

Reclamation Manual
Design Data Collection Guidelines
Chapter 5 – “Typical” Design Data Package Template

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.

Design data submittals respond to and provide information designated in the design data request. The design data should be submitted on the schedule agreed upon by the Originating Office and the design team(s). The design data should be submitted in the format agreed upon. The following “typical” template, for a design data submittal, is based on the specifications level design data. The items included in the template are generic and may apply to many types of features. Items required for specific features would have to be added by the designers. For feasibility studies, the data should be completed if critical to the cost estimate, and the detail should be held to a minimum.

1. Project Overview:

- A. Location of proposed project facilities.
- B. Project goals such as water supply, power production, and rehabilitation of existing facilities. Provide data on initial goals and future goals.
- C. Project schedule.
- D. Water and power delivery commitments.
- E. Water source(s) and delivery location(s).
- F. Design flows, water storage requirements, flood protection requirements.
- G. Main features such as: dams, pumping plants, canals, pipelines, powerplants, pumping plants, etc.
- H. Reservoir, river, water surface elevations.
- I. Major environmental considerations.

2. Copies of Previous Studies, Correspondence, Codes and Regulations, or Other Material Which May Affect the Design.

3. General Map:

- A. Area to be covered.
- B. Details and features to be shown.

- C. Format to be submitted in.

4. General Description of Local Conditions:

- A. Existing transportation availability and limitations.
- B. Description of local area and waterway conditions.
- C. Access for design data collection, construction, and operation and maintenance.
- D. Road detour requirements for construction.
- E. Availability of utilities for construction.
- F. Access to public utilities required for the operation of the proposed facilities.
- G. Climatic conditions which may affect design, construction and operation and maintenance.
- H. Requirements for clearing local vegetation.
- I. River trash, sediment, and ice loading.

5. Surveying:

- A. Determine if surveys are required; and if required, the extent and detail of requirements.
- B. Area and features required to be included in the survey.
- C. Determine how surveying will be accomplished.
- D. Survey control requirements.
- E. Format of submitted data.

6. Topographic Map:

- A. Determine if topographic maps are required.
- B. Area to be mapped.
- C. Details to be included in the map.
- D. Scale and contour interval requirements.
- E. Format requirements of submitted map data.

7. Photographs:

- A. Determine which items and features to photograph.
- B. Determine how the photographs will be acquired: ground level, aerial, satellite.
- C. Determine if hard copies or computer files are adequate:
 - (1) Size print for hard copy.
 - (2) Type of computer file.

8. Drawings:

- A. Determine type of drawings to include:
 - (1) Location map.
 - (2) Plan and profile.
 - (3) Site plan.
- B. Drawing requirements for showing area to be covered and existing and proposed facilities.
- C. Details required to be shown on each drawing.

9. Specific Structure Design Data Items:

- A. Hydraulic:
 - (1) Design flows and water delivery requirements.
 - (2) Period of operation: all year round, irrigation season, other.
 - (3) Water surface and hydraulic gradeline elevations.
 - (4) Water storage requirements.
 - (5) Water treatment requirements.
 - (6) Federal, State, and local design requirements.
- B. Structural:
 - (1) Types and description of structures required.
 - (2) Location and alignment of structures.
 - (3) Any required elevations of items such as dam crests, structure footings, structure decks, etc.

- (4) Structure performance requirements and dimension requirements.
 - (5) Structure design loads.
 - (6) Structure material requirements: concrete, steel, timber, etc.
 - (7) Mechanical and hydraulic equipment requirements.
 - (8) Electrical equipment requirements.
 - (9) Types of materials available and required for construction of specific features.
 - (10) Applicable design codes, design standards, or other design guidelines.
 - (11) Federal, State, and local design requirements.
- C. Linear features such as canals and pipelines.
- (1) Location and alignment.
 - (2) Hydraulic capacity.
 - (3) Material and lining requirements.
 - (4) Any known invert elevation and bank elevation requirements.
- D. Water delivery systems.
- (1) Irrigation plan – full demand or rotational.
 - (2) Sprinkler system or open ditch irrigation.
 - (3) Pressurized pipe system or low head system.
 - (4) Description of farm delivery (valves, flow measurement).
 - (5) Will deliveries be operated by landowner or district?
- E. Roads and bridges:
- (1) Traffic volume, lane requirements, pedestrian walkways.
 - (2) Road surfacing requirements.
 - (3) Traffic control requirements.
 - (4) Traffic signage and safety requirement.
 - (5) Utilities in area which will have to be accommodated.
- F. River and wetlands:

- (1) Functional requirements (river modifications, habitat restoration, fish protection, recreation, affect stream flows, water quality).
- (2) Overall approach (watershed, local).
- (3) Natural approach, bioengineering approach for habitat and wildlife.
- (4) Details of habitat and wildlife conditions, if required.
- (5) Proposed habitat and wildlife conditions, if required.

10. Existing Facilities:

- A. List and describe existing facilities in the area which will affect design and operation and maintenance of the facilities, or be modified by the design, or included in the final features.
 - (1) Include: location, condition, future plans, structural capacity, flow capacity.
 - (2) Provide latest drawings and describe condition of existing facilities.
- B. If to be removed note how the facilities will be disposed of and environmental or other concerns with removing and disposing the facilities. Note any hazardous materials which require removal.
- C. Operation and maintenance concerns noted for existing facilities.

11. Corrosion Survey:

- A. Performance history of similar materials in the area.
- B. Corrosion protective measures which are used on existing structures in the area.
- C. Data on direct current sources in the vicinity.
- D. Unusual chemistry in the area: geologic material, ground water, other.
- E. High voltage transmission lines in the area.
- F. Corrosivity of fluids carried by pipelines or in which the pipeline is immersed, etc.
- G. In situ electrical resistivity tests.
- H. ASTM or other tests for corrosion as required.

12. Construction Materials:

- A. Information on required borrow materials and potential environmental impacts of removing and transporting the borrow materials. Include: location and distance to borrow areas, approximate quantities available, environmental impacts.
 - (1) Results of sample analysis and tests.
- B. Requirements and locations for permanent stockpiles.
- C. Information on concrete aggregates.
- D. Alkali conditions in soil and water which might affect the choice of soil resisting cement.
- E. Data on commercial concrete plants within practical hauling distance of the construction site.
- F. Information on firms within practical hauling distance which may provide manufactured products such as precast concrete products and other masonry units.
- G. Types of pipe or other items recommended for use or which are not acceptable.
- H. Allowable pipe bedding options.

13. Electrical Data:

- A. State and local code requirements.
- B. Electric power suppliers and contacts.
- C. Type of power sources available.
- D. Existence of transmission lines of other organizations operating in the area.
- E. Location where connection to power supply will be made.
- F. System voltage at which power will be supplies, number of phases, and whether service will be overhead or underground.
- G. Specific requirements for items such as: powerplant uprating, switchyards and substations, and transmission lines if required.
- H. For non-Reclamation powerplants and pumping plants, single line diagrams switching diagrams.
- I. Load requirements.

- J. Electrical system reliability criteria.
- K. Dates when power will be available.
- L. Backup power requirements.
- M. Feasibility of generating power onsite with wind power, solar collectors, or adaptors.
- N. Fire protection plan.
- O. Operation and control considerations.
 - (1) Attended, unattended or supervisory control.
 - (2) Requirements for monitoring.
 - (3) Communications requirements.
 - (4) Location of station with supervisory controls.
 - (5) Indoor and outdoor lighting requirements.
- P. Overhead or buried transmission lines.

14. Cost Data:

- A. Procurement strategy (open bids or other contract award method).
- B. Requirements for disposal of existing buildings.
- C. Information on local labor and housing accommodations.
- D. Availability of local transportation such as roads and railroads.
- E. Estimated cost of right-of-way.
- F. Interest rates, power rates, and plant factor for economic studies.
- G. Local freight and trucking rates.
- H. Information on important construction work in progress or planned in the vicinity and presence of interested contractors or subcontractors in the area.
- I. Field estimated quantities, of items (earthwork, removal of vegetation, etc.) which can not readily be determined in the design office, which may be required to complete the cost estimate.

- J. If cost of construction of the proposed features exceeds the anticipated funding, determine if the construction cost estimate should be broken down into incremental costs and required details of the cost breakdown.

15. Foundation Data:

- A. Description of regional geology.
- B. Description of site geology.
- C. Surface geologic map.
- D. Description of surface deposits and bedrock.
- E. Selected determination of engineering properties of surface deposits.
- F. Ground water conditions and water levels.
- G. Geologic exploration requirements:
 - (1) Geophysical surveys (seismic, resistivity, etc.).
 - (2) Geologic logs.
- H. Geologic sections.
- I. Geologic samples and testing.
- J. Evaluation of landslide, snowslide, and rockfall conditions.
- K. Photographs or pertinent geologic and topographic features.
- L. Document past, present, and future petroleum, water, and mineral extraction operations in the vicinity.
- M. Conditions which may effect construction such as boulders, marshes, drilling conditions.
- N. Footing elevation.

16. Hydrologic and River Morphology Design Data:

- A. Source of project water.
- B. Data on upstream dams and reservoirs.
- C. Data for preparation of specifications hydrographs.
- D. Hydrographs for flood frequencies for construction and design.

- E. Peak design flows for facilities such as culverts and diversion dams.
- F. Anticipated occurrence and amount of sediment, trash, and ice.
- G. Reservoir data:
 - (1) Inflow design flood.
 - (2) Area capacity curves.
 - (3) Topography.
 - (4) Storage allocations.
 - (5) Limitations to maximum water surface elevation.
 - (6) Backwater curves including sediment deltas.
 - (7) Annual fluctuations.
 - (8) Wave action.
 - (9) Method of reservoir operation for flood control and releases.
 - (10) Annual net evaporation and distribution.
- H. River hydrologic data:
 - (1) Downstream control sections, measuring devices or other operating works.
- I. River morphology data:
 - (1) Water surface elevations for a range of flows for design and construction.
 - (2) Potential changes in river configuration due to natural events, operation of in-river facilities, or future construction.
 - (3) Sedimentation and aggradation potential.
 - (4) Channel and bank protection requirements.
 - (5) Potential for sediment to be taken into project facilities.
 - (6) Potential impacts of project (increased scour, additional downstream channel protection required, etc.).
- J. Surface drainage facilities:
 - (1) Location of intersecting water courses.
 - (2) Discuss flood history and channel locations and characteristics.
 - (3) Locations of any protective dikes and ditches.

(4) Potential for adding additional capacity to natural channels, if required.

K. Water quality: chemical and biological.

17. Environmental Data:

A. Requirements to meet air quality, noise limitations, during construction and post construction.

B. Requirements in the National Environmental Policy Act (NEPA) compliance document.

C. Are any threatened and/or endangered habitats or species in or adjacent to the project?

D. Requirements for review of designs by other agencies.

E. Aesthetic requirements and need for blending structures with the environment.

F. Identify existing or potential wetlands.

G. Requirements for animal protection.

H. Unusual local pests.

I. Archeological and cultural resources in the area.

J. Suitability and possibility of present and future use of land adjacent to proposed facilities.

K. Special environmental compliance requirements for ensuring that water quality standards (including temperature) are met during construction and operation of the facilities.

L. Minimum river flow requirements for design and construction.

M. Impact of moving construction materials on local roads.

N. Requirements, if any, for fishways and fish barriers and background material.

O. Animal safety requirements such as requirements for fencing and animal escapes.

P. Requirements for removal and disposal of materials: vegetation, hazardous materials, aquatic weeds, sludge, etc., existing facilities in the construction area.

Q. Excavated materials which will require special considerations.

R. Solid waste or hazardous waste facilities within the construction area.

- S. Seeding and planting requirements.
- T. Local regulations regarding the use of soil herbicides.
- U. Anticipated public use.
- V. Potential Indian trust assets.
- W. Potential environmental justice issues.
- X. Disease vector control.

18. Site Security and Public and Worker Safety:

- A. Consider a site security risk assessment.
- B. Discuss potential for vandalism, theft, or terrorism.
- C. Potential for loss of life and property due to terrorist attack.
- D. Availability of local law enforcement forces, fire protection forces, and medical facilities.
- E. Fire protection requirements.
- F. Requirements for access and limiting access by roads, boats, or otherwise.
- G. Requirements for notifying public agencies in case of attack or incident.
- H. Codes or standards which are required to be met.
- I. Times when staff will be at facility.
- J. Anticipated public use.
- K. Public safety and worker safety requirements such as fencing, handrail, and grating.
- L. Operation requirements in case of nuclear attack.
- M. Recommendations for protection against falling rocks and boulders.

19. Mechanical and Hydraulic Equipment:

- A. Description of mechanical and hydraulic equipment requirements.
- B. Availability of electric power.
- C. Purpose of mechanical and hydraulic equipment.

- D. Hydraulic design criteria.
- E. Specific equipment criteria.
- F. Access for operation and maintenance of equipment.
- G. Will facilities need to be indoor or outdoor.
- H. Potential corrosion effects of the environment.
- I. Material requirements (steel, stainless steel, plastic [type], etc.).
- J. Debris type and quantity.
- K. Ice loading, if any.
- L. Will facilities be manned or unmanned?
- M. Will operation be local, automatic, or supervisory.

20. Right-of-Way Requirements:

- A. Existing right-of-way.
- B. Requirements for additional right-of-way for the facilities, for construction, for access (including construction access), and for disposal of materials, for borrow:
 - (1) Areas in right-of-way for waste, contractor facilities, borrow, and government facilities.
- C. Requirements for right-of-way fencing.

21. Construction Considerations:

- A. Permits required for construction.
- B. Availability of public utilities (water, electricity, etc.) for construction.
- C. Construction schedule:
 - (1) Recommended construction period: particular period of the year.
 - (2) Construction constraints (environmental or otherwise).
 - (3) Permissible times to make connections.
- D. Requirements for maintaining streamflow and diversions during construction.
- E. Maximum water levels expected during construction and possibility of controlling water levels by operation of upstream and/or downstream facilities.
- F. Allowable in river materials (permanent and temporary).
- G. Filling and draining criteria for dams, canals, and pipelines.

- H. Water availability for construction purposes and associated water treatment requirements.
- I. Location of borrow and waste areas and stockpile locations.
- J. Access for construction and requirements for maintaining access roads.
- K. Road detour and traffic control requirements.
- L. Unusual site conditions which would affect construction.

22. Operation and Maintenance Data:

- A. Plan of operation.
- B. Regional operation scheme if any.
- C. Responsible organization(s) for operations and maintenance (O&M).
- D. Operating period considerations:
 - (1) Part or full time operation.
 - (2) Period of year facilities should be designed to operate.
- E. Allowable outage times based on operation and maintenance requirements.
- F. Conditions that may cause O&M problems: trash, sediment and ice considerations (type, quantity, potential deposition, methods of cleaning, disposal requirements.
- G. Special reliability requirements.
- H. Self sustainability requirements.
- I. Requirements for lighting for night operation (reservoirs, downstream dam faces, etc.).
- J. Availability of O&M personnel and equipment.
- K. Maintenance equipment requirements.
- L. Space required for O&M personnel:
 - (1) Office space requirements.
 - (2) Service area and machine shop requirements within the plant.
 - (3) Requirements for facilities for maintenance of equipment.

- (4) Storage requirements for operation and maintenance equipment.
 - M. Monitoring and control requirements (e.g., local, remote, SCADA system, etc.).
 - N. Communications requirements.
 - O. Requirements for preparation of Designers' Operating Criteria.
 - P. Post-construction monitoring and evaluation requirements.
 - Q. Recommendations on plant type (indoor or outdoor).
- 23. Miscellaneous Data:**
- A. Expected visitor load and accommodation requirements.