

# NEBRASKA PRACTICE DOCUMENTATION REQUIREMENTS

## PUMPING PLANT (533)

### 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 (eFOTG), Section IV, Conservation Practice Standard – Pumping Plant for Water Control, 533
5. National Engineering Handbook (NEH), Part 650 and Part 650 Appendix 1
6. NEH, Part 652, Irrigation Guide with Nebraska Supplements
7. NEH- Section 15 Irrigation, Chapter 8
8. NEH- Section 16 Drainage, Chapter 7
9. National Electric Code (NEC)
10. Worksheet: [NE-ENG-85](#)
11. Conservation plan for the unit
12. State and Local supplemental criteria

### II. RESOURCE INVENTORY AND SURVEYS

#### A. Design Investigations

1. Water source
2. Water quality
3. Water quantity of supply
4. Water availability of supply
5. Required applicable permits (pumping, well installation, backflow prevention and etc)
6. Flow measurement device(s) – existing or planned
7. Affiliated (irrigation, drainage and etc) system layout and location
8. Soils and Geological Investigation: consider soil types, characteristics, depths, topography, water tables, inhibiting layers, seepage rates, etc
9. Structural Components – location and type
10. Location of utilities and power sources including the potential for interruptible load control

#### B. Design Surveys

1. Topographic map -- where required to aid in positioning the Pumping Plant
2. Critical elevations: control points, critical field features which impact the design and operation of the Pumping Plant
3. All pertinent water operating elevations for both surface and subsurface water

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 Number three. 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 and documentation items for pumping plant systems should include a completed [NE-ENG-85](#) Worksheet along with the relevant items below or equivalent :
1. Pump Requirements
    - a. Minimum and maximum design flow capacity operating ranges
    - b. Minimum and maximum pumping levels or lifts
    - c. Minimum and maximum design operating pressure head(s)
    - d. Net Positive Suction Head Calculation ( $NPSH_A$  versus  $NPSH_R$ ) – primarily applicable in centrifugal pump installations
    - e. Minimum and maximum efficiencies
    - f. Nominal pump size
    - g. Number of pumps and / or stages
    - h. Impeller trim size(s)
    - i. Design operating flow, head and efficiency
  2. Suction and Discharge Pipe(s) Requirements
    - a. Appurtenances
      - 1) Gates
      - 2) Valves
      - 3) Pipe connections
      - 4) Screens and / or filters
      - 5) Discharge bays
      - 6) Connection(s)
    - b. Suction pipe
      - 1) Material type
      - 2) Outside or inside diameter
      - 3) Wall thickness
      - 4) Connection(s)
    - c. Nominal diameter of pump discharge pipe
  3. Power Unit Requirement
    - a. Electric Motor
      - 1) Type (Single, 3-Phase, other)
      - 2) Brake horsepower capabilities within all pump operating ranges and or conditions
      - 3) Voltage and amperage
      - 4) Necessary safety shutoff devices
    - b. Combustion Engine

- 1) Type (diesel, propane, natural gas and etc)
  - 2) Brake horsepower capabilities within all pump operating ranges and or conditions
  - 3) Necessary safety shutoff devices
  4. Electrical panel requirement
    - a. Type
    - b. Load capacity
    - c. Starting and shut-off switches
    - d. Protective covers
    - e. Necessary safety overload shut-off devices
  5. Pumping Plant Building and Accessories Requirements
    - a. Design details of structural design components, including computations (dependant upon structural objectives)
    - b. Vibration control
    - c. Foundation stability
    - d. Anchoring
    - e. Safety
  6. Flow measurement device design ([NE-ENG-83](#) or equivalent)
  7. Initials/signatures and dates by the person(s) responsible for the design, approval, and checking of the design.
- B. Permits
1. Water rights -- owner is responsible for obtaining all required permits including, but not limited to: pumping waters of the state, application of effluent, well installation, backflow prevention, chemigation / fertigation, water rights and etc; see GM, 450, Part 405.
  2. 404 Permit – document if individual permit obtained, nationwide permit applies, or if practice is exempt.

#### **IV. PLANS AND SPECIFICATIONS**

- A. Plans
1. Use standard sized drawing sheets no smaller than (11"x17"). Drawings with construction notes should be sufficient to provide full installation instructions.
  2. Scaled or Dimensioned drawing. Detailed to show layout of components, alignment, stationing, areas involved, cultural features, reference points, structural features, map orientation, bar scale and appurtenances.
  3. A stationed profile along the centerline of the pumping plant system to the outlet point showing original ground line, pump intake and outlet requirements (i.e.: screens, connections, and valves) , appurtenances, minimum and maximum hydraulic gradelines, maximum static pressure, etc.
  4. Show location of all pertinent safety shields and relevant warning signs

5. Structural details
    - a. Plan and sectional views of foundation and anchors
    - b. Plan and sectional views of the housing and / or shading of the pump and control panel
  6. Show electrical details
    - a. Safety shields
    - b. Warning signs
    - c. Necessary shutoff devices
  7. Show cathodic protection details, if applicable
  8. Table of quantities.
  9. Site location map with legal description.
  10. Construction notes. Add notes to clarify a component and furnish directions for installations to supplement standard specifications as needed.
  11. 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.
    - a. 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.
  12. NRCS Engineering Job Class from NE-ENG-14.
  13. Applicable Practice Standard(s) usually shown on the cover sheet
- B. Specifications
1. Nebraska FOTG Conservation Practice specifications  
(<http://efotg.nrcs.usda.gov/references/public/NE/NE533s.doc>)
  2. Component specifications from NEH Part 650, Engineering Field Handbook Appendix 1, or equivalent, modified as needed.
  3. Additional specifications may be written to provide full material and installation instructions.
- C. O&M Plans
1. As specified in Pumping Plant for Water Control Standard. Nebraska eFOTG  
(<http://efotg.nrcs.usda.gov/references/public/NE/NE533m.doc>)
- D. Plans, Specifications, O&M Plans Delivery
1. Case folder
  2. Transmittal letter copy

## V. LAYOUT

- A. Layout Surveys
1. Centerline alignment stakes
  2. Offset stakes
  3. Field layout of location stakes for structures and appurtenances
  4. Use field notebook, forms, etc.
- B. Quantity Computations
1. Final quantities are based on staked lines and grades or approved changes.

## VI. COMPLIANCE CHECKING

- A. Record in a field notebook, or on the construction plans
  - 1. Does the pumping plant system function as planned and designed? If not, document.
  - 2. Quantity of materials installed.
  - 3. Location of flow measurement device(s)
  - 4. Number, type, location of appurtenances including safety shields, screens, valves / vents, pressure gauges, stand pipes and etc.
  - 5. Elevations of installed structural components. Include check out notes.
  - 6. Construction inspection reports.
  - 7. Copies of all applicable permits obtained
    - a. Pumping (waters of the state, waste water, etc)
    - b. Well registration
    - c. Chemigation / fertigation permits
  - 8. Statement of compliance -- statement that construction is completed according to plans and specifications signed and dated by the person certifying completion.
    - a. Statement that "electrical work done" was completed in compliance with National Electric Code (NEC) and signed by the responsible installer.
  
- 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.