

15. Mechanical and Hydraulic Equipment. The following design data items may be required for feasibility and specifications levels designs:

A. General:

- (1) Purpose of equipment.
- (2) Hydraulic design criteria:
 - (a) Range of upstream and downstream water surface elevations anticipated over the life of the project.
 - (b) Velocity criteria (maximum and minimum requirements).
 - (c) Any anticipated or potential changes in flow rates over the life of the project.
- (3) Access available or desired for removal and installation of equipment, along with anticipated size and weight of equipment and proposed or desired methods of handling.
- (4) Recommendations on whether gate hoist equipment, controls, and measuring devices should be indoor or outdoor types.
- (5) Operating period (all year, irrigation season, extreme events, or emergencies).
- (6) Corrosion potential of material in contact with equipment, such as water, air, and soil.
- (7) Material requirements (steel, stainless steel, plastic (type), special material).
- (8) Debris type and loading anticipated.
- (9) Climatic conditions.
 - (a) Type of ice loading, if any, anticipated.
- (10) Are facilities manned or unmanned?
- (11) Is mechanical equipment locally operated, automatically controlled, supervisory controlled?
- (12) Is electric power readily available? Will equipment be hand operated or power operated?

- (13) If power operated, state preference for electric operators or hydraulic operators.
- (14) Plant factor and power and interest rates for economic sizing of pumps, turbines, and intake and discharge lines.

B. Mechanical Equipment:

- (1) Trashracks and debris screens:
 - (a) Bar spacing.
 - (b) Angle of trashracks with vertical.
 - (c) Type of deck and deck size anticipated.
 - (d) Type and loading of debris.
 - (e) Desired method of cleaning: manual, automated trashrake, etc.
 - (f) Method of debris removal (manual, conveyor belt).
- (2) Fish screens:
 - (a) Location.
 - (b) Fishery agency requirements (criteria): type of opening, required percent opening, maximum opening requirements, approach velocity, sweeping velocity, etc.
 - (c) Desired type of screen:
 - Flat plate, drum, traveling
 - (d) Type and loading of debris.
 - (e) Method of debris removal and type of cleaning equipment anticipated
 - (f) Fish bypass requirements.
 - (g) Will sediment deposits at the screens be a potential O&M problem?
- (3) Hoists:
 - (a) Location.
 - (b) Type.
 - (c) Pickup and dropoff points.

- (d) Size and weight of components or equipment to be handled.
- (4) Heating, ventilating, and air conditioning:
 - (a) Type of building.
 - (b) Size of building.
 - (c) Range of outdoor temperatures.
 - (d) Special exhaust, heating, ventilating, or air-conditioning requirements including artifact storage and preservation, and laboratory ventilation and exhaust.
 - (e) Heating, ventilating and air-conditioning system requirements. Preference for evaporative cooling or refrigeration cooling for the main plant/building area. Preference for electric or gas heat utilizing propane/natural gas.
 - (f) Is natural gas available at the site?
 - (g) Noise restrictions at the site.
- (5) Flow and water level measurement:
 - (a) Location.
 - (b) Type of flow measurement structure or device (ramp flume, constant head orifice, Parshall flume, venture meter, ultrasonic, etc.).
 - (c) Units of measurement and totalizing requirements.
 - (d) Accuracy requirements.
 - (e) Read locally or send data to remote location, or both.
- (6) Bulkheads and stoplogs:
 - (a) Location.
 - (b) Provide expected upstream and downstream water surface levels over the life of the project.
 - (c) Type of guides.
 - (d) Anticipated lifting equipment.

- (7) Miscellaneous metal designed to control or guide flow.
- (8) Engine-generator sets:
 - (a) Location, enclosure requirements, and any special O&M needs or aesthetic requirements.
 - (b) Voltage and phase required.
 - (c) Equipment to be operated by engine-generator set.
 - (d) Standby (backup) or main power source.
 - (e) Fuel preference (diesel, propane, natural gas, etc.).
 - (f) Automatic or manual transfer.
 - (g) Ambient temperature range.
 - (h) Altitude.
 - (i) Requirements for emergency engine generator set for the plant/building. Systems to be connected to the standby emergency engine generator set.
 - (j) Anticipated engine generator usage for sizing the fuel storage tank.
 - (k) Preferred fuel (diesel/propane/natural gas) for the engine generator set.

C. Hydraulic Equipment:

- (1) Pumps:
 - (a) Range of flows and heads anticipated over life of project.
 - (b) Initial and ultimate design flows.
 - (c) Number of pumps and type of pumps to be considered.
 - (d) Flow for each pump or range of flow for each pump.
 - (e) Special fishery or other environmental requirements
- (2) Hydraulic power turbines:
 - (a) Flow range and operating heads.
 - (b) Number and type of turbines and flow range for each turbine.
 - (c) Special fishery or other environmental considerations.

- (3) Piping for water, air, etc.:
 - (a) Range of flow rates.
 - (b) Type of fluid to be carried.
 - (c) Restrictions or special provisions for location of piping.
 - (d) Cleaning and draining requirements.
 - (e) Required water quality analysis to determine the materials of construction for the plant piping systems. Types of materials of construction for existing piping systems conveying water. Have there been any corrosion problems with existing systems?
 - (f) Types of water supplies available at the site for plant/building fire suppression and other water usage requirements.
 - (g) Preferences concerning the method of joining the piping components for the various plant/building auxiliary mechanical systems. Are victaulic type grooved coupling connections acceptable?
 - (h) Types of hazardous materials on the existing piping systems (i.e., lead based paint, asbestos).
- (4) Gates and valves:
 - (a) Location (pipe, canal, general buildings, powerplants, and pumping plants).
 - (b) Purpose of gate or valve:
 - Flow control
 - Energy dissipation
 - Segmentation
 - Isolation for maintenance
 - Release of flow during an extreme event such as a spillway gate
 - (c) Type of gate (slide, radial, overtopping, other).
 - (d) Type of valve (butterfly, gate, other).
 - (e) Type of operator.