions
- d. Job approval authority (NRCS personnel)
- e. Soils/geologic investigation
  1. Planned by individual with job approval.
  2. Conduct a preliminary screening of the site with information from the county soil survey report.
  3. Test hole logs and samples.
    - (a) Unified Soil Classification System
    - (b) Embankment centerline and offsets (when used)
    - (c) Emergency spillway centerline and offsets (when used)
    - (d) Groundwater (groundwater source)
  4. Sedimentation - Consult with geologist when investigation and analysis are considered critical to practice life.
- f. Locations of overhead and buried utilities. North Dakota ONE CALL.

### III. Design Surveys

Minimum survey data will be recorded on Form ND-ENG-17 or 17a, as appropriate. Other survey notes shall be kept in loose-leaf or bound field notebooks.

Additional notes will be kept in a format similar to that shown in Technical Release 62, and Chapter 1, Engineering Field Manual. Electronic survey notes will be documented in a format that allows complete checking by others.

When staking for construction, all offset stakes shall be marked with the offset distance circled, i.e. 5 foot offset; mark 5' on stake as well as cut and other pertinent information.

### IV. Design Plans and Specifications

The design of excavated ponds will be in accordance with Standard and Specification 378 Pond, Section IV, Technical Guide.

The following steps shall be followed for the design of excavated ponds where peak inflow (discharge or volume) is considered in design.

- a. Delineate and measure drainage area on USGS Quad map, aerial photo, or other suitable map.
- b. Determine runoff curve number (CN) Use Forms ND-ENG-12 or ND-ENG-31 for computations. Specific References: 1) Hydrology Manual for ND, Chapters 2-3  
2) EFM, Chapter 2  
3) NDSEFM, Chapter 2
- c. Determine the required peak discharge rates by the procedures outlined on Forms ND-ENG-8 or ND-ENG-31.  
Specific References: 1) ND Hydrology Manual, Chapter 5  
2) EFM, Chapter 2  
3) NDSEFM, Chapter 2

### V. Material and Construction Requirements

At least 3 sets of drawings and specifications will be prepared and distributed to the cooperator, contractor, and NRCS cooperator's file. For most jobs, complete appropriate parts of Form ND-ENG-17 (Stockwater Dugout Data Sheet) or ND ENG-17a (Stockpond Restoration Data Sheet) for recording survey, design, layout, and yardage determinations.

For more complex jobs, site specific drawings and other approved drawings will be used. In addition to drawings and specifications, the cooperator will be provided an O&M Plan.

### VI. Layout and Installation Procedures

- a. Record bench mark; describe and assign elevation.
- b. Record top and bottom dimensions, side and end slopes, and rod readings at dimension points; also a minimum of one rod reading on either side where spoil will be placed. Determine yardage from ND-ENG-17 or ND-ENG-17a.
- c. Record if fencing is required.
- d. Locate and log test holes.

### Yardage Computations for Enlargement or Restoration of Excavated Dugouts.

Yardage computations may be made by several methods. The following two methods are preferred:

a. Method 1

- (1) Determine the size of the existing dugout by taking at least eight shots around the perimeter of the hole, average the shots and subtract from HI to determine weighted top elevation. Take at least five shots in bottom of hole, average the shots and subtract from HI to determine weighted elevation of bottom. Difference in elevations is weighted depth. Determine an average top width and length and an average bottom width and length. Determine midwidth and midlength by:

$$\frac{\text{TW (Ave.)} + \text{BW (Ave.)}}{2} = \text{MW, and } \frac{\text{TL (Ave.)} + \text{BL (Ave.)}}{2} = \text{ML}$$

- (2) Use prismoidal formula

$$\frac{(A_T + 4A_m + A_B)}{6} \times \text{weighted depth} = \text{volume cubic yards}$$

6 (27)

The front of Engineering Form 17 can be used.

- (3) Set new slope stakes and take shots 6 through 13 (Engineering Form 17), use weighted top elevation determined in Step 1 and subtract new design bottom elevation to determine Cuts 1 through 5. Compute yardage from dugout yardage tables.
- (4) Compute yardage actually moved by subtracting yardage determined in Step 1 from yardage determined in Step 2.

b. Method 2

- (1) Cross section existing dugout taking at least seven cross sections--one at each end, one halfway down each slope, one at bottom of end slopes, and one midway in bottom.
- (2) Compute yardage by average and area\* method for existing dugout with ground line as straight from edge of hole to other edge on each cross section, except end ones which are zero end area.
- (3) Cross section newly designed dugout at ends and same locations as Step 1 plus ends of new bottom. Compute yardage for new dugout by average end area method\* using procedure in Step 2.
- (4) Determine actual yardage moved by subtracting yardage determined in Step 2 from yardage determined in Step 3.

\*Determine end area by double end area, planimetry, or other acceptable methods.

## VII. Checkout

NRCS or Other than Contractor:

- a. Check appropriate section of Form ND-ENG-17 or ND-ENG-17a.
- b. Survey and record on Form ND-ENG-17, ND-ENG-17a, or ND-ENG-52.
- c. Also use ND-ENG-17 or ND-ENG-17a for 5% spot check. \* Show:
  - 1) Centerline profile (cross section)
  - 2) Cross sections at ends of design bottom

Do not use Form ND-ENG-52 for 5% spot check. Show:

- 1) Partial cross sections showing end slopes
  - 2) Partial cross sections showing side slopes
- a. Berm width (both forms)
  - b. Spoil height (bottom forms)
  - c. Check yardage computations. Include signature and date.

Contractor checkout \*

- 1) Check appropriate section of Form ND-ENG-17 or ND-ENG-17a.
- 2) Review contractor completed Form ND-ENG-17, ND-ENG-17a, or ND-ENG-52 for completeness and compliance with design requirements and specifications.
- 3) Check yardage computations.
- 4) Initial and date form under contractor's signature.

\*In addition to the required 5% spot check, the district conservationist will determine need and spot check of each contractor operating in the district. He will implement procedures, schedule and assist in training of contractors in checkout procedures.