6. Pipelines. 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 data collection requirements included in this section cover pressure and gravity or open (low-pressure) pipeline systems.

A. General Map(s). The General Map should cover the project area and the area immediately surrounding the project within approximately 2 or 3 miles. The scale of the General Map should be adequate to clearly show listed details. A scale of approximately 1 to 3 miles per inch is commonly used. The following data are shown on a General Map for feasibility and specifications level design data collection:

(1) A key map locating the general map within the State.

(2) A legend of symbols used for existing and constructed facilities.

(3) North arrow.

(4) Existing or potential areas or features having a bearing on the design, construction, operation, or management of the project. The locations of these features should bear the parenthetical reference to the agency or entity which owns or operates the property; for example, the Bureau of Reclamation (Reclamation):

(a) Name of agency responsible for maintaining and/or managing the affected land.

(b) Recreation areas; fish and wildlife areas; building areas; highways, railroads, and shipping points; housing; areas of cultural sensitivity; areas of archeological, historical, and mining or paleontological interest; and bridges with special loads or size limitations.

(c) Existing towns, residences, private property, roads, transmission lines, substations, stream-gauging stations.

(d) Areas of environmental concern.

(e) Public utilities such as electric power and telephone lines, pipelines, etc.

(f) County, range, township, and section lines.

(g) Land use restrictions such as easements and rights-of-way.

(5) Rights-of-way:

(a) Show rights-of-way required or available for facility/structure sites, construction access, and staging areas.

(b) Land ownership boundaries and legal jurisdictions. Indicate ownership by agency acronym or private land with "private."

(6) The proposed structures and features:

(a) Location of features to be constructed or modified.

(b) Locations of potential construction and permanent access roads, sites for contractor's staging areas and construction facilities, and sites for temporary water treatment facilities.

(c) Locations of borrow areas for natural construction materials, locations of commercial quarries, and disposal areas for waste excavation.

(d) Sources of construction power and power transmission facilities.

(e) Sources of water for construction.

B. Location Maps. Location maps are commonly used as a condensed method of showing location and alignment of the features and associated structures. The location map may be combined with the general map, site plan, or plan and profile drawings for small areas. A scale of 1 inch = 1,000 feet to 1 inch = 2,000 feet is commonly used for location maps. The location map should show:

(1) **General:**

(a) North arrow.

(b) Proposed alignment, major structures, and delivery locations by symbols. Station and appropriate ties to section lines, section corners, existing buildings, pipelines, roads, railroads, etc.

(c) Topography and ownership information should be shown.

(d) Towns, roads, railroads, streams, existing pipelines, canals, reservoirs, etc.

(e) Transportation facilities and other cultural features.

(f) Location of borrow areas, riprap sources, sources of special pipe embedment material, if required

(g) Disposal areas for wasting excess excavation.

(h) For distribution systems, show ownership, turnout locations, and irrigable areas served.

(i) Sources of power for construction and operation and maintenance.

(j) Existing or potential areas or features having a bearing on the design, construction, or operation and maintenance such as: recreation areas, fish and wildlife areas, railroads, housing, and areas of archeological, historical, and mining and paleontological interest.

(k) Where the scale does not permit proper detail of a congested area, a blowup at a larger scale may be included elsewhere on the drawing and referenced to its proper location.

(l) Where density of the structures or other features is such that individual stationing and naming is impractical, the information should be shown in tabular form and station marks shown on the alignment.

(m) Linear feature (canal, pipeline, wasteway, drains, etc.), together with structures and stations. Structures and delivery locations are normally shown by symbol.

(n) Legend of symbols for existing and proposed facilities

(o) Right-of-way and land ownership information.

(2) **Distribution Systems.** Where the source of the water is a canal, reservoir, or pipeline with turnout or headworks located outside the distribution system area boundary, topographic maps should be submitted covering all the areas in which the connecting feeder main is to be located. The water surface elevation range in the source canal or reservoir or hydraulic grade line range in the source pipeline should be shown. Also, where appropriate, data such as capacities, grades, etc., should be shown.

C. General Description of Local Conditions Covering. The following data may be required for feasibility and specifications designs:

(1) Information relating to access for possible site visit by the design team, access for foundation exploration and construction, and access limitations due to environmental restrictions, etc.

(2) Access to the site for operation and maintenance (O&M) forces.

(3) Permits or permit requirements and any past permit violations or exceedences.

(4) Name and description of similar construction in the area or region.

(5) The approximate distance from the nearest railroad shipping terminal to the structure site; load restrictions and physical inadequacies of existing roads and structures and an estimate of remedial improvements to accommodate construction hauling; estimate of access road length and major structures required for new construction; and possible alternative means for delivering construction materials and equipment to the structure site.

(6) Availability or accessibility of public facilities or utilities such as water supply, sewage disposal, telephone utility, fire protection services, and electric power for construction (give location, power supplier, voltage, number of phases, and capacity of existing transmission lines; power rate schedules; probability of interruption of supply; and requirements for additional transmission line, if needed).

(a) Names, telephone numbers, email addresses, and Web sites of local utilities and contacts within those organizations.

(7) Climatic conditions that will affect design, construction, and O&M such as amount, rate, and distribution of rain, snow, and hail; ice conditions; heating and air-conditioning design temperatures; summer and winter temperatures with extremes; maximum wind velocities and their directions; probability of excessive dust or sand.

(8) Local frost depths.

(9) Ground water presence and depths.

(10) Vegetation to be cleared or preserved including kinds, sizes, and density of growth.

(11) Road detour requirements.

D. Survey Control. Survey control is required for all surveys including surveys associated with aerial photography. If existing facilities or features are affected or incorporated into designs, then verification of original coordinate system with current coordinate system and datum should be made.

E. Topographic Maps.

(1) Topographic maps, when used, should be furnished covering all the project area showing ownerships, gross acreage, and irrigable acreage for each ownership, proposed delivery location and type, and delivery water surface elevation. The acreage information, delivery type, and delivery

water surface elevation may be omitted from the maps if the information is submitted separately in tabular form.

(2) Location and layout should be based on the latest system used in previous designs or preliminary studies. A scale of 1 inch equals 100 feet to 1 inch equals 400 feet and a contour interval of 2 feet is satisfactory. Structures proposed on the pipeline should be shown by symbols; where proposed pipeline locations are shown on these maps. If the project area is flat or small, a 1-foot contour interval may be required.

(3) Where the source of the water is a canal, reservoir, or pipeline with turnout or headworks located outside the distribution system area boundary, topographic maps of the same scale and contour interval provided for above, should be submitted covering all the areas in which the connecting feeder main is to be located. The water surface elevation in the source canal or reservoir or hydraulic gradient in the source pipeline should be shown. Also, where appropriate, data such as capacities, grades, etc., should be shown.

(4) Unless the information can be shown in adequate detail on the plan-profile drawing and/or the location map, topographic maps should be furnished for the proposed sites for pumping plants, flow control stations, reservoirs, regulating tanks, surge stands, etc. Such maps should be prepared with a scale of 1 inch equals 20 feet and a contour interval of 2 feet unless steep terrain requires a greater interval for clarity. If the project area is flat or small, a 1-foot contour interval may be required.

F. Plan and Profile Drawings. Plan and profile drawings are normally requested for linear features such as roads, canals, and pipelines. Drawings are prepared so that both plan and profile are plotted on one sheet. The plan view may not be required if shown on other drawings. These drawings are normally prepared with a 1 inch = 10 feet vertical scale and the horizontal scales from 1 inch = 100 feet to 1 inch = 200 feet unless more or less detail is required. The scale should be adjusted, as required, if it is necessary to show details. Plan and profile drawings should show features such as:

(1) **General:**

(a) Strip topography may be used for the plan view.

(b) North arrow and land survey lines.

(c) Proposed centerline and stationing and curve data.

(d) Location of existing features such as highways, railroads, public utilities, major drainages, and any other features that will affect the location and cost of proposed project facilities.

(e) Ties and stationing for turnouts, sublaterals and deliveries, as well as road crossings, railroad crossings and utility crossings. Grid coordinates for major structures such as pumping plants, flow control stations, tanks, reservoirs, etc.

(f) Land control survey lines with ties to alignment where appropriate.

(g) Survey data to include stationing, ties to existing features, etc.

(h) Existing ground surface contours with date of surveys and mapping. Significant topographic features.

(i) Existing utility lines within the right-of-way and requirements for relocation.

(j) Location of any existing intersecting facilities, watercourses, or other physical features affecting the new line or riprap protection on steep slopes.

(k) Cross drainage and direction of flow. Location of riprap protection on steep slopes. For major cross drainages, include flow (ft^3/s) and associated frequency (years)

(l) Low wire elevations and station of power lines (include voltage) where they cross the alignment.

(m) Buildings, fences, and other obstructions.

(n) Right-of-way.

(o) Feature alignment, curve data, and stationing.

(p) Hydraulic properties by reaches of proposed features (including hydraulic gradeline, feature dimensions, and pressure class for pipelines).

(q) Structures (including conduit size for siphons, turnouts, and culverts).

(r) Alignment of laterals, sublaterals, overflow wasteways, reservoirs, and access roads.

(s) Crossings: Individual drawings should be furnished that show the plan and the profile, drawn to appropriate scales, of the following types of crossings:

- Railroad crossings.

- Highway crossings which cannot be constructed by open-cut methods.

- River or canal crossings.

(t) Roads, borrow pits, and waste areas.

(u) Anticipated right-of-way widths and minimum radius of curve that should be used to establish right-of-way (ROW) limits at points of intersection on pipeline centerline alignment. Where possible, curves having a minimum radius of 500 feet should be used at horizontal changes in the direction of the pipeline alignment. On large diameter pipelines, curve radii of 1,000 feet or more may be desirable to permit use of "pulled" joints in pipe or curves rather than concrete encasements.

(v) Areas where special construction effort is required, such as directional drilling, microtunneling, compacting pipe trench backfill up to the ground surface, excavating the pipe trench using shoring or a safety shield, limits of encasement under proposed drains or canals, etc.

(w) Profile: Existing ground surface, centerline elevations of pipelines, canals, hydraulic gradeline, utilities or other subsurface features where they cross the alignment.

G. Geologic Data. The following list of geologic design data provides general guidelines for the collection and reporting of geologic information for this type of facility. The geologist should apply these guidelines with good judgment and sound reasoning, elaborating upon them as required by the particular geologic setting and engineering requirements. Because the collection of geologic data is a dynamic process and often continues into the preparation of final designs, all stages of the specification design geologic exploration program must be constantly coordinated with the designer through the appropriate geology office. The TSC geologic and geophysical staff will provide necessary assistance and guidance in the gathering of these design data.

(1) Compilation, summary, and reporting of Bureau and non-Bureau geologic information on the area, with attention being paid to the sequence of explorations and historical geologic events.

(2) Surface geologic map showing locations of explorations. Locations of all existing explorations should be indicated by coordinates or stationing of the permanent survey control system for the facility.

(3) Specific foundation exploration criteria (if required).

(4) Factual narrative description of surficial deposits with attention being paid to engineering geologic matters, such as swelling minerals, low-density materials, presence of gypsum and other sulfates, caliche, erodibility (see Earth Manual). Strength of the trench wall is necessary to determine trench type for flexible pipe.

(5) Factual narrative description of bedrock with attention being paid to engineering geologic matters such as swelling minerals, presence of gypsum and other sulfates; and depth of weathering, joints, faults, and other planes of weakness.

(6) Selected determination of engineering properties of surficial deposits and bedrock by visual examination or laboratory testing.

(7) Test pits shall be excavated at 2,500 ft. intervals and laboratory testing shall be performed to determine proctor or relative densities. This information will be used to determine trench type.

(8) Drill holes shall be drilled at 2,500 ft. intervals to a depth of 15 ft. below the invert of the pipe or until bedrock is encountered. This information will is used to determine where suitable pipe foundations exist.

(9) Photographs representative of particular geologic conditions.

(10) Summary and data of exploration geophysical surveys (seismic, soil resistivity, etc.), if performed.

(11) Determine ground water conditions with attention being paid to water levels and their seasonal fluctuation, occurrence of unconfined and confined aquifers, water-producing capabilities, chemistry, and ground subsidence.

(12) Logs of exploration. Logs of drill holes advanced by churn drilling, chop and wash, or other methods which result in less then adequate sample recovery should be augmented by borehole electric (geophysical) logs where appropriate.

(13) Evaluation of landslide, snow slide, and rockfall conditions. If a threat to life exists then determine age of faulting in vicinity, especially if suspected to be late Pleistocene or Holocene.

(14) Document past, present, and possible future petroleum, water, and mineral extraction operations in vicinity.

(15) Determine geologic conditions which may affect construction methods such as, boulders on ground surface, marshes, drilling conditions, stability

of drilled holes, ground temperatures, or gases. Any potential surface water runoff problems should be brought to the attention of a hydrologist.

H. Corrosion Survey. Corrosion surveys shall be performed on all projects where pipe and fitting options with ferrous materials are considered. In order to determine corrosion mitigation measures for external surfaces, corrosivity surveys shall be performed on all projects where buried pipe options with ferrous materials are considered. This survey shall include information relating to the native corrosivity of the surroundings and to interfering direct current (DC) and alternating current (AC). The following determinations shall be included:

(1) In-situ electrical resistivity measurements of geologic materials in the area of construction. Additional measurements should be made in the areas where there is a pronounced change in type of geologic materials, drainage, and/or moisture conditions.

(2) Performance history of construction materials that have been used in the area.

(3) List of structures within ¼ mile of the vicinity of the proposed structure and appurtenant features. Determine if buried structures in the vicinity have cathodic protection and, if so, the type and location of the cathodic protection groundbed.

(4) List location, output, and purpose of the direct-current sources in the earth situated within ¼ mile of the proposed structure and appurtenant features. If the purpose of the direct current is for cathodic protection, describe the structure protected and its location.

(5) Information as to any unusual chemistry in the area from geologic materials, ground water, or manmade sources shall be gathered. In particular, analyze for pH, chlorides, and sulfates.

(6) Report alkali conditions in soil and water which might affect the choice of sulfate resisting cement.

(7) In-situ electrical resistivity measurements in accordance with the 10-percent Soil Resistivity Method (see Technical Memorandum No. MERL-05-19) shall be made. Resistivity data are to be processed through an inversion program such as Resix-Plus (Interpex, Ltd.) or equivalent. The controlling 10-percent soil resistivity shall be determined following computer processing of the data.

(8) Road salt use is aggressive and shall be noted.

(9) Identify the location of any nearby high-voltage AC (HVAC) transmission lines running parallel or nearly parallel to the pipeline in question. If not

parallel, provide approximate angle of real or projected intersection between the pipeline and such electrical transmission lines. Determine:

- Distance from the pipeline to the nearest tower legs.
- Horizontal distance between the ground below the nearest load carrying conductors and the nearest pipeline segment(s) roughly paralleling the conductors.
- Distance of the conductors above ground.
- Obtain from the power company the geometric mean radius (GMR) of the shield wires and their lineal resistance (e.g., Ohms per kilometer).
- Obtain from the power company the maximum fault currents anticipated along the run of the pipeline for each circuit.
- Obtain from the power company the maximum anticipated current loading of each circuit.
- Obtain from the power company the horizontal and vertical separation distances between each of the phase conductors and shield wires.
- Obtain from the power company the order in which the phases are arranged on the tower.
- Measure the longitudinal electric field strength for AC lines using the horizontal wire method and obtain from the power company the percent of line load at the time of the measurement.
- Determine soil resistivity at pipe depth along the powerline route.

(10) Identify the location of any high-voltage DC (HVDC) grounding electrode beds within 50 miles of the pipeline.

(11) Based on soil resistivity values, Technical Memorandum No. 8140-CC-2004-1, *Corrosion Considerations for Metallic Water Pipe* (posted on the Intranet) presents required external corrosion protection measures for pipelines.

I. Construction Materials Data.

(1) Classification of all materials taken from test holes as soils, rock, etc., should be designated according to Unified Soils Classification System (see Earth Manual). Location and extent of rock, areas of high ground water (existing and future conditions), and other unusual conditions should be shown.

(2) Information on concrete aggregates and recommendation of type of cement to be used, e.g., sulfate-resistant cement.

(3) Source, location, and gradation of acceptable road or service yard surfacing materials, and/or embedment materials.

(4) Location of manufacturers of potential pipe alternatives.

(5) Desirability of including controlled low strength material (CLSM) as an allowable pipe embedment option.

(6) Maximum Standard Proctor and relative density tests of pipe trench for determining trench type and soil strength.

(7) Embedment requirements for pipe (native soil, select material, gravel, CLSM).

(8) Reference to service history of any material thought suitable for use on project if previously used, to include results of sample analysis and tests.

(9) Types of pipe commonly used on the project or in the project area including types of pipe which are not acceptable for use on the project.

(10) Source, location, availability, and cost of water to be used for construction.

J. Operating Data:

(1) The hydraulic data.

(a) Full demand system or rotational flow measurement requirements

(b) Filling and draining criteria

(2) Type of water service desired by the water district to include:

(a) Pressure at farm delivery point.

(b) Location of farm delivery with respect to high point of land to be irrigated.

(c) Suggested configuration of farm delivery, including type of flowmeter, type of valve control, and use of automatic control (telemetering). Requirements for components to facilitate electronic readout of flowmeter.

(d) Use of automatic controls: Automatic pump restart after power failure; installation of alarms, warning devices, tank or reservoir water level indicators at pumping plants, etc.

(e) Type of water screening devices required at delivery turnout, i.e., traveling or stationary screens.

(3) Irrigation data:

(a) Season requirement. This is usually stated in terms of acre-feet per productive acre per year for irrigation (application efficiency already considered).

(b) Monthly requirement. Expressed as a percentage of season requirement for each month of operation. Irrigation flows will be distributed over the irrigation season and will vary based on crop requirements per month.

(c) Peak requirement. This is the basic criteria for sizing pipelines and can be based on the maximum demand for a month, peak day, or other time period. The demand should be stated as the number of productive acres to be served by a flow of 1 ft^3/s or a flow rate of a specified number of gallons per minute required to irrigate 1 acre. Note distribution of irrigable acres along the irrigation system.

(d) Criteria for reducing irrigable acres to productive acres. This can be expressed as a percentage of the irrigable area.

(e) Basic criteria for sizing farm deliveries. This may be shown as a table showing the maximum and minimum number of productive acres to be served by deliveries of 1 ft^3/s, 2 ft^3/s, 3 ft^3/s, etc.

(f) Type of farm distribution system, including pressure required at farm delivery of sprinkler or drip irrigation systems.

(g) Controls and equipment to be included in farm deliveries such as flowmeters, control valves, open stands, and pressure-reducing valves.

(4) Municipal and/or industrial conveyance systems. In general, the data requirements are the same as for irrigation distribution systems. In addition provide:

(a) A general profile and alignment drawing of the entire system should be furnished at a vertical scale of 1 inch equals 100 feet and a horizontal scale of either 1 inch equals 1,000 feet, 1 inch equals 2,000 feet, or 1 inch equals 5,000 feet, depending on roughness of the terrain and length of the pipeline.

(b) Location of water treatment plant, if required, and of terminal tank.

(c) Maximum and minimum water level elevations at raw water intake and clearwell.

(d) Overflow, maximum, normal, and minimum water level elevations, size of facility, mode of connection to, etc., where delivery is made to a terminal tank or reservoir owned by a city or other agency.

(e) Flowmeter requirements at the outlet and at the terminal facility.

(f) State health department requirements for disinfection of the pipeline, tanks, and reservoir; chlorine booster stations, chlorine residual level and sampling points, etc.

(g) Requirements for chlorination stations in pipelines, tanks, and reservoirs.

(h) Anticipated right-of-way widths and minimum radius of curve that should be used to establish ROW limits at points of intersection on pipeline centerline alignment. Where possible, curves having a minimum radius of 500 feet should be used at horizontal changes in direction of pipeline alignment. On large diameter pipelines, curve radii of 1,000 feet or more may be desirable to permit use of "pulled" joints in pipe or curves rather than concrete encasements.

(i) State or local requirements and codes related to construction of a municipal water distribution system.

(j) Requirements for compacting backfill in pipe trenches to the ground surface, e.g., through irrigated farm land, at road crossings or stream crossings.

(k) Peaking factor.

(l) Yearly requirement. This is usually stated in terms of acre-feet per year or ft^3/s or mgd.

(m) Monthly requirement. Expressed as a percentage of the yearly requirement for each month of operation. M&I systems may be

spread out equally over the entire year when better data is not available.

(n) Peak requirement. This is the basic criteria for sizing pipelines and can be based on the maximum demand for a month, peak day, or other time period.

(o) Delivery demands can be stated in acre-feet per month or ft^3/s and pressure requirements at the delivery points.

(p) Capacity for future development.

(q) Controls and equipment to be included in deliveries such as flowmeters, control valves, altitude valves, and pressure-reducing valves, etc.

(r) Chlorination requirements.

(s) Fire demand.

(t) Lifeline designation?

K. Miscellaneous Data:

(1) Criteria for flow measurement and/or screening at lateral turnouts.

(2) Location and data on existing sources of electric power, including construction power sources and dates when power will be available.

(3) If a pumped system, use data listed under Pumping Plants and Powerplants, as applicable.

(4) Any limitations imposed on height of stands, tanks, and other structures due to location, by the Federal Aviation Administration, Environmental Protection Agency, State, county, municipal, or district regulations. Maximum wind velocities expected at tank sites and requirements for beacon lights.

(5) Minimum cover on lateral pipelines based on farming over pipe, frost depth, depth to ground water, type of soils, vehicle wheel loadings, etc.

(6) Details of drainage system (if existing or proposed) that will influence designs of irrigation pipe distribution system.

(7) Plan of irrigation desired by the district to include: Operation of delivery by individual landowner or district personnel, fire protection, domestic requirements and plans for future district expansion (where applicable). If

domestic flow is to be provided, State health department requirements for water-supply systems.

(8) Fencing details as desired by the operating district.

(9) Safety requirements for slope of pipe trench walls.

(10) Maximum predicted and recorded flood stage elevations to be expected at major drainage and river crossings and recommended cover required for protection against scour at these locations.

(11) Suggested types of pipe to be allowed as alternatives, i.e., steel, reinforced concrete pressure pipe, polyvinyl-chloride (PVC), high density polyethylene (HDPE), etc.

(12) Water quality data: sulfites, chlorides, etc.

(13) A list of previous Reclamation or other projects that have been constructed in the area.

L. Electrical Data. Data listed below will be required to initiate design. The data furnished should be sufficient to permit designers to complete the basic design (single-line diagram) for the distribution systems. 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 their organizations.

(2) Location of point where connections 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) Electrical system reliability criteria.

(5) Discuss requirements for an alternative power source. If an alternative 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 alternative source.

(6) Requirements for remote monitoring of conditions at the facility. Discuss location of remote station, and items required to be monitored.

(7) Requirements for supervisory control, including location of station from which supervisory control is exercised.

(8) Requirements for voice and data communications between the supervisory master station and the remote facilities.

M. Environmental Considerations. Information should be included which will aid the designer in minimizing the environmental impacts due to construction of these systems. The following items should be considered in preparing design data:

(1) Photographs of the environmental setting.

(2) Cultural (historical archeological, architectural, and paleontological) resources along any alignment or within the area of the distribution system.

(3) Wildlife or refuge areas.

(4) Existing or potential wetland areas.

(5) Any threatened and/or endangered critical habitat within or adjacent to the pipeline system.

(6) Areas of heavy public use should be clearly identified.

(7) The need for restoring borrow areas and reseeding spoil banks.

(8) The water quality and location of return flows.

(9) Environmental considerations such as water pollution control standards, noise and dust abatement requirements, areas that will require landscaping, replacing of topsoil, seeding, architectural treatment for structures, tree lists, endangered species, and mitigation requirements, etc.

N. Right-of-Way (ROW).

(1) Determine the minimum ROW limits for construction and the permanent ROW limits required.

(2) Limits of rights-of-way, extent of casing pipe required, minimum cover, and any local permit requirements required at railroad and highway crossings. Where a paved highway crossing can be made by open-cut methods the road surfacing requirements for replacing the pavement.

(3) The method for determining the ROW and how the ROW will be obtained should be described.

O. Cost Data for Field Cost Estimate. The field cost estimate is an estimate of the capital costs of a feature or project from award to construction; non-contract costs are not included. Cost data developed in previous or other studies (either by Reclamation or others) should be included with the design data submittal. Include a description or outline of estimating methods and data used. The following design data for feasibility and specifications levels designs should be considered for submittal:

(1) Procurement Strategy. Will solicitation be advertised and awarded under other than full and open competition? This includes solicitations which will be set aside under socio-economic programs that may limit competition or allow award to other than the lowest bid or proposal.

(2) Estimate of cost of ROW for all features including reservoirs, dams, and appurtenant works. Include supporting data:

(3) Information on local labor supply and labor problems.

(4) Local freight or trucking rates.

(5) Housing accommodations.

(6) Interest rate for economic studies.

(7) Power rate in mills per kilowatt-hour, interest rate, and plant factor for economic tunnel, and pipeline sizing studies in cases where transported water is pumped.

(8) Estimated cost for construction items which cannot readily be determined in the design office and include the supporting data:

(a) Clearing reservoir area and for removing or replacing private improvements in the area.

(b) Earthwork (common and rock), excavation with freehaul distance. For canals, include compacting embankment, canal lining, and borrow (with free haul distance)

(c) Riprap, guardrail, culverts, row fencing, and gates.

(d) Designated areas to be cleared of vegetation, with description of kinds, size, and density of growth. State recommended method of payment (i.e., lump-sum price for area with defined limits or unit price per acre for area with limits subject to change during

construction). Use separate payment items for clearly defined areas differing in growth density and difficulty of clearing operations. If vegetation to be cleared is very sparse or can be removed without special equipment or separate operations, the cost of clearing should be included in the prices bid for excavation or prices bid for other appropriate items of work.

(9) Where buildings are located within the area to be cleared by the prime contractor, and if disposal will be the contractor's responsibility, designate building groups by number and furnish detailed list of buildings for each group. Details should include general description, size, materials, and general condition. Drawings should be provided of these buildings, if available, that depict dimensions, construction materials, the structural system for the building, and major electrical and mechanical equipment. Determine if disposal will be the responsibility of the prime contractor. If not, submit dates when disposal will be completed by others.

(10) Information on important construction work that is in progress or planned in the vicinity and the presence of interested contractors or subcontractors in the area.

(11) If potential actions exceed anticipated funding, an assessment should be made as to whether the cost estimate will reflect incremental costs of these potential actions. Provide any known increment or arrangement of the incremental costs.

(12) Local and tribal taxes.

(13) Estimates of costs for relocating railroads, highways, roads, water systems, and other public utilities. Include supporting data.

(14) Method for projecting cost into the future if required.

(15) Cost of local materials (precast concrete, etc.).

P. Construction Considerations. The following design data items should be considered for feasibility and specifications designs:

(1) Construction schedule:

(a) One contract or several contracts.

(b) Any construction timeframe restrictions

(c) Are designers required to provide a construction schedule and/or logic diagram?

(d) Recommended period for construction.

(e) Recommended period for completion of construction work and features of the work that should be completed early.

(f) Permissible times to make connections to existing facilities.

(g) Whether construction schedule will be adaptive, (e.g., provide a remedy, observe the effects, and then modify remedy as required).

(2) Allowable in-river materials (permanent and temporary).

(3) Construction constraints including allowable construction methods, traffic considerations, environmental restrictions, climatic restrictions, blasting limitations, etc.

(4) Filling and draining criteria for dam, ponds, and pipelines

(5) Unusual conditions for excavation or construction.

(6) Extent of construction surveying to be accomplished by Government surveyors.

(7) Water for construction purposes. For large rivers, this item may be unimportant. For small streams and offstream reservoirs, the item becomes critical. Determine if up to 2 ft^3/s of diversion flow for construction purposes can be assured to the contractor. The Government should obtain the water rights required. If it is necessary to use ground water, obtain information on probable sources and yields. Furnish information on locations and yields of existing wells in the vicinity. Determine restrictions, if any, to use of ground water for this purpose. It may be necessary to obtain permits from State or other governing agencies. Retrieve water quality samples for testing and evaluation.

(a) Water treatment requirements for return flows

(8) Requirements for maintaining streamflow or diversions during construction and maximum length, time, and number of permitted interruptions.

(9) Required permits from government agencies and others.

(10) Requirements for meeting criteria for suppression of nitrogen, adequate oxygen levels, and temperature control and control of turbidity during construction.

(11) Impact of moving construction materials on existing road facilities, including consideration of such factors as traffic congestion, effect on road condition, air pollution, etc.

(12) Requirements for temporary construction access roads, permanent access and service roads, and relocation of existing roads or railroads. Include any limiting requirements imposed by road owners for public access/haul roads.

(13) Comments on disposal of special excavation problem materials such as lignite.

(14) Give borrow area and temporary haul road restoration requirements such as stockpiling of topsoil, grading of the area, general cleanup, etc.

(15) Give consideration to using required excavated material in lieu of material from other borrow sources wherever possible.

Q. Site Security. Many Reclamation projects may require a security risk assessment. The need for a site-specific security risk assessment should be considered for feasibility designs where an assessment may impact the field cost estimate and for specifications designs. Specific issues to consider are contained in Section 14 of Chapter 7 – Site Security and Public and Worker Safety. If assistance is required to determine specific design data needs, contact the Office of Security, Safety and Law Enforcement. Where design data and designs include site-specific security assessment, compliance with Reclamation Manual DM Part 444 – Physical Protection and Facility Security, Chapters 1 and 2 is required.