

# NEBRASKA PRACTICE DOCUMENTATION REQUIREMENTS

## IRRIGATION SYSTEM, SPRINKLER (442)

### 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. NRCS National Environmental Compliance Handbook
3. NRCS Cultural Resources Handbook
4. Nebraska Field Office Technical Guide (FOTG)
5. National Engineering Handbook (NEH), Part 650, Chapter 15.
6. NEH, Part 652 – Irrigation Guide
7. NEH (15) Part 623 – Chapter 11
8. Conservation and Irrigation plans for the unit.
9. Computer software – CPNozzle, Center Pivot Evaluation and Design (CPED or versions there-of), IWR, FIRI, etc.
10. Local supplemental criteria

### II. RESOURCE INVENTORIES AND SURVEYS

#### A. Design Investigations

1. Soils – type, texture and intake rate, available water holding capacity (AWC), irrigation limitations, and/or restrictive layers
2. Crops – type, tillage practices, water use, and peak consumptive use
3. Topographic information – elevations, slopes
4. Water source – flow rate, volume, seasonal variation, well and pumping plant information, and water quality limitations

#### B. Design Surveys

1. Surveys, as needed to document/design the irrigation system.
2. 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. Record design data on: Computer Printout, [NE-ENG-85](#) - Pumping Plant Inventory and Evaluation Worksheet, [NE-ENG-28](#) - Irrigation System Inventory Worksheet, [NE-ENG-26](#) - Center Pivot or Linear Move Sprinkler Data Sheet, [NE-ENG-59](#) - Center Pivot Sprinkler Design Worksheet, or other equivalent worksheets for all sprinkler types.
  - a. System area (ac).
  - b. Soil texture and intake. Limiting impervious layers.
  - c. Weighted peak consumptive use under the system (in/day).
  - d. System capacity required for maximum peak consumptive use with estimated efficiency. If system does not meet peak demand, document system capacity using crop water use and soil storage, i.e. water budget (NEH Part 652, Chapter 4 -Table 4-2, IWR computer program) or document that crop water needs may not be met by the system (deficit irrigation).
  - e. Hydraulic analysis of the system – nozzle pressure required, pressure rating of pressure regulators, elevation changes along the lateral, lateral height, friction loss determination for lateral(s), mainline, pump column, minor losses, etc.
  - f. Design application depth – gross, net, and time requirement.
  - g. Water measurement - [NE-ENG-83](#) or equivalent
  - h. Total dynamic head (TDH) (ft) for maximum capacity and the power unit required for the estimated or computed pump efficiency. Document adequacy of proposed pumping plant to meet these requirements.
  - i. Quantity and cost estimates.
  - j. For Center Pivot and Linear Move Sprinklers
    - 1) Weighted potential runoff analysis – document with CPNozzle Printout
      - a) System wetted length (ft)
      - b) System capacity (gpm or gpm/ac) – this does not include any flow or area affiliated with an end gun
      - c) Wetted diameter of outer sprinkler nozzle (ft), also include manufacturers performance rating table
      - d) NRCS soil intake family or “Green and Ampt” parameters
      - e) Surface storage (in)
        - (1) Residue storage (in)
        - (2) Slope storage (in)
          - a. Slope option “constant slope / residue”
          - b. Slope option “variable slope / residue”
          - c. Slope option “User define constant”
          - d. Slope option “User define variable”
      - 2) Sprinkler type, positioned height (ft) and spacing (ft).
      - 3) Pressure regulator type and rating (psi), if used.
      - 4) Required minimum sprinkler spacing (ft) or computed coefficient of uniformity (CU).

- k. For solid set, hand move, drag-line, side roll, etc. sprinklers
  - 1) Design sprinkler application rate (in/hr), soil intake rate (in/hr).
  - 2) Sprinkler type, height (ft), wetted diameter (ft), operating pressure (psi), location.
  - 3) Pressure regulator type and rating (psi), if used.
  - 4) Minimum lateral and sprinkler spacing (ft) or computed coefficient of uniformity (CU).
  - 5) Prevailing direction and average wind velocity (mph).
  - 6) Lateral line pressure variation (psi).
2. Initials/signatures and dates by the person(s) responsible for the design, approval, and checking of the design.

B. Permits

1. Applicable permits associated with the installation of this practice, well permit, chemigation permit, etc.

#### IV. PLANS AND SPECIFICATIONS

A. Plans

1. Scaled plan view or aerial photo showing location of sprinkler system, mainline and lateral line locations, benchmark elevation/description, and map orientation.
2. Sprinkler package including type, size, and location of sprinklers, nozzles, pressure regulators, etc.
3. Table of quantities.
4. Location map with legal description.
4. 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.
5. 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.
6. 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 Irrigation System, Sprinkler ([NE442](#)) Standard in Nebraska FOTG.

D. Plans, Specifications, O&M Plans Delivery

1. Case folder
2. Transmittal letter copy

## V. LAYOUT

- A. Layout Surveys
  1. Locate lateral starts, ends, row spacing, mainline, pivot points, appurtenances, etc.
  2. Use field notebook, forms, etc.
- B. Quantity Computations

## VI. COMPLIANCE CHECKING

- A. Record on field notes, construction plans, NE-ENG-26 - Center Pivot or Linear Move Sprinkler Data Sheet, etc.
  1. Sprinkler type, height and spacing, nozzle size, and pressure regulator type are installed in accordance with the designed system.
  2. Length and size of the system lateral and main line, valve, and appurtenances location.
  3. Overall workmanship.
  4. 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 a drawing a box around the as-built value) on the official file copy and show:
    - a. Significant<sup>1</sup> design changes.
    - b. Significant<sup>1</sup> 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.

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<sup>1</sup> 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.