

NEBRASKA PRACTICE DOCUMENTATION REQUIREMENTS

IRRIGATION SYSTEM, MICROIRRIGATION (441)

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
6. NEH, Part 652 – Irrigation Guide
7. NEH (15) Part 623 - Chapter 7
8. Conservation and Irrigation plans for the unit.
9. Computer software – 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 -- types, tillage practices, water use, peak consumptive use
3. Topographic information -- elevations, slopes.
4. Water source -- flow rate, volume, seasonal variation, well and pumping plant information
5. Water quality -- water quality analysis specifically of drip irrigation system

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 on [NE-ENG-86](#) – Micro Irrigation Design Data Worksheet, [NE-ENG-85](#) – Pumping Plant Inventory and Evaluation Worksheet, [NE-ENG-28](#) – Irrigation System Inventory Worksheet, or other equivalent worksheets.
 - a. System design capacity (gpm) at required pressure (psi)
 - b. Water quality analysis
 - c. Field and zone size (ac)
 - d. Number of zones or blocks, concurrent zones or blocks watered concurrently
 - e. Application rate per zone (in/hr)
 - f. System capacity required for maximum peak consumptive use with estimated efficiency. If system capacity 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).
 - g. Hydraulic analysis of the system with total head required at filter discharge (psi).
 - h. Hydraulics analysis of flush-lines with required system flow rate.
 - i. For each zone/block show
 - 1) Type or lateral or tape (drip line) inside diameter (mm or in), spacing (in), bury depth(in) (if applicable)
 - 2) Emitter spacing (in)
 - 3) Type of emitter -- make, model, coefficient of variance, discharge coefficients
 - 4) Average design emitter discharge rate and pressure
 - 5) Maximum emitter discharge, including pressure and location of that emitter
 - 6) Minimum emitter discharge, including pressure and location of that emitter
 - 7) Design manifold inlet pressure (downstream of valve)
 - 8) Emission uniformity for zone and lateral
 - j. Type of filter system - make, model and capacity (gpm), head loss across filter, back-flushing time required (% of total operating time), continuous back-flush rates (% system flow rate).
 - k. Total dynamic head (TDH) for maximum capacity and the power unit required for the estimated or computed pump efficiency, adequacy of proposed pumping plant to meet these requirements.
2. Quantity and cost estimates
3. 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, underground injection permit, etc.

IV. PLANS AND SPECIFICATIONS

A. Plans

1. Map and/or drawing showing location and layout of:
 - a. Mainlines -- sizes, lengths, type and pressure rating of pipe
 - b. Sub-mainlines -- sizes, lengths, type and pressure rating of pipe
 - c. Manifolds, headers or flush lines -- sizes, lengths, type and pressure rating of pipe
 - d. Valves (gate, regulating air, pressure relief, pressure regulators, etc.)
 - e. Irrigation well(s) with capacity (gpm)
 - f. Filter station, chemical injection and appurtenance layout
 - g. Zones or blocks (label with number of tapes and type of tape)
2. Critical elevations, a site specific contour map, if available, is preferred
3. Scale or dimensions with map orientation
4. Table of quantities
5. Location map with legal description
6. 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.
7. NRCS Engineering Job Class from NE-ENG-14

B. Specifications

1. Use Nebraska FOTG Conservation Practice specifications, component specifications in 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, Microirrigation ([NE441](#)) 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 main, sub-mains, flush lines, appurtenances, etc.
2. Use field notebook, forms, etc.

B. Quantity Computations

VI. COMPLIANCE CHECKING

- A. Record on field notes, construction plans, forms, etc.
 - 1. Mainline, sub-mains, flush-line type, size and lengths.
 - 2. Lateral line type, size and lengths, emitter type, spacing, etc.
 - 3. Type and location of filtration system, chemigation, valves, meters, and other appurtenances.
 - 4. Overall workmanship.
 - 5. 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. Significant¹ design changes
 - b. Significant¹ 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.