

9. **Wells.** The Introduction (Chapter 1) for these design data collection guidelines contains additional information concerning: preparing a design data collection request, design data collection requirements, and coordinating the design data collection and submittal.

The design of wells for water supply, drainage, and other similar purposes requires extensive subsurface and other data. Because of the nature of the environment of ground water, maximum reliance for correct interpretation and use of the data must be based on the competence, experience, and judgment of the ground water engineer or geologist.

The following is a minimum checklist of data necessary for specification design and cost estimates for wells and well fields.

A. Maps.

- (1) A general location map showing locations of the well site(s) and communities, transportation facilities, and other cultural features.
- (2) A construction site map showing locations of the well(s), rights-of-way, access roads, and sources of power and water for construction purposes.
- (3) A geologic map showing surface geology, topography, subsurface data points such as existing wells and other similar data.

B. General Conditions.

- (1) Location, ownership of, and accessibility to the site.
- (2) Location and included area if a well field.
- (3) Stratigraphic and structural conditions including general types and sequences of materials.
- (4) Drilling conditions - ease of drilling, stability, etc.
- (5) Standards, permitting requirements, etc.
- (6) Other wells in the immediate area (oil, gas, etc.).
- (7) Location and type of power sources, utility easements, buried cables, pipelines, etc.

- C. Climatic and Hydrologic Conditions.** Materials showing climatic and hydrologic conditions including weather and stream storage or reservoir storage conditions, where applicable.

D. Subsurface Conditions.

- (1) Logs, geologic sections, and other material showing stratigraphic and lithologic conditions including rock or soil types, sequence, attitude of beds, and other available geologic data.
- (2) Samples and/or cores of subsurface materials or photographs of such.
- (3) Logs, hydrographs, hydrogeologic sections, and other material showing ground-water conditions including mode of occurrence, depth to and elevation of the water table or piezometric surface, seasonal and other fluctuations of water levels, flowing conditions, and chemical quality of the ground water.
- (4) Logs, hydrogeologic sections, and other material showing aquifer conditions including depth and thickness, types of materials, and factual results of pumping tests.
- (5) Descriptions of drilling conditions including anticipated casing requirements to permit drilling, and limitations on drilling equipment and methods.

E. Aquifer Conditions.

- (1) Depth.
- (2) Thickness.
- (3) Type and stability of material.
- (4) Size and range if material is granular.
- (5) Transmissivity and storativity.
- (6) Water budget.
- (7) Aquifer storage capacity and amount of water storage.
- (8) Depth and thickness of confining unit(s).
- (9) Contour maps (bedrock surface, top of aquifer(s), etc.).
- (10) Natural recharge and discharge locations and amounts.
- (11) Sustained yield potential.

F. Ground-Water Conditions.

- (1) Static water level.
- (2) Water level trends.
- (3) Known locations and types of potential or existing pollution source(s) – either natural or anthropogenic.
- (4) Locations, amounts, and usage of existing and planned future withdrawals.
- (5) Radius of influence and drawdown map.
- (6) Quality of water to include the concentration of major ions and all parameters having primary and secondary maximum contaminant levels as defined by the Safe Drinking Water Act.

G. Well Conditions.

- (1) Design yield.

The foregoing factors must be considered in light of ground-water reservoir conditions - areal distribution, recharge, yield, and pumping conditions, including pump costs, power availability and cost, etc.

H. Sections and Details. Sections and details of a typical well showing relationship of the general components and details, where applicable.

I. Well Dimensions. Tabular material showing total depths, casing and screen lengths, and other known or estimated dimensions of the well.

J. Pumping Test Requirements. Material outlining pumping test requirements including design yield and expected drawdown, pump capacity setting, and head requirements, well development requirements, flow measurement requirements, test duration, and disposal of water.

K. Environmental Factors. Material outlining environmental factors including:

- (1) Location, size and type of wetlands that could be influenced by the drawdown core or by discharge from the well.
- (2) Aesthetic requirements, should be considered in the benefit-cost studies and design of the pumphouse and related powerlines and discharge pipe.

- (3) Impact of drilling and testing operations
 - (4) State standards
 - (5) Presence of completed facility
 - (6) Permitting requirements
- L. Safety Factors.** Material outlining safety factors including presence of high subsurface pressures or toxic gases.
- M. Report.** The foregoing data should be included in a report together with a brief, descriptive summary of the geology of the area, existing ground-water conditions and ground-water development to date.
- N. Electrical Data.** Data listed below will be required to initiate design. The design furnished should be sufficient to permit designers to complete the basic design (single-line diagram) for the facility. After designs of the facility have progressed enough to develop details of electrical system needs, designers will prepare a list of additional data required to complete final design of electrical installation.
- (1) Names and telephone numbers of electrical power suppliers and contacts within those organizations.
 - (2) Location of point where connection to power supply will be made.
 - (3) System voltage at which power will be supplied, number of phases, and whether service will be overhead or underground.
 - (4) Discuss requirements for an alternate power source. If an alternate supply is required, indicate:
 - (a) If required by State or local authority.
 - (b) If source should be an engine-generator.
 - (c) If a threat to life or property will result if normal power supply is lost.
 - (d) Loads requiring service from alternate source.
 - (5) Requirements for remote monitoring of conditions at the facility. Discuss location of remote station, and items required to be monitored.
 - (6) Requirements for supervisory control, including location of station from which supervisory control is exercised.
 - (7) Requirements for voice and data communications between the supervisory master station and the remote facilities.