

Appendix D: Design and Restoration Project Deliverables

This appendix covers a wide range of design and restoration project elements, and reflects best practices for salmon recovery projects. The guidance intends to provide clear requirements for documentation of the design and construction process and help the sponsor demonstrate project quality and success. Appendix D will serve as a guide to develop a project application and specific deliverables in the project agreement.

How Appendix D is Organized

This appendix is split into four sections. The goal is to provide a better understanding of the different design stages and deliverable expectations that will go into the project agreement. For example, D-4 covers a comprehensive restoration project from conceptual design through construction, including as-built documentation. All restoration projects that include design elements shall follow four standard project development stages, described below, completed in a single design grant or in multiple design phases.

- Appendix D-1: Conceptual Design Deliverables
- Appendix D-2: Preliminary Design Deliverables
- Appendix D-3: Final Design Deliverables
- Appendix D-4: Construction Deliverables

Project Deliverables

Each section of Appendix D (D1-D4) includes the deliverables matrix (see below). The project agreement will include specific project deliverables based on project type, application, local evaluation, SRFB Review Panel recommendations, and the sponsor's experience.

Appendix D: Design and Restoration Project Deliverables

Project Deliverables	Project Phase			
	Conceptual Design	Preliminary Design	Final Design	Construction Project ¹
Conceptual Design Report and Drawings	✓	Application	Application	Application
Preliminary Design Report and Drawings		✓	✓	✓
Landownership Certification Form	✓	✓	✓	✓
Permit Applications		Optional	Optional	✓
Design Review Comments		Optional	✓	✓
Final Design Report and Drawings			✓	✓
Technical Specifications			✓	✓
Construction Quantities and Costs	3	✓	✓	✓
Bidding Documents			✓	✓
Permits			Optional	✓
Cultural Resources Compliance	2	2	2	✓
Control and Tenure Documents				✓
As-Built				✓

¹Design-build construction projects have an abbreviated set of design requirements before construction. See Appendix D-4.

²Cultural resources compliance may be required if sponsor is conducting ground-disturbing activities during the design phases.

³Rough cost estimate of the preferred alternative.

Restoration Project Design

Salmon habitat restoration projects require a designer or team with a balance of knowledge and experience within fisheries biology, civil engineering, and other technical fields. The person or team completing the preliminary project design should include at least one licensed professional engineer with experience in salmon habitat restoration. Projects with straightforward project design and minimal sponsor liability concerns may not require a licensed professional engineer and people with applicable experience and technical knowledge may design the project.

If a licensed engineer will not design the project, indicate this on the salmon project proposal and describe the qualifications and experience of the team which will design the project. The SRFB Review Panel will use this information during its review.

Restoration Design Report Examples

To help with understanding the design report deliverable, RCO staff have published some [sample design reports](#) on the RCO Web site. They include simple to complex examples to help illustrate the needed level of detail and the layout of a design report.

Stream Habitat Restoration Guidelines

The [Stream Habitat Restoration Guidelines](#) are part of a series of guidance documents produced with SRFB funding through the Aquatic Habitat Guidelines program. The aquatic habitat guidelines do not replace existing regulatory requirements, though they are designed in part as technical guidance supporting regulatory streamlining and grant application review for stream restoration proposals.

In developing the application, RCO highly recommends the sponsor consult Chapters 4 and 5 of the [Stream Habitat Restoration Guidelines](#). Chapter 4 provides guidance for developing goals and objectives for the restoration projects as well as restoration strategies. Chapter 5 provides guidance on designing and implementing restoration techniques.

Appendix D-1: Conceptual Design Deliverables

Project Deliverables	Conceptual Design	Project Phase		
		Preliminary Design	Final Design	Construction Project ¹
Conceptual Design Report and Drawings	✓	Application	Application	Application
Preliminary Design Report and Drawings		✓	✓	✓
Landownership Certification Form	✓	✓	✓	✓
Permit Applications		Optional	Optional	✓
Design Review Comments		Optional	✓	✓
Final Design Report and Drawings			✓	✓
Technical Specifications			✓	✓
Construction Quantities and Costs	3	✓	✓	✓
Bidding Documents			✓	✓
Permits			Optional	✓
Cultural Resources Compliance	2	2	2	✓
Control and Tenure Documents				✓
As-Built				✓

¹Design-build construction projects have an abbreviated set of design requirements before construction. See Appendix D-4.

²Cultural resources compliance may be required if sponsor is conducting ground-disturbing activities during the design phases.

³Rough cost estimate of the preferred alternative.

This appendix identifies the deliverables required when a planning project includes a conceptual design in the scope. Such planning projects may include watershed or reach assessments and feasibility studies. Projects resulting in a conceptual design require a minimum 15 percent match. This guidance intends to ensure that applicants, evaluators, and RCO grants managers have the same expectations for grant agreement deliverables.

Conceptual Design

The conceptual design is the first stage of developing site specific restoration actions. This process should use available watershed- and reach-level assessment information to address one or more priorities within a watershed strategy. The conceptual design should be guided by specific desired outcomes (objectives). Adequate technical information must be collected from the site to evaluate existing conditions and develop concept-level restoration techniques (alternatives). The preferred alternative concept must be documented with detailed drawings and a written report sufficient to explain and support proposed actions as well as guide the next stages of design.

Submit the following deliverables to the RCO grants manager.

Conceptual Design Deliverables

Submit the following deliverables to the RCO grants manager along with any assessment and feasibility deliverables funded in the scope of work.

- Description of the project site and the problems within the context of salmon recovery.
- Identification of specific goals and objectives to address the problems.
- Identification and conceptual design of alternatives to achieve the project objectives. Each conceptual design alternative must include a description of the design and a plan view drawing of existing site conditions and the proposed project on accurately scaled site plans. The plan view drawing must include an area/location map, property boundaries (either surveyed or approximated based on assessor's data), landownership, roads or other infrastructure as appropriate, scale, north arrow, water bodies and direction of flow, bank-full width or mean high water line for marine waters, and approximate dimensions of proposed elements.
- Evaluation and discussion of stakeholder comments and the pros and cons of each alternative.
- Selection of the preferred alternative(s).
- Rough construction cost estimate of the preferred alternative(s).

Appendix D-2: Preliminary Design Deliverables

Project Deliverables	Project Type			
	Conceptual Design	Preliminary Design	Final Design	Construction Project ¹
Conceptual Design Report and Drawings	✓	Application	Application	Application
Preliminary Design Report and Drawings		✓	✓	✓
Landownership Certification Form	✓	✓	✓	✓
Permit Applications		Optional	Optional	✓
Design Review Comments		Optional	✓	✓
Final Design Report and Drawings			✓	✓
Technical Specifications			✓	✓
Construction Quantities and Costs	3		✓	✓
Bidding Documents			✓	✓
Permits		Optional	Optional	✓
Cultural Resources Compliance	2	2	2	✓
Control and Tenure Documents				✓
As-Built				✓

¹Design-build construction projects have an abbreviated set of design requirements before construction. See Appendix D-4.

²Cultural resources compliance may be required if sponsor is conducting ground-disturbing activities during the design phases.

³Rough cost estimate of the preferred alternative.

Conceptual Design

The conceptual design phase of the project describes the initial phase of identifying a restoration project. For preliminary design projects, the application requirements in the project proposal comprise an adequate conceptual design.

Preliminary Design

RCO uses the term “preliminary project design” to define the final deliverable in a preliminary design project, or an intermediate deliverable in a final design or restoration project. Preliminary designs intend to advance project concepts to a detailed understanding and quantification of all the major project elements.

Preliminary designs may traditionally be labeled “30 percent design,” “50 percent design,” etc., but these numeric labels tend to confuse the process and do not always reflect the design detail of the project. For example, preliminary designs for some straightforward projects, such as culvert replacement on a private driveway, may be considered 80 percent of the final design requirements. Conversely, the preliminary designs for some large-scale, complex projects, such as levee setbacks with tidegate installations, may be considered only 20 percent of the final design requirements. Therefore, sponsors and consulting engineers should use the RCO definitions for consistency.

A licensed professional engineer must supervise the preparation of the preliminary design unless the project design is straightforward and sponsor liability concerns are minimal. In that case, a licensed professional engineer may not be required and individuals with applicable experience and technical knowledge may complete the design.

While the detailed scope of each project’s preliminary design process is unique, in general, the process for developing a preliminary design includes preparing surveyed site plans; conducting field investigations of hydrologic, geotechnical, and other site conditions; conducting data analysis; preparing drawings and designs; preparing the design report; and preparing engineering cost estimates. For additional detailed guidance on designing and implementing restoration projects, please refer to Chapters 4 and 5 of the [Stream Habitat Restoration Guidelines](#).

Preliminary Design Deliverables

Preliminary designs must adequately describe all proposed project elements in sufficient detail for permit review and authorization. While the design team may tailor the design process to suit the unique circumstances of each project, the following project deliverables are required for preliminary design projects:

- Preliminary design report, drawings, and engineering cost estimate
- Landownership Certification Form ([Appendix E](#)), if not already provided
- Design review comments (optional)
- Permit applications (optional)

Sponsors must submit these deliverables to the RCO grants manager at the close of the preliminary design project or before moving on to the next phase of the project. The following section provides more details on the preliminary design deliverables.

A. Preliminary Design Report, Drawings, and Construction Cost Estimate

A design report is a record of the technical decisions that inform the development of the selected project design at the preliminary and/or the final design stage. By clearly documenting and explaining the design process, the report allows reviewers and other stakeholders to understand the proposed project and the relevant factors that contributed to its design. The preliminary design report must describe all elements of the project and provide sufficient details to support project permitting.

While the design team may structure the design report to suit the circumstances of its project, in general, the design reports should include the following elements:

- **Introduction:** An explanation of the purpose of the project and its specific habitat restoration goals and objectives.
- **Existing Conditions:** A characterization and analysis of the existing conditions relevant to project design. These conditions include: Description of the problem; summary of site, reach, and watershed conditions; biological and water quality factors as they relate to the project conditions; site history and constraints leading to the observed problems and which may present challenges to restoration; and description of identified causes of the problem. This section typically includes historical data; surrounding land uses; landowner and community expectations; survey information (topographic, geomorphic, and vegetative); sediment sampling; water velocities, depths, and flow rates; groundwater or hyporheic flow evaluation ranges; tidal elevation and ranges; and maintenance requirements. The level and detail of survey and data collection needed depends upon project goals, objectives, and the context of the project.
- **Preliminary Design Alternatives:** An identification, description, and evaluation of design alternatives considered to achieve the project goals and objectives. Describe each element of the design alternatives. Include a comparison of each of the alternatives discussing project objectives, other evaluation criteria (such as fish benefit, maintenance, sustainability, social acceptance, etc.) and cost, to the extent that cost data is available at this stage of the design process.
- **Preferred Alternative:** A description of a preferred alternative and the rationale for choosing it, citing the relevant factors described above. Include a brief explanation of why other alternatives were not selected.

- **Design Considerations and Preliminary Analyses:** A listing of specific design criteria that define the intent and expectations for each project element. Design criteria are specific, measurable attributes of project features that clarify the purpose of each project element and articulate how each element will contribute to the project's overall goals and objectives. Include justification and documentation of design methods applied, including assumptions that facilitated the design. Provide design output, including analytical results of all technical and design analyses and how these translate to project element designs.
- **Permitting and Stakeholder Consultation:** A description of regulatory and/or other public consultation activities. Review and address comments from agencies and other stakeholders in the preliminary design. This section is optional based on proposed deliverables in the application.
- **Preliminary Design Drawings:** The preparation of preliminary design drawings is key to completing a successful habitat restoration project. All design and restoration projects require preliminary design drawings. Provide preliminary design drawings in digital format (e.g. AutoCAD). Each drawing should be to scale, and it is strongly suggested that the vertical and horizontal scales on the drawings be kept the same.

For the preferred alternative, minimum drawing requirements include depiction of all elements of the project in sufficient detail to support project permitting and include at a minimum the following:

- Existing site plan showing: Area/location map; property boundaries; landownership; road, utilities, or other infrastructure as appropriate; scale; north arrow; water bodies and direction of flow; and bank-full width or mean low and high water (marine waters).
- Project site plan view drawing(s) showing proposed actions overlaid on the existing site plan (above). The site plan should include all project elements including installation and removal of fill, wood, rock, culverts, infrastructure, clearing and staging, dewatering, etc.
- Project profile and cross-section at important project locations showing water surface elevations relevant to the design (e.g. ordinary high water, maximum design flow, tidal elevations, flood elevations, etc.)
- Structure design details, as needed.

Provide additional design drawings for complex projects and projects with multiple features or multiple sites.

- **Construction Quantities and Preliminary Construction Cost Estimate.**
- **Appendices:** Include references, analytical and model inputs, outputs, and other supporting documentation.

B. Design Review Comments (Optional at Preliminary Design Phase)

Send the preliminary design report and drawings to relevant stakeholders and the RCO grants manager after the in-house review. After a reasonable time for review, plan an on-site visit to review the design plans at the project location with stakeholders (e.g. landowners, co-managers, lead entity citizen and technical groups, the RCO grants manager, etc.).

These steps have been very useful for a comprehensive “reality check” for stakeholder review and consideration of all stated project objectives.

Send the RCO grants manager a memo (or similar correspondence) that consolidates stakeholder comments and other considerations received during design review. The memo should describe how the comments have (or have not) been incorporated into the design. Distribute this memo to all entities involved in the review. This step is optional because, for some sponsors, this step is more practical during the final design phase.

C. Permit Applications (Optional at Preliminary Design Phase)

The sponsor should provide permit applications or proof of permit receipt (e.g. copies of permits or permit numbers and issue dates) to the RCO grants manager or in the PRISM progress report under the “Permit” tab. This step is optional at the preliminary design phase because, for some sponsors, this step is more practical during the final design phase.

Appendix D-3: Final Design Deliverables

Project Deliverables	Project Type			
	Conceptual Design	Preliminary Design	Final Design	Construction Project ¹
Conceptual Design Report and Drawings	✓	Application	Application	Application
Preliminary Design Report and Drawings		✓	✓	✓
Landownership Certification Form	✓	✓	✓	✓
Permit Applications		Optional	Optional	✓
Design Review Comments		Optional	✓	✓
Final Design Report and Drawings			✓	✓
Technical Specifications			✓	✓
Construction Quantities and Costs	3		✓	✓
Bidding Documents			✓	✓
Permits		Optional	Optional	✓
Cultural Resources Compliance	2	2	2	✓
Control and Tenure Documents				✓
As-Built				✓

¹Design-build construction projects have an abbreviated set of design requirements before construction. See Appendix D-4.

²Cultural resources compliance may be required if sponsor is conducting ground-disturbing activities during the design phases.

³Rough cost estimate of the preferred alternative.

Conceptual Design

For restoration projects and preliminary and final design projects, the application requirements in the project proposal should comprise an adequate conceptual design.

Preliminary Design

RCO uses the term “preliminary project design” as either a final deliverable in a preliminary design project or an intermediate deliverable in the design process of a final design or restoration project. Submit the preliminary design deliverables to the RCO grants manager before progressing to the final design and restoration phases. See the preceding Appendix D-2: Preliminary Design Deliverables for detailed information on the preliminary design process.

Final Design

The final design will incorporate comments provided by stakeholders, landowners, RCO, and/or permit agencies about the preliminary design report and on-site review. The final design process must address and resolve all substantial issues raised in the permitting and stakeholder review process, so that all stakeholders agree on the final plans.

The final project design process converts the preliminary design drawings and report into a stand-alone and comprehensive set of final design drawings (construction drawings) and technical specifications for project construction. A licensed professional engineer must supervise the preparation of the final design unless the project design is straightforward and sponsor liability concerns are minimal. In that case, a licensed professional engineer may not be required and individuals with applicable experience and technical knowledge may complete the design.

Final Design Deliverables

While the design team may tailor the design process to suit the unique circumstances of each project, the following are required deliverables for final design and restoration projects. The RCO grants manager must accept these required deliverables before moving forward to construction.

- Design review comments
- Final design report and drawings (refer to Section D-2 for a list of items to include in the design report)
- Landownership Certification Form ([Appendix E](#)), if not already provided
- Technical specifications
- Final construction quantities and costs
- Contract bidding documents and general contract conditions (unless the project will be built by sponsor crew)
- Construction permits (optional)

The following section provides more details on the final design deliverables.

Design Review Comments

Include the design review memo in the final design report or submitted as a separate document.

Submit a memo that consolidates stakeholder comments and other considerations received during preliminary design review. The memo should explain how the comments and other feedback have, or have not, been included in the final design. Distribute this memo to all entities involved with design review. This step may have been completed during the preliminary design phase.

Final Design Report and Drawings

Revise the preliminary design report and drawings to address the review and permitting comments, as needed. RCO may need additional detailed drawings to clarify the design of specific work items. Final designs should define the project elements considered essential to meet the project's goals and objectives in sufficient detail to minimize changes made during construction.

Technical Specifications

Technical specifications may be included in the final design report or as a separate document.

Support all work shown on project drawings with one or more technical specifications to further describe and/or control the work. The construction contractor should know about project materials, technical requirements, project elevations, permit requirements, or any other elements of the proposed project. Clear and detailed technical specifications reduce on-the-ground adjustments and changes that may deviate from the original project objectives.

Final Construction Quantities and Costs

Include construction quantities and costs in the final design report or as a separate document.

SRFB-funded projects require a detailed list of work items and quantities as part of the final project design; the practice of listing a lump sum cost for the entire project is not acceptable. A detailed breakdown of work quantities typically includes 10 to 40 separate work items, matched with respective estimated quantities. Generate a construction cost estimate for comparison with contractor bids to ensure a competitive bid; any experienced project designer can produce this estimate, traditionally termed "engineer's estimate."

Contract Bidding Documents and General Contract Conditions

Include contract bidding documents and contract conditions in the final design report or as a separate document.

If the sponsor's construction crew will build the project then bidding documents and contract conditions are not required; however, the requirements for technical specifications and a detailed list of work items (above) still apply.

Bidding documents should include: A bid form, definitions, a proposed agreement (to be between the sponsor and contractor), general conditions, special provisions, technical specifications, and the project drawings (usually bound separately).

Sponsors should select contractors using good business practices, which could include selective negotiations with known contractors, public advertisement for bidding, or competitive bidding using some combination of proposed price and contractor qualifications. The contractor selection process should be objective and defensible in case of contest by companies not selected for the construction work. Follow all applicable state and/or required federal procurement procedures.

Construction Permits (Optional at the Final Design Phase)

Provide permit applications, or proof of permit receipt (e.g. copies of permits or permit numbers and issue dates) to the RCO grants manager or in a PRISM progress report. This step is optional at the final design phase because, for some sponsors, this step is more practical during the construction phase.

Appendix D-4: Construction Deliverables

Project Deliverables	Project Type			
	Conceptual Design	Preliminary Design	Final Design	Construction Project ¹
Conceptual Design Report and Drawings	✓	Application	Application	Application
Preliminary Design Report and Drawings		✓	✓	✓
Landownership Certification Form	✓	✓	✓	✓
Permit Applications		Optional	Optional	✓
Design Review Comments		Optional	✓	✓
Final Design Report and Drawings			✓	✓
Technical Specifications			✓	✓
Construction Quantities and Costs	3		✓	✓
Bidding Documents			✓	✓
Permits		Optional	Optional	✓
Cultural Resources Compliance	2	2	2	✓
Control and Tenure Documents				✓
As-Built				✓

¹Design-build construction projects have an abbreviated set of design requirements before construction. See Appendix D-4.

²Cultural resources compliance may be required if sponsor is conducting ground-disturbing activities during the design phases.

³Rough cost estimate of the preferred alternative.

Conceptual Design

For restoration projects, preliminary and final design projects, the application requirements in the project proposal comprise an adequate conceptual design.

Preliminary Design

Submit preliminary design deliverables to the RCO grants manager before moving onto the final design and restoration phases. See Appendix D-2: Preliminary Design Deliverables for detailed information on the preliminary design process.

Final Design

Before awarding the construction contract or initiating construction, submit the final design deliverables to the RCO grants manager. See Appendix D-3: Final Design Deliverables for detailed information on the final design process and required pre-construction design deliverables.

Design-Build Projects

Most sponsors complete final design reports before moving forward into construction. However, some sponsors prefer to proceed to construction after completing a preliminary design. RCO refers to these projects as “design-build” projects.

Design-build projects are considered only in cases where the sponsor, the engineer, and construction crew have extensive experience and have been successful with a particular project type. Additionally, design-build may be considered where design is straightforward and liability concerns are minimal. Design-build projects typically develop less detailed drawings before construction than other construction projects. In exchange, design-build documents typically include a detailed written description of how to locate and construct various project elements in the field. Design-build projects require the project designer to provide a high level of construction oversight to ensure the project goes as planned. Sponsors should develop detailed, as-built drawings following construction, and submit them to the RCO grants manager before project close-out. Sponsors must obtain all required permits before construction.

If proposing the design-build method to complete the project, indicate this on the salmon project proposal and describe the pre-construction design deliverables that will be submitted to RCO in lieu of the final design and report.

The application and the SRFB Review Panel’s recommendations will develop the specific deliverables for design-build projects. The special conditions section of the project agreement will identify specific project deliverables.

Construction Phase

This section identifies the required pre-construction deliverables, the construction management process, and “as-built” requirements.

Pre-Construction Deliverables

- 1. Control and tenure documentation.** Before construction, provide control and tenure documentation of the property being restored. See [Section 6](#) for more information.
- 2. Cultural resources review.** Real property restored through RCO funding is subject to [Governor's Executive Order 05-05](#) or compliance with Section 106 of the National Historic Preservation Act. RCO requires documented compliance with the applicable cultural resources review process. For more information on cultural resources review, see [Section 6](#).
- 3. Proof of permits.** Before construction, secure all necessary permits and submit proof of permit receipt (e.g. copies of permits or permit numbers and issue dates) to the RCO grants manager or in a PRISM progress report.

Construction Management

To minimize unintended errors introduced during construction, RCO highly recommends that the project engineer has direct, on-site involvement during construction. Some project sponsors may have extensive construction experience and knowledge, and may perform daily construction supervision. RCO recommends that the sponsor and the engineer agree to share construction supervision responsibilities with mutual confidence required of both entities. The engineer should be confident that the on-site construction inspector will recognize any problems before construction is complete and ensure daily communication between the construction inspector and engineer. The engineer should review and approve substantial changes during construction before implementation.

Post-Construction Deliverable: "As-Built Drawings"

Document all changes made during construction. "As-built drawings" refers to the conventional term applied to project design drawings modified by the engineer after completion of construction to document the completed project. Prepare "as-built drawings" if changes were made to the final design during construction and if the sponsor used a design-build construction approach. Submit these drawings to the RCO grants manager after project completion.

Instead of the conventional "as-built drawings" described above, RCO may allow the sponsor to submit the following as-built documentation:

- Original final designs (if no changes were made during construction).
- Original final designs with a list of change orders describing the construction changes.

Appendix D: Construction Deliverables

- A design memo from the engineer with notations on the final design/construction plans identifying the changed elements of the project with photo points and photographs showing the project post-construction.