

NEBRASKA PRACTICE DOCUMENTATION REQUIREMENTS

DAM, DIVERSION (348) DAM, MULTIPLE PURPOSE (349) POND (378)

FLOODWATER RETARDING STRUCTURE (402) GRADE STABILIZATION STRUCTURE (410) IRRIGATION STORAGE RESERVOIR (436) IRRIGATION REGULATING RESERVOIR (552-B)

I. GENERAL

Minimum documentation requirements for this practice are outlined below. Documentation for associated practices or system components shall follow the appropriate practice documentation requirements. Additional documentation requirements can be found in the General Documentation Requirements section of the Nebraska Practice Documentation Requirements Manual.

A. References

1. National Engineering Manual (NEM)
2. Nebraska Field Office Technical Guide (FOTG)
3. National Engineering Handbook (NEH), Part 650
4. Nebraska Standard Drawings
5. Technical Releases (TR) – 56, 69, 77, 20, 55, 60, and others
6. Conservation plan for the unit
7. Computer software - Missouri Pond Program, SITES, EFH-2, TR-55, TerraModel, OHIO Engineering Programs, ArcView, and others
8. Local supplemental criteria

II. RESOURCE INVENTORY AND SURVEYS

A. Design Investigations

1. Inventory and Evaluation
2. Geologic Investigation
 - a. Group I dam sites as defined in NEM Part 531, Section 531.20, will be investigated under the supervision of a qualified geologist as defined in subpart 531.21. The level, intensity, and requirements of the site investigation will be as defined in subparts 531A, B, and C of NEM 531. (NE-ENG-11).
 - b. Group II dam sites as defined in NEM Part 531, Section 531.20, will be investigated under the guidelines provided in Section 531.23 of NEM Part 531. Record on NE-ENG-11 or equivalent.
3. Corrosion potential
 - a. Resistivity readings
 - b. Other justification
4. Soil Mechanics Investigation
 - a. Justification for sampling and testing (or lack thereof)
 - b. Test results and conclusions
 - 1) NEM 210-V, Part 531, Subpart 531B Dam site investigations
5. Location of underground utilities

B. Design Surveys

On smaller projects the design survey may be combined with the layout survey, depending upon the experience and judgment of the technician.

1. Topographic mapping.
 - a. Irrigation Storage Reservoir, Floodwater Retarding, and Multiple Purpose Dams -- topographic map of reservoir area and dam site in sufficient detail to adequately design the structure.
 - b. Other Earth Dams -- as needed, depending on site conditions and project needs. Surveys must be adequate in nature and extent to provide accurate design values.
2. Profiles and cross-sections -- record in field notes. If an electronic data collector is used, include hard copies of the raw data and reduced notes in the design folder. If a detailed topographic field survey is taken and the points are loaded into CADD software, the following profiles and cross-sections can be derived using the digital terrain map and may not have to be surveyed individually.
 - a. Centerline of embankments
 - b. Centerline of auxiliary spillway -- from below inlet section to a point beyond control section to establish exit channel slope on Ponds (Practice Standard 378) and down to base grade of outlet channel on all other earth dams.
 - c. Centerline of principal spillway far enough downstream to determine tailwater conditions and stability of outlet channel.
 - d. Grade Stabilization Structure (Practice Standard 410) -- profile in channel upstream and downstream from structure including area protected.
 - e. Cross-section at maximum fill section (one section minimum, depending on size, and type of structure).
 - f. Cross-section of auxiliary spillway at control section.
3. Horizontal and Vertical Control
 - a. A sufficient number of temporary benchmarks placed so that horizontal and vertical control can be established throughout the design, construction, and checkout of the structure.
4. Field survey notes will conform to NEM Part 540 and follow standard field note documentation as illustrated in Technical Release 62 (TR-62) and/or Nebraska Standard Format for Engineering Notes Transmittal Sheets No. 3. Survey notes will be prepared such that they exhibit legible, logical, clear and concise data.

C. Environmental Inventory

1. NEPA inventory of resources -- form NE-CPA-52 must be completed by NRCS during planning
2. Wetland effects, if applicable
3. Archeological/Historical/Cultural Resources
 - a. Complete all continuing environmental requirements stemming from planning as expressed in the General Documentation Requirements section of the Nebraska Practice Documentation Requirements Manual.

III. DESIGN

- A. Design Data - record on standard data sheets, printouts, and/or appropriate worksheets. This information along with Resource Inventory and Survey information should also be summarized in a design report.
1. Watershed hydrologic data
 - a. Drainage area (ac or mi²)
 - b. Runoff curve number

- c. Watershed slope (%)
 - d. Watershed length (ft)
 - e. Sediment delivery volume (ac-ft)
 - f. Design storm(s) return period (year)
 - g. Storm runoff (in)
 - h. Peak flow (cfs)
 - i. Annual surface yield (ac-ft)
 - 1) References: NE-ENG-16, 18, 36, NEH Part 650 Engineering Field Handbook (EFH) Chapter 2, TR-55, OHIO Engineering Programs, Missouri Pond Program, SITES2000
 - 2. Flood routing method or software
 - 3. Hydraulic data; elevations and dimensions for:
 - a. Auxiliary spillway
 - b. Principal spillway
 - c. Drawdown pipe
 - d. Outlet channel
 - 1) References: OHIO Engineering Programs, SITES2000, Missouri Pond Program, NE-ENG-38, 39, 40, 41, 41A, and 42.
 - 4. Reservoir data – sediment delivery volume, stage-storage table, storage (temporary and permanent) required for intended purpose such as irrigation, recreation, flood prevention, etc. (NE-ENG-13, 18, and 31)
 - 5. Dam hazard classification
 - a. NEM 210-V, Part 520, Subpart C DAMS
 - 6. Structure data – top width, side slopes, berm dimensions (NE-ENG-38, 39, 40, 41, and 42).
 - 7. Structural design computations – design life, pipe lengths, anti-seep diaphragm, etc. (depending on structural needs) (TR-60).
 - 8. Quantity, cost, and performance time estimates (NE-ENG-15, 37, and 7).
 - 9. Seeding mix(s) (NE-CPA-8).
 - 10. Initials/signatures and dates by the person(s) responsible for the design, approval, and checking of the design.
- B. Permits
- 1. Certified Wetland Determination. A wetland determination may be required to obtain a U.S. Army Corps of Engineers (USACE) 404 permit.
 - 2. 404 Permit - individual permit obtained, nationwide permit applies, or if practice is exempt.
 - 3. Dam Safety and Water Rights – Nebraska DNR Permit
When a structure is classified as an “inventory size” structure by Nebraska Department of Natural Resources (NDNR), the design shall be submitted to NDNR for approval (see NE501.81, NE Exhibit 2 in NEM Part 501, for “inventory size” criteria and permit requirements).
 - 4. Easements – owner is responsible for obtaining all easements/agreements.

IV. PLANS AND SPECIFICATIONS

- A. Plans
- 1. Use Nebraska standard drawings to the extent possible. These are to be supplemented by additional drawings or specification notes on the drawings to provide full installation instructions. Standard drawing sheet sizes will be used.
 - 2. Cover Sheet
 - a. Project name
 - b. Sponsor name

- c. Designer (agency) name
- d. Location map showing drainage boundary
- e. Legal description
- f. Sheet index
- g. Engineer's seal (if required)
- h. NRCS Engineering Job Class from NE-ENG-14
- i. Hazard class

3. Data Sheet

- a. Legend and symbols
- b. Reservoir capacity table
- c. Hydrologic data
- d. Hydraulic data
- e. Table of quantities
- f. Construction notes

NOTE: Some of the items listed for Cover Sheet and Data Sheet may be moved and/or copied to other plan sheets as required.

4. Plan view of dam and reservoir area. Include map orientation. Distance and bearing from a section corner to the structure is required for inventory size structures.
5. Profile and cross-section of auxiliary spillway.
6. Profile on centerline of embankment.
7. Channel profile showing overfall (for grade stabilization structures).
8. Core trench profile and typical cross-section.
9. Constructed elevations, slopes, dimensions, and stationing on profiles and cross-sections. Settled elevations may also be shown but should be labeled as such.
10. Location and extent of borrow area.
11. Principal spillway and drawdown pipes.
 - a. Profile on centerline
 - b. Stationing, dimensions, elevations
 - c. Location of related appurtenances such as anti-seep diaphragms, pipe supports, gates, etc.
 - d. Skew angle on plan view of dam
12. Structural details -- as needed to clarify drawings
13. Foundation/Embankment drain details (if required)
14. Plunge Pool/Outlet Channel details (if required)
15. Log of soil borings
16. Construction notes -- add notes to clarify a component and furnish directions for installations to supplement standard specifications as needed.
 - a. Construction plans shall include a statement requiring the contractor to notify the Nebraska One-Call System (Diggers Hotline) regarding utilities on the construction site. See the General Documentation Requirements section of the Nebraska Practice Documentation Requirements Manual for the recommended statement.
 - b. Add notes as necessary to identify avoidance and, if needed, protection areas and boundaries associated with cultural resources, threatened or endangered species, or other resources needing temporary protection during installation.
17. Graphical scales
18. Benchmarks with elevation, description, and location.
19. Areas to be seeded and/or fenced

- B. Specifications
 1. Nebraska FOTG Conservation Practice specifications, component specifications from NEH Part 650, Engineering Field Handbook Appendix 1, or equivalent, modified as needed. Additional specifications may be written to provide full material and installation instructions.
 2. More complex structures may require the use of NEH Part 642 or PL-46 specifications.
 3. Cover sheet (NE-ENG-47).
- C. O&M Plans
 1. As specified in the applicable standard in Nebraska FOTG
- D. Plans, Specifications, O&M Plans Delivery
 1. Case folder
 2. Transmittal letter copy

V. LAYOUT

- A. Layout Surveys
 1. Record in field notes. If an electronic data collector is used, include a hard copy of the raw data and a hard copy of the reduced notes.
 2. Centerline alignment stakes.
 3. Offset grade stakes for principal spillway, drawdown pipe, irrigation supply conduit, etc., as necessary.
 4. Slope or construction stakes for embankment and auxiliary spillway.
 5. Location and grade stakes for structural components.
- B. Quantity Computations
 1. Compute quantities in embankments, dikes, cutoff trench, and other excavations as needed.
 2. Methods to be used in making computations of quantities (NE-ENG-15):
 - a. Three-level section
 - b. Any level method
 - c. Computer software - Area Vol., OHIO Cross-Sections with Quantities, CADD software
 3. Compute quantities from layout notes. Final quantities are based on staked lines and grades and/or approved changes. In some cases, neat line quantities may also be used. (NE-ENG-15)
 4. Show quantities of all components in the table of quantities on the plans.

VI. COMPLIANCE CHECKING

- A. Record on field notes and/or construction plans, NE-ENG-49, 49A
 1. Profiles on centerline of embankments, channels, auxiliary spillway, and pipelines.
 2. Cross-sections of auxiliary spillway, dam embankment, outlet channels.
 3. Elevations at inlet and outlet of principal spillway and other pipes and control elevations of all structures.
 4. Pipes - check length, gauge, thickness, type, and diameter.
 5. Number, type, location, and dimensions of appurtenances (gates, valves, trash racks, etc.).
 6. Construction inspection reports.
 7. Material certification statement.

8. Statement of compliance - statement that construction is completed according to plans and specifications, signed and dated by the person certifying completion.
- B. "As Built" Plans
1. Refer to NEM, 512.51 and 512.52.
 2. "As Built" plans are a record of constructed facilities. "As Built" plans are required when a significant change in design occurs during construction or when the job is designated Class V or higher. Changes are superimposed in a different color (usually red), or differentiated in some other manner (such as drawing a box around the as-built value) on the official file copy and show:
 - a. Significant¹ design changes.
 - b. Significant¹ changes in linear measurement.
 - c. Final quantities - may be based on layout stake notes or neat line quantities, if no changes were approved and work meets planned lines and grades.
 - d. Identify as "As Built" on plans.

¹ Determination of "significant" is a matter of judgment by the technician. As a general rule, changes that exceed normal measuring error allowances, normal construction tolerances, and methods of mathematical computation, should be considered as significant.