

- 15. Fish Barriers.** 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.

A. General Map Showing:

A key map locating the general map area within the State.

- (1) Location of the structure site.
- (2) County, township, range, and section lines.
- (3) Existing towns, highways, roads, railroads, public and private utilities, transmission lines, substations, rivers, streams, and stream-gauging stations.
- (4) Locations of sites for required construction facilities.
- (5) Sources of natural construction materials, location of commercial quarries, and disposal areas for waste material.
- (6) Existing or potential areas or features having a bearing on the design, construction, operation, or management of the project feature such as: housing and building areas; and areas of paleontological, archeological, historical or mining interest.
- (7) Sources of construction power and power for operation.
- (8) Scale of the general map should be adequate to clearly show listed details.
- (9) North arrow.

B. Topographic Maps. Generally, both a map and an electronic file, in AutoCAD or compatible format, of the topography covering the structure site should be provided. A contour interval of 1 foot is required in the immediate vicinity of the structures. Elsewhere, larger contour intervals may be acceptable. Details to be shown are:

- (1) Proposed locations of fish screen facilities including bypass pipe.
- (2) Location of existing features such as diversion dam, headworks, highways, railroads, public and private utilities, and any other features that may affect the location and cost of the fish screen facilities. Note modifications required to headworks, if any.
- (3) Existing right-of-way. Proposed acquisition of additional right-of-way should be discussed.

- (4) Location of river thalweg.
- (5) Below water contours should be included.

C. General Description of Local Conditions Covering:

- (1) The capabilities of and constraints imposed by local shipping and transportation facilities.
- (2) Names and telephone numbers of local utilities and irrigation districts and contacts within those organizations.
- (3) Name and brief description of similar construction in the area or region. Preferable to use Reclamation projects if possible.
- (4) Previous applicable studies.
- (5) Climatic conditions of site (e.g., icing or freezing of canal).
- (6) Seismic conditions.

D. Survey Control. The survey can be tied to the township and range system or an existing coordinate system is acceptable but tying to the State plane coordinate system is recommended.

- (1) Right-of-way surveys are required to locate government owned property at the structure site.

E. Foundation Data. Sufficient data on rock and soil at the proposed structure site(s) must be included to determine the type of materials that the foundations of the fish facility structures will encounter. Logs of all drill holes, auger holes and exploration pits will be included. Sufficient pumping tests should be performed to evaluate dewatering costs during construction. Generally, both a map and electronic file of the surface geology overlaying the topography should be included. Major soil types should be identified, including such significant factors as expansive and low-density soils, erosive or dispersive soils, rock, and high water tables. Limited tests may be required to identify some of these problem soils.

F. Biological Data:

- (1) Fish species targeted.
- (2) Fish species swimming abilities.
- (3) Behavior.
- (4) Fish migration season.

- (5) Age of fish targeted.
- (6) Minimum and maximum size of the species.
- (7) Run size.
- (8) Biological requirements of the species (e.g., spawning, rearing or foraging habitats that require protection).

G. Hydrological Data:

- (1) Range of river flows.
- (2) Percent exceedence curves for flows.
- (3) River hydraulic data.
- (4) River rating curves over range of design flows.
- (5) River velocities.
- (6) Provide seasonal 1-year, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year river flow rates and water surfaces for evaluating construction related structures such as cofferdams and bypasses.

H. Canal Hydraulic Data:

- (1) Canal flow range.
- (2) Maximum canal design flow.
- (3) Percent exceedence curves for flows.
- (4) Available head at point of diversion.
- (5) How diversions are made.
- (6) Dates of diversions.
- (7) Availability of bypass flow.
- (8) Type of tailwater control for fishscreen, if any.

I. Agency Coordination:

- (1) List of agencies to coordinate with.
- (2) Review of designs by other agencies, including the findings of the Fish and Wildlife Coordination Act Report (if available).
- (3) The need for a field conference to resolve critical environmental problems with participation of other agencies.

(4) Agency criteria which is required to be complied with.

J. **Sedimentation Data:** Sufficient data on the soil at the proposed structure site(s) must be included to determine whether sedimentation will be a problem.

K. **Fish Screen Data:**

(1) Type of screen required (e.g., flat plate, drum, etc.).

(2) Maximum allowable approach velocity. Approach velocity measured perpendicular to the screen face.

(3) Minimum allowable sweeping velocity. Sweeping velocity measured parallel to the screen face.

(4) Maximum allowable time of travel for fish moving along the screen face before entering a bypass.

(5) Maximum clear opening of the screen mesh.

(6) Maximum and minimum drum screen submergence, if applicable.

(7) If applicable, are drum screens to operate at optimum submergence for all flows?

(8) Maximum and minimum design flows through screens.

(9) Should screen structure be expandable if canal flow is increased in future.

(10) Predation issues.

L. **Fish Bypass Data:**

(1) Entrance requirements (e.g., flow control weir, etc.).

(2) Maximum and minimum entrance velocities.

(3) Maximum and minimum conveyance velocities.

(4) Is there a requirement for pumpback system with secondary screens?

(5) If on a river, trashrack bar spacing.

M. **Trashrack Data:**

(1) Amount and type of floating debris in canal and/or river.

(2) Minimum clear opening between trashrack bars.

(3) Cleaning system.

N. Other Features:

- (1) Criteria for fish viewer where applicable.
- (2) Criteria for adult trapping facility where applicable.
- (3) Equipment needed to determine fish movement by telemetry or other means where applicable.
- (4) Requirements for supplemental lighting.
- (5) Location of access required by fishery interests.

O. Construction Data:

- (1) Construction window to complete all work.
- (2) Restrictions on in-water work.
- (3) Will bypass around canal construction site be required?

P. Operating and Maintenance Data:

- (1) Plan of operation for fish screen facilities.
- (2) Portion of year structures should be designed to operate.
- (3) Dates of water diversion.
- (4) O&M access requirements.
- (5) Method for cleaning rotating drums.
- (6) Responsibility for maintaining screens.
- (7) Type of equipment to remove screens for service (e.g., gantry, jib crane, mobile truck).
- (8) Frequency of O&M.
- (9) Ability and experience of O&M personnel to maintain proposed screens.
- (10) Will cleaning of screens be problematic?

- Q. **Environmental Considerations.** Design data should include, as a minimum, the environmental issues and/or requirements that would affect a fish screen facilities design and construction and a brief description of the environmental resources that could be affected by the proposed development. The emphasis should be on those areas within the range of alternatives open to the designers in developing a structural design. The following items should also be considered in preparing design data:
- (1) The environmental setting, photographs, both black and white and color are helpful.
 - (2) Minimum river flows.
 - (3) Cultural (historical, archeological, architectural, and paleontological) resources in the area of the fish screen facilities.
 - (4) Background on the need for fish screen facilities.
 - (5) The need for blending structures with the surroundings, restoring borrow areas, and reseeded spoil banks.
 - (6) Anticipated public use around the structure.
 - (7) Any threatened and/or endangered critical species and habitat in or adjacent to the fish screen facilities or bypass.
 - (8) Cofferdam requirements, materials and allowable time period.
 - (9) Existing or potential wetland areas.
- R. **Cost Data.** Cost data developed in planning and appraisal estimates should be included.