

## DOCUMENTATION REQUIREMENTS Waterspreading - 640

### I. Reference Materials

The following is a list of reference materials useful in planning, design and construction of a waterspreading system.

- a. Engineering Field Manual, Chapters 2 (Estimating Runoff), 3 (Hydraulics), 6 (Structures), 9 (Diversions)
- b. Supplement to Engineering Field Manual, Chapters 2 (Estimating Runoff), 3 (Hydraulics), Chapter 16 (Waterspreading)
- c. Section IV Technical Guide, Practice Standard 640, Waterspreading
- d. North Dakota Construction & Material Specifications for Conservation Practices
- e. North Dakota Irrigation Guide
- f. North Dakota Hydrology Manual
- g. ASTM and AWWA Standards
- h. King's Handbook
- 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)
  - Hydraulics (e.g. OHIO Program)

### II. Site Investigation/Data Collection

The following is a list of items to be checked in the field:

- a. Does proposed waterspreading system have an adequate and stable outlet?
- b. Determine watershed drainage area, average watershed slope, and weighted cover complex number.
- c. Log soils in waterspread area and review soil survey data. Soil survey information is minimum, detailed field survey by Soil Scientist is recommended. Determine potential salinity/sodicity problems, crops to be grown, etc.
- d. Is there a spring or base flow condition?
- e. Check for buried utilities, North Dakota ONE-CALL
- f. Determine engineering job class

### III. Design Surveys

- a. Survey notes shall be kept in loose-leaf or bound field notebooks. The notes will be kept in a format similar to that shown in Technical Release 62 and Chapter I, Engineering Field Manual. Electronic survey notes will be documented in a format that allows complete checking by others.
- b. Record bench mark; describe and assign elevations.
- c. Create a topographic map of waterspreading area and sufficient field notes to accurately

locate dikes, ditches, structures, and other works pertinent to the design of the system. Survey should show maximum 1 foot contour lines, ½ foot contours with random intermediate shots are preferable in the waterspread areas. Detail of survey will vary by structures and type of system.

- d. The surveyor will use sound professional judgement in gathering information for the design and construction of the waterspreading system. Information will be used to determine diversions, ditches, dikes, waterspreading grades, pipe(s) elevations, outlets, and estimated quantities for the system.

#### IV. Design Plans and Specifications

The design of a waterspreading system will be in accordance with Standard 640 Waterspreading, Section IV, Technical Guide. Individual structures and components will be designed in accordance with the appropriate Standard for that feature (e.g. Diversion Standard 362).

- a. Conduct hydrologic investigations for the 2, 5, and 25 year - 24 hour events. Determine feasibility and waterspread acres able to serve with available water source (pumped or diverted).
- b. During this period the appropriate Water Rights, Permit to Construct applications need to be completed. Other Federal, State, and Local laws - rules - regulations will apply depending on specific features (e.g. Cultural, Historical, Endangered Species).
- c. Determine type of system to use based on topography and supply. Complete design plans for turnout and/or diversion structures, dikes, ditches, pipe outlets, emergency spillways, etc.
- d. Use applicable portions of Form ND-ENG-40 (Waterspreading Data Sheet), field notebooks, Form ND-ENG-31 (Peak Flow Data Sheet), or Form ND-ENG-16 (Dam Data Sheet), if applicable along with standard drawings. Electronic survey and computer design of features, computer output, and CADD drawings will include adequate information for checking by others (design, quantities, etc.)

#### V. Material and Construction Requirements

Construction specifications are to be provided with each set of plans. The North Dakota Construction and Material Specification for Conservation Practices shall be used for each item of work and material, as applicable or available. Additional specifications may need to be written to provide full material and installation instructions. A cover sheet and list of specifications is to be provided with the specifications.

The cooperator, contractor, and the NRCS cooperator's file will be provided a set of construction plans and specifications. The plans can be shown on appropriately sized grid or plan/profile sheets. The plans will contain, as a minimum, the following:

- a. Overall Plan View. This may be superimposed on the location map. Show stationing, identify reaches, locate all structures.
- b. Profile ditches, dikes, waterspread areas. Show original ground superimposed on design grade, stationing, reaches, etc. Centerline profiles are required.
- c. Cross Sections - Show typical cross sections. Cross sections are required at all significant changes in original cross section shapes and grades to calculate quantities.

- d. Construction Notes - Add notes to clarify or furnish direction for construction.
- e. Quantities - Estimates based on earthwork cross sections and structural quantities.
- f. Job Approval.

#### VI. Layout and Installation Procedures

Layout surveys will be recorded in loose-leaf or bound survey books. Set necessary stakes for at alignment, depth, width, and side slopes. Set grade stakes as needed. Survey notes will be kept in the format as shown in Chapter I - Engineering Field Manual and/or Technical Release 62. Electronic survey notes will be documented in a format to allow complete checking by others.

#### VII. Checkout

- a. Compliance checking - record in field notes. Take standard survey notes of dikes, ditches, and structures. If electronic equipment is used, the output must be readable by others and contain the information needed to verify quantities
  - (1) Record elevations and cross sections of each spreader dike or ditch, canal, or supply ditch to verify adherence to design and specifications. Record a minimum of one cross section per reach not to exceed 400 feet between cross sections. Cross sections for dikes, ditches, and diversions are required at all significant changes in original design cross section shapes and grades for final yardage computations. Check centerline profiles, top and bottom elevations, sideslopes. Verify widths and depths.
  - (2) Record elevations and dimensions of all control structures. Measure lengths and areas seeded.
  - (3) Check all quantities using appropriate ND-ENG forms or alternate acceptable methods (e.g. computer generated double end-area earthwork quantities).
  - (4) Qualified signature and date checked.
- b. Statement of compliance on "as-built" plans - that construction is complete according to plans and specifications, and adequacy or status of vegetation and topsoil placement. Date and sign by individual making determination.