NEBRASKA PRACTICE DOCUMENTATION REQUIREMENTS

TERRACE (600)
DIVERSION (362)

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, Chapters 2, 3, 8, 9
4. NRCS--TP-61, Handbook of Channel Design
5. Conservation plan for the unit
6. Computer software: EFH-2, Nebraska Terrace and Diversion Program, Missouri Terrace Program, OHIO Engineering programs, TR-55
7. Local supplemental criteria

II. RESOURCE INVENTORY AND SURVEYS

A. Design Investigations
1. Soils map
2. Aerial photo
3. Conservation plan for unit
4. Location of underground utilities
5. Locations of outlets considering erosion, sedimentation, and drainage laws
6. Topographic map of area as needed
7. Data on bridges and culverts which affect the diversion design

B. Design Surveys: The design surveys can be combined with the layout surveys, dependent on the judgment and experience of the responsible designer.
1. Sketch of terrace or diversion location showing terrace number, direction of flow, etc.
2. On systems where a topographic map is not considered necessary for design, the design survey is usually combined with the layout surveys and recorded on loose leaf survey notes or summarized on the NE-ENG forms (19, 19a, 20), or terrace program computer printouts. All supplementary design information (surveys, etc.) should be on field notes, CADD files, or worksheets.
3. For diversions, record the average land slope along proposed centerline. For significant land slope changes, divide the diversion into reaches.
4. For storage terraces with double base widths, cross-sections shall be obtained for the computation of earthwork quantities. This shall also be the method of determining quantities for diversions when earthwork volumes are the basis of payment.
5. Benchmarks elevations, descriptions, and locations. At least one benchmark per riser location for storage terraces or diversions with underground outlets.
6. Embankment, grade, and land slope changes.

7. Initials and dates of person(s) staking the system, reducing, and checking of survey notes.
8. 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
   1. Quantity and cost estimates
   2. All Terraces (Show in field notes and/or on job sheets and computer printouts, or in good engineering format)
      a. Sketch of terrace layout
      b. Terrace number
      c. Type of terrace
      d. Design land slope
      e. Planned cropping equipment width and slippage
      f. Number of rows (planter)
      g. Terrace spacing
      h. Vertical and/or horizontal interval, and FOTG method used to determine such intervals
      i. Planned terrace dimensions, grades, channel widths, and lengths
      j. Hydrologic data for storage terraces (drainage area for the top terrace in a system as needed, RCN, sediment, Q_{10} rainfall).
   3. Diversions
      a. Hydrology -- for each reach, record on forms NE-ENG-16 or use EFH-2 or OHIO hydrology software.
      b. Hydraulics -- hydraulic elements of the diversion, i.e., cross-section, slope, and capacity for each reach. Record on forms NE-ENG-20, or applicable software.
      c. Quantities, NE-ENG-20.
   4. Initials/signatures and dates by the person(s) responsible for the design, approval, and checking of the design.

B. Permits
   1. 404 Permit -- document if individual permit obtained, nationwide permit applies, or if practice is exempt.
   2. County road ditch discharge permits, if applicable.

IV. PLANS AND SPECIFICATIONS

A. Plans
1. Use NE-ENG forms (19, 19a, or 20) or terrace program computer printouts for construction layout and checkout or appropriate “D” or ”B” sized sheets. Complement these drawings with notes to facilitate layout and construction of the practice.
2. Plan view of the system should include numbering of each diversion or terrace, stationing reference, and significant cultural features that would impact construction. Include map orientation. Plan views can be shown on a USGS Quadrangle map, aerial photo, or a sketch showing the above items.
3. Location map with legal description.
4. Benchmarks with elevation, description, and location.
5. Type of terrace being installed.
6. Typical cross-section for all storage terraces and diversions.
7. Design land slope and terrace spacing used for each terrace or diversion where applicable.
8. Channel grades and elevations for design channel and ridge for each station or channel reach.
9. Terrace or diversion dimensions such as channel widths, cutslopes, stationing, embankment slopes, and locations of risers and outlets.
10. Location and dimensions of any blocks required.
11. Stationing where double base width begins and ends, if applicable.
12. 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.
13. Estimated earthwork quantities for storage terraces and diversions when cost share payment is based on earthwork volumes.
14. Lengths of each terrace and diversion and a summary for the total lengths of each type of terrace or diversion.
15. Profile of designed channel and ridge superimposed over the original ground for diversions.
16. NRCS Engineering Job Class from NE-ENG-14.

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.

C. O&M Plans
1. As specified in Terrace (600) and Diversion (362) Standards 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 notebook and summarize on terrace program computer printouts or NE-ENG forms 19 or 20.
   2. Place channel flags or stakes at intervals consistent with what is shown on the terrace program computer printouts or NE-ENG 19 or 20.
   3. Identify and stake the location of the riser for the underground outlet for storage terraces or diversions.
   4. See section on design survey for benchmark requirements, channel staking intervals, and combining layout surveys with design surveys.
   5. For gradient terraces, identify the location (station, channel elevation) of the terrace where it outlets into a waterway.

B. Quantity Computations
   1. Final quantities are based on staked lines and grades or approved changes.
   2. Storage terraces with double base widths will have earthwork computations determined by the double end area method.

VI. COMPLIANCE CHECKING

A. Record in field notes, NE-ENG forms 19, 20, or on the construction checkout sheet of the terrace program computer printout.
   1. For diversions, all storage terraces, and at least one gradient terrace within the system, record profile and cross-section notes of channel and ridge. The gradient terrace selected should be the one that appears least likely to meet the practice standard if there is an apparent difference in the sizes of the terraces. Extend the cross-section beyond the elevation of the top of the ridge on the uphill cut slope, and beyond the lower embankment toe. Show as-built bottom width of channels, side slopes, berm widths, etc. on cross-sections.
   2. Cross-sections of the embankment at the riser for storage terraces or diversions.
   3. Use the backside of NE-ENG form 19 for additional cross-sections or profiles. For larger projects, use field notebook and “D” or “B” sized drawing sheets as appropriate for plotting profiles and cross-sections.
   4. Channel cross-sectional area.
   5. Maximum allowable channel grades for terraces and diversions.
   6. Ridge and channel elevations for level terraces.
   7. Size, slope, and type of underground outlet where appropriate.
   8. Adequacy or status of seeding for grassed back slope and narrow base terraces, and diversions.
   9. Installed quantity of work or materials.
   10. Constructed length of <u>each</u> completed terrace or diversion, use measuring wheel, chain, tape, or GPS.
   11. Construction inspection report -- form NE-ENG-49.
   12. Statement of compliance -- statement that construction is complete according to plans and specifications, signed and dated by the person certifying completion.
   13. Bills from the landowner and contractor for costs incurred in the construction of the project.

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 a drawing a box around the as-built value) on the official file copy and show:
      a. Significant[1] design changes.
      b. Significant[1] changes in linear measurement.
      c. Final quantities -- may be based on layout stake notes, 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.