11. Electrical Data. This section presents design data collection guidelines for feasibility and specifications designs.

A. **Feasibility Designs.** The following is a list of design data required for feasibility designs:

(1) Availability of electric power for construction and for O&M.

(2) For existing non-Reclamation powerplants and pumping plants, single-line diagrams and switching diagrams that include equipment ratings will be necessary for a proper evaluation of existing equipment within the scope of any proposed feasibility or specifications design.

(3) Source of electricity: location of the point where the connection to power utility will be made, the capacity, and type (single phase/three phase).

(4) Location of existing transformers.

(5) Route of proposed distribution lines and whether they are to be overhead or underground.

(6) Plant uprating (powerplant): Design data should include, as a minimum, a description of the hydrologic and hydraulic conditions and anticipated increase in power capacity and/or energy. The data should also include recommendations regarding the expected means (machine addition or machine rebuilding) of achieving the uprate. The following items should be considered in preparing data:

(a) Need for replacement of any existing major power equipment due to age or deterioration (generator winding and core, power transformers, power circuit breakers, switchgear, station service equipment, etc.).

(b) Changes in operation of the plant, such as from base load to peaking load operation; changes in upstream or downstream storage; and changes in irrigation demands.

(c) Environmental and recreational impacts resulting from changes in water release through the plant. Identify proposed mitigation measures if appropriate.

(d) Recommendation/need or to replace existing rotating exciter/voltage regulator with static excitation system.

(e) Recommendation/need to replace existing mechanical governor with a digital system.

(f) Recommendation/need to replace existing protection system with modern digital system.

(g) Recommendation/need to replace existing control systems.

(h) Identify and describe any changes required to bring the plant or equipment into compliance with electrical, safety, or fire codes.

(i) Identify any equipment that is being replaced and having any historical value.

(7) Switchyards and substations:

(a) For design of most substations, it will be sufficient to specify only supply and output voltage, number of connecting transmission lines at each voltage, capacity of the facility in kilovolt amperes, and type of operation (attended, unattended, or supervisory control). For more complex structures, the requesting office should consult with the designing office for specific details needed.

(8) Transmission lines:

(a) Estimated average and peak loads.

(b) Operating voltage of the line.

(c) Value of energy for sizing purposes.

(d) A description of terminal and intermediate substations.

B. Specifications Designs. The following is a list of data requirements for specifications designs, in addition to data requested for feasibility designs.

(1) Names, telephone numbers, Web sites, and email addresses of electrical power suppliers and contacts within those organizations.

(2) Source and voltage of incoming power including construction power.

(3) Location of point where connection to power supply will be made.

(4) Estimated electrical peak load.

(5) State and local code requirements.

(6) System voltage at which power will be supplied, number of phases, and whether service will be overhead or underground.

(8) Dates when power will be available.

(9) Electrical system reliability criteria.

(10) Discuss requirements for an alternative power source. If an alternative supply is required, indicate:

(a) If required by a 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 alternative source.

(11) Feasibility and expense of generating power onsite with wind power, solar collectors, or adaptors.

(12) O&M considerations.

(a) Requirements for remote monitoring of conditions at the facility, including fire protection or security systems. Discuss location of remote station and items required to be monitored.

(b) Nature of operations (i.e., whether base load, peaking or seasonal, attended, semiautomatic, fully automatic, or supervisory controlled) give estimated distances to points of control; other facilities to be controlled from this plant and, if supervisory controlled, location of master station.

(c) Include location of station from which supervisory control is exercised.

(d) Requirements for voice and data communications between the supervisory master station and the remote facility.

(e) Requirements for lighting for night operation or security.

(13) Powerplants and pumping plants:

(a) The data furnished should be sufficient to permit designers to complete the basic design (single-line diagram) for the facility. After designs 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.

(b) Proposed initial and ultimate power generation capacity.

(c) Need for bypass of water during generator shutdown or load rejection.

(d) Characteristics of power load including load-duration curve, load factors, typical daily load curves, summaries of power production studies, and power market demands.

(e) Destination, proposed voltage, and number of outgoing transmission circuits. Name of agency or utility with whom interface will be made.

(f) Requirements for minimum and maximum system impedance and any operating limitations to be imposed by agency or utility supplying power.

(g) Source and voltage of pumping power. Name of agency or utility supplying power, limitations on starting voltage dips and number of starts, power factor limitations, and distance to source. Requirements for minimum and maximum system impedance and any operating limitations to be imposed by agency or utility supplying power.

(h) Existence of transmission lines of other agencies and utility companies operating in the area that might influence connection of power units; furnish voltage, capacity, type of construction, and distance of these lines from powerplant or pumping plant.

(i) Local load requirements and availability and capacity of reliable outside sources for alternative supply of station-service power.

(j) Recommended number of pumps and pump sizes.

(k) Requirements for measurement of plant discharge.

(l) Plant uprating:

- For design data, see items listed under subsection A., "Feasibility Designs." For specifications designs, target date(s) for completing the uprate work and the outage periods when the unit(s) may be removed from service should also be provided. In addition, the designers should be asked for a specific list of design data required.

(14) Switchyards and substations.

(a) Single-line diagram of foreign primary systems which will connect to the Reclamation station. This information is required for relay studies and should include the following:

- Location of primary system circuit breakers and relays as contemplated for initial operation. Future changes should be indicated where possible.
- Type of primary system relays (distance, overcurrent, etc.) and the relay operating characteristics. The actual relay settings will be required to make coordinating settings of Reclamation relays, but these data need not be provided initially if it will delay receipt of other information. Relay coordination problems, such as slow relaying on primary system, should be presented.
- Primary system operating conditions which may affect Reclamation relaying or control.
- Reclosing time if automatic reclosing breakers will be used on the primary systems.
- Length and characteristics of primary lines and whether they are three-wire or four-wire circuits.
- Location, connections, and rating of transformers and synchronous machines which connect to the primary systems. The locations and type of neutral grounding should be included.

(b) Heights and locations of existing buildings, transmission lines, and other obstructions which are not associated with the station but are in or near the station site and will present clearance problems.

(c) Capacity charge, energy charge, interest rate, and plant factor to be used in evaluating transformer losses.

(d) Refer to the specific requirements of the “Environmental Criteria for Electric Transmission Systems” by the Departments of the Interior and Agriculture.

(15) Tunnels:

(a) Requirements for installation of power, lighting or telemetering cables in tunnel.

(16) General purpose buildings:

(a) Number of buildings to be served, segregating residences and other types, with anticipated load and recommended supply voltage for each type.

(b) Use of electric ranges, electric water heaters, and/or electric heating in residences.

(c) Desire for a series-type street lighting system.

(d) Other requirements for power, such as water pumps, warehouse cranes, machine shops, etc.

(e) Fire protection plan for the community, including information on available fire protection services.

(17) Rehabilitation of existing electrical power equipment/systems which may require replacement/modifications.

(a) Detailed list of structures and equipment being modified or replaced with list of electrical equipment servicing this equipment or structure (i.e., at sewage lift station XX existing pumps and electrical controls boards CBA, CCA and distribution panels DBA, and DBB to be removed and replaced with new equipment).

(b) Latest as-built drawings for existing power equipment, controls, protection, and indication/annunciation circuitry.

(c) Latest as-built drawings for existing equipment layout, conduits, cables and conductors, and grounding systems.

(d) Operational description of existing control systems and list of features that are still required in rehabilitated or modified installation and required new features.

(e) Description of downtime/outage period allowed when removing or modifying existing equipment or systems. List of critical equipment which downtime must be kept to a bare minimum (i.e., Critical control and protection circuitry that must be powered up continuously during renovation of a DC control board).

(f) List of known hazardous materials (lead paint, asbestos, etc.) which will be encountered or handled by the Contractor during rehabilitation work. If unknown, then provide a testing program to test suspected equipment or materials.