

**NATURAL RESOURCES CONSERVATION SERVICE
STATEMENT OF WORK
ARIZONA**

PUMPING PLANT

(No.)

CODE 533

These deliverables apply to this individual practice. For other planned practice deliverables refer to those specific Statements of Work.

INVESTIGATIONS AND SURVEYS

Deliverables

1. *Site investigation, inventory and evaluation shall include:*
 - a. *Preliminary site assessment, investigation or reconnaissance to determine the complexity of the problem, the need and feasibility of the pumping plant, and the location of power sources, if applicable. Determine the water source, quality, quantity and availability.*
 - b. *Determine the type of pump (axial flow, centrifugal, etc.) that would be applicable to the project (i.e., irrigation, livestock, drainage, etc.).*
 - c. *Soils and geological investigation. Consider soil types, characteristics, depths, topography, water table, inhibiting layers, seepage rates, etc.*
 - d. *Verify appropriate state or local laws for permitting (i.e., well installation, backflow prevention, water rights, etc.) and approval requirements and notify landowner of his/her responsibilities.*
2. *To adequately plan and layout this practice, a detailed topographic survey is required, that adequately details:*
 - a. *The location of the proposed pumping plant and any structures that may interfere with its installation.*
 - b. *All critical or control elevations (topographic survey of system) and pertinent water surface elevations for both surface and subsurface applications.*
 - c. *Location of underground or overhead utilities or markers.*
 - d. *A permanent benchmark(s) shall be set and described. Preferably, the elevations and coordinates should be based on a local (assumed) or coordinate system (State or grid) and clearly stated on the plan. Datum may be in the form of Northing and Easting coordinates, or Longitude and Latitude. Where applicable, USGS 7.5-minute topographic Quadrangles may be used.*

DESIGN

Deliverables

1. Design documentation that will demonstrate that the criteria in NRCS practice standard have been met and are compatible with other planned and applied practices.
 - a. Practice purpose(s) as identified in the conservation plan.
 - b. List of required permits to be obtained by the client.
 - c. Impacts on adjacent properties and structures.
 - d. Compliance with *Federal, State, Tribal and local utility safety laws and policy* (NEM Part 503-Safety, Subpart A - Engineering Activities Affecting Utilities 503.00 through 503.06).
 - e. Practice standard criteria related computations and analyses to develop plans and specifications including but not limited to:
 - i. Mechanical
 - a. *Determine the pump/motor efficiencies, nominal pump size, number of pumps and/or stages, impeller trim size (as applicable);*

- b. *Electrical panel requirements (type, load capacity, starting/shutoff switches, protective covers, and safety or overload shutoff devices;*
 - c. *Power unit type and requirements.*
 - i. *Electric motor (i.e., electric submersible): single or 3-phase, brake horsepower capabilities within all pump operating ranges or conditions, voltage or amperage requirements, and safety or shutoff appurtenances;*
 - ii. *Pump Jack and Windmill: manufacturer, pump or sucker rod diameter, drop pipe, well cylinder assembly, polished rod assembly, automatic bleeder valve;*
 - iii. *Combustion Engine: type (diesel, propane, natural gas, etc.), brake horsepower capabilities within all pump operating ranges or conditions, and safety or shutoff appurtenances;*
 - iv. *Photovoltaic: PV module size and number, amperage and voltage characteristics, service life/warranty, mounting requirements, solar trackers, batteries and lightning protection, as applicable.*
 - ii. *Structural*
 - a. *Suction and Discharge pipe requirements, i.e. material types, nominal diameters (outside or inside diameters), wall thickness or pressure rating, connection types;*
 - b. *Building and accessories (design details of structural components, including computations and analysis), vibration control, foundation stability, anchoring, safety, etc;*
 - iii. *Appurtenances and/or components, including gates, valves, pipe connections, screens and/or filters, discharge and inlet bays, flow measurement devices, pressure gauges, etc.*
 - iv. *Determine the pump requirements (i.e. capacity [gpm] and total dynamic head [feet]) required or the pump discharge pressure when the pumping life is not readily available (i.e., determine the minimum and maximum design: flow capacity operating ranges; pumping levels or lifts; operating pressure head); Net Positive Suction Head Calculation ($NPSH_A$ versus $NPSH_R$), primarily for centrifugal pump installations;*
2. *Written plans and specifications including sketches and drawings shall be provided to the client that adequately describes the requirements to install the practice and obtain necessary permits. The drawings shall meet all the graphic and content requirements as set forth in the NEM Part 541 "Drafting", Subpart A "Drawings", and shall include, but not limited to :*
- a. *Project location map, including section, township and range, North arrow, cooperator acknowledgement and certification signature blocks, engineering job class (cover sheet);*
 - b. *References that the owner/cooperator are responsible for all permits, rights-of-way, easements and the contact, coordination and location determination of any existing utilities or clearances (buried utility disclaimer);*
 - c. *Landowner/operator acknowledgement and certification signature blocks;*
 - d. *If applicable, a plan view or map showing the location of the pumping plant in relationship to other structures or natural features and in reference to a known or established benchmark or reference point with the location, description and elevation clearly shown. Topographical features and/or controls shall be shown, showing tie in with existing or other planned practices, if applicable.*
 - e. *Field surveys and notes, soil investigations or geologic soil boring locations and soil classifications, earthwork or material estimates/quantities (compute quantity of materials and all appurtenances when used as basis of payment), verification or certification of used materials (if any);*
 - f. *System overview and layout (i.e., water source; pump location; size and type of pump; pump discharge capacity [gpm] and required head [feet]; location of all system components; stationing profile along the centerline of the pumping plant system to the outlet point showing original ground line, pump intake and outlet requirements; screens, connections, valves and required appurtenances; minimum and maximum hydraulic gradelines and maximum static pressure; show cathodic protection details, if applicable; construction/installation criteria; State and Federal [OSHA] safety requirements).*

- g. *Details for mounting the pump (may be left to the manufacturer); plan and sectional views of the pump pad, foundation and/or anchors, including dimensions, type of material, etc. Plan and sectional views of the housing, cover or shading of the pump and control panel.*
 - h. *Electrical details or requirements, including safety shields, warning signs, and necessary shutoff devices.*
 - i. *Construction notes and/or detail drawings of the pumping plant and appurtenances, such as piping, inlet and outlet connections, mounting, foundations, and other structural components, as required, for proper system functionality.*
 - j. *Table of quantities.*
 - k. *Written specifications that describe the site specific details of installation. Use Arizona Construction and Material Specifications for each item of work and material, as applicable and available. Additional specifications may need to be written to provide full material and installation instructions. Fill in blanks and add or delete items from the specifications to make them fit the job as needed.*
3. Design Report and Inspection Plan as appropriate (NEM Part 511, Subpart B Documentation, 511.11 and Part 512, Subpart D Quality Assurance Activities, 512.30 through 512.32).
 4. Operation and Maintenance Plan
 5. *For designs completed by non-NRCS personnel, provide Certifications that the documentation, design, plans and specifications meets all applicable NRCS criteria, practice standards and comply with applicable laws and regulations (NEM Subpart A, 505.03(b) (2)). Certification shall be made by a licensed professional as governed by the AZ State Technical Board of Registration, and as stated in the NEM, §AZ505.01 (b).*
 6. Design modifications during installation as required.

INSTALLATION

Deliverables

1. Pre Installation conference with client and contractor. *Review the plans and specifications with the landowner and/or contractor prior to the start of construction.*
2. *Ensure that they thoroughly understand their responsibilities including obtaining all permits, easements, etc., and/or verification that client has obtained required permits.*
3. Staking and layout according to plans and specifications including applicable layout notes.
4. Installation inspection (according to inspection plan as appropriate). *Adequate site visits and checks shall be made during construction to verify that the plans and specifications are followed.*
 - a. Actual materials used
 - b. Inspection records
5. Facilitate and implement required design modifications with client and original designer. *Any changes in the design must be reviewed and concurred by the landowner and shall be approved by the designer and person with appropriate engineering design job approval authority.*
6. Advise client/NRCS on compliance issues with all federal, state, tribal, and local laws, regulations and NRCS policies during installation.
7. Certification that the installation process and materials meets design and permit requirements.

CHECK OUT

Deliverables

1. *Record the following information in the job diary or field notes:*
 - a. *Size, type of pump, model, manufacturer, rated RPM, and required appurtenances*
 - b. *Pump discharge capacity*
 - c. *Number, type and location of appurtenances including flow measurement devices, safety shields, screens, valves, air vents, pressure gauges, stand pipes, etc.*
 - d. *Gear head or horsepower, if applicable*
 - e. *Power unit (type, manufacturer, RPM, HP). Note any safety features (power shaft covered)*
 - f. *Intake elevation of suction pipe, pump and any structural component*

- g. Operational check (flow test)*
- h. Type and size (dimensions) of pump pad*
2. The As-Built documentation. *Drawings shall meet the requirements as set forth in the NEM Part 512 "Construction", Subpart F, "As-Built Drawings, including any Arizona supplemental thereof.*
- a. Extent of practice units applied
 - b. *Each sheet of the drawings shall have an "As-Built" stamp and date on them. Any changes or modifications, additions or deletions to the approved drawings shall be clearly identified with red ink.*
 - c. Final quantities
3. Certification that the installation meets NRCS standards and specifications and is in compliance with permits (NEM Subpart A, 505.03(c) (1)). *If the practice meets NRCS standards and specifications, then the statement "This practice meets NRCS practice standards and specifications" shall be placed on the check out documentation and shall be signed and dated by the responsible individuals.*
4. *After is has been determined and documented that the practice(s) meets NRCS criteria and applicable plans and specifications, it can be reported and certified (progress reporting).*
5. *Any additional feature, item, or appurtenance not specifically mentioned or addressed that is critical to the proper installation and operation of the practice.*

Additional Information:

REFERENCES

- Arizona Field Office Technical Guide (eFOTG), Section IV, Conservation Practice Standard 533 – Pumping Plant
- NRCS National Engineering Manual (NEM)
- NRCS National Environmental Compliance Handbook
- NRCS Cultural Resources Handbook

State Contact: State Conservation Engineer