

Appendix C: Fish Passage Project Design Deliverables

How Appendix C is Organized

This appendix is split into four sections and aims to provide a better understanding of the different design stages and deliverable expectations that will go into the grant agreement.

- [Appendix C-1: Feasibility and Alternatives Analysis Deliverables](#)
- [Appendix C-2: Preliminary Design Deliverables](#)
- [Appendix C-3: Final Design Deliverables](#)
- [Appendix C-4: Construction Deliverables](#)

Project Deliverables

All projects generally must follow the standard project development stages: feasibility, alternatives analysis, conceptual design, preliminary design, final design, and construction. The FBRB has tasked WDFW's TRT to review and approve the alternatives analysis, preliminary design, and final design stages. The table below lists deliverables for all eligible project types (planning, planning and construction, or construction). This guidance intends to ensure that everyone has the same expectations for grant agreement deliverables.

Project Deliverables	Project Type ⁷			
	Planning	Design-build	Planning and Construction	Construction
Alternatives Analysis or Correction Analysis Form	✓	✓	Due at Application	Due at Application
Conceptual Design Report	Optional	Optional	Optional	Optional
Preliminary Design Report and Drawings	✓	✓	Due at Application	Due at Application
Land Ownership Certification Form		✓	✓	✓
Final Design Report and Drawings	✓	✓	✓	Due at Application
Technical Specifications	✓	✓	✓	Due at Application
Construction Quantities and Costs	✓	✓	✓	Due at Application
Bidding Documents	Optional	Optional	Optional	Optional
Permits	Optional	Optional	Optional	Optional
Cultural Resources Compliance	1	1	1	✓
Control and Tenure Documents		✓	✓	✓
As-Built Drawings		✓	✓	✓
✓ Project Deliverable				
1 Cultural resources compliance is required before a sponsor disturbs the ground.				

Fish Passage Project Design

Fish passage projects require a designer or team with a balance of knowledge and experience in the fisheries biology, civil or environmental engineering, and other technical fields. The person or team completing the preliminary project design is required to include at least one licensed professional engineer with experience in fish passage restoration.

Fish Passage Design Report Examples

To understand the design report deliverable, RCO has 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.

⁷See [Eligible Project Types](#) in Section 2

Water Crossing Design Guidelines

The *Water Crossing Design Guidelines* is a WDFW document to help the road crossing owner and designer comply with Washington State law that protects fish. This document provides practical, real-world knowledge and techniques to improve the overall success of water crossings. These guidelines do not replace regulatory requirements, though they are designed in part as technical guidance supporting regulatory streamlining and grant application review for fish passage project applications.

The FBRB highly recommends that project sponsors and designers review the *Water Crossing Design Guidelines*. Chapter 1 discusses the geomorphic approach to designing fish passage corrections and the other relevant chapters. Chapter 2 provides guidance on no-slope culvert design, Chapter 3 covers stream simulation culvert design, Chapter 4 provides bridge design criteria, and Chapter 6 provides guidance on hydraulic design options.

Stream Habitat Restoration Guidelines

The *Stream Habitat Restoration Guidelines* are part of a series of guidance documents that promote process-based, natural stream restoration. The FBRB highly recommends that project sponsors review the [Stream Habitat Restoration Guidelines](#) (2012). Chapter 4 provides guidance for developing goals and objectives for restoration projects as well as restoration strategies. Chapter 5 provides guidance on designing and implementing restoration techniques.

Appendix C-1: Feasibility and Alternatives Analysis Deliverables

Project Deliverables	Project Type ⁸			
	Planning	Design-build	Planning and Construction	Construction
Alternatives Analysis or Correction Analysis Form	✓	✓	Due at Application	Due at Application
Conceptual Design Report	Optional	Optional	Optional	Optional
Preliminary Design Report and Drawings	✓	✓	Due at Application	Due at Application
Land Ownership Certification Form		✓	✓	✓
Final Design Report and Drawings	✓	✓	✓	Due at Application
Technical Specifications	✓	✓	✓	Due at Application
Construction Quantities and Costs	✓	✓	✓	Due at Application
Bidding Documents	Optional	Optional	Optional	Optional
Permits	Optional	Optional	Optional	Optional
Cultural Resources Compliance	1	1	1	✓
Control and Tenure Documents		✓	✓	✓
As-Built Drawings		✓	✓	✓
✓ Project Deliverable				
1 Cultural resources compliance is required before a sponsor disturbs the ground.				

⁸See [Eligible Project Types](#) in Section 2

Feasibility and Alternatives Analysis Deliverables

Feasibility and alternatives analysis, as described below, is a standard element in the early stages of a fish passage project. This stage also is a required review step by the TRT as part of a planning project, or the planning phase of a design-build project. The feasibility and alternatives analysis may be submitted in report format or a sponsor and their engineer may complete and submit a Barrier Correction and Analysis Form ([Appendix G](#)) that provides equivalent overview of the alternatives being considered to correct a barrier. Remember that abandonment and removal is an acceptable alternative to consider and an eligible activity. Elements common to a feasibility and alternatives analysis are as follows:

- Description of the project site and the problems in the context of salmon recovery.
- Identification of specific goals and objectives for addressing the problems.
- Identification of alternatives for achieving the project objectives. Each design alternative must include a detailed description of the design elements and may include a plan view drawing of existing site conditions and the proposed project on accurately scaled site plans. If provided, 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.
- Document the preferred alternative.
- Rough construction cost estimate of all alternatives.

Upon completion, the sponsor must attach these deliverables to PRISM and notify the WDFW biologist and RCO outdoor grants manager so that evaluation by the TRT may begin in a timely manner. The sponsor must receive notice from the TRT that the alternative analysis or Correction Analysis Form has been approved before beginning work on the next stage of design.

Appendix C-2: Preliminary Design Deliverables

Project Deliverables	Project Type ⁹			
	Planning	Design-build	Planning and Construction	Construction
Alternatives Analysis or Correction Analysis Form	✓	✓	Due at Application	Due at Application
Conceptual Design Report	Optional	Optional	Optional	Optional
Preliminary Design Report and Drawings	✓	✓	Due at Application	Due at Application
Land Ownership Certification Form		✓	✓	✓
Final Design Report and Drawings	✓	✓	✓	Due at Application
Technical Specifications	✓	✓	✓	Due at Application
Construction Quantities and Costs	✓	✓	✓	Due at Application
Bidding Documents	Optional	Optional	Optional	Optional
Permits	Optional	Optional	Optional	Optional
Cultural Resources Compliance	1	1	1	✓
Control and Tenure Documents		✓	✓	✓
As-Built Drawings		✓	✓	✓
✓ Project Deliverable				
1	Cultural resources compliance is required before a sponsor disturbs the ground.			

This appendix describes the project deliverables for preliminary design. This guidance intends to ensure that everyone has the same expectations for design deliverables

⁹See [Eligible Project Types](#) in Section 2

before evaluation by the TRT. Missing or misrepresenting any of this information may cause a delay and result in a more time-consuming iterative TRT review process.

Preliminary Design

The term “preliminary design” is an intermediate deliverable in a final design project. Preliminary designs advance a preferred alternative concept to a detailed understanding that quantifies all the major project elements, including site conditions, survey and modelling designs, and drawings of the project as it should look when finished. Sponsors should make sure preliminary designs show how water crossing guidelines will be met.

Preliminary designs traditionally may be labeled “30 percent design,” “50 percent design,” etc., but these numeric labels are confusing and do not always reflect the design detail of the project. Therefore, sponsors should use this manual’s definitions for consistency.

Fish passage projects require a design team with a balance of knowledge and experience within the fish biology, civil engineering, and other technical fields. The person or team completing the preliminary project design must include at least one licensed professional engineer, who would be qualified to follow through with the final project design.

Preliminary Design Process

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 fish passage projects, please refer to Chapters 4 and 5 of the [Stream Habitat Restoration Guidelines](#).

Preliminary Design Deliverables

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

- Preliminary design report, drawings, and engineering cost estimate
- Design review comments (optional)
- Permit applications (optional)

Upon completion, sponsors must attach these deliverables to PRISM and notify the WDFW biologist and RCO outdoor grants manager so that evaluation may be done by the TRT quickly. The TRT must notify the sponsor that the preliminary design has been approved before the sponsor may begin the next stage of design. The following section provides more details on the preliminary design deliverables.

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 either at the preliminary 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 be sufficiently detailed 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 that may be relevant to project design. Typically, 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 that have led 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 is dependent upon project goals, objectives, and the context of the project.
- **Preliminary Design Alternatives:** An identification, description, and evaluation of design alternatives considered for achieving 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) and cost, to the extent that cost data is available at this stage.
- **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 the other alternatives were not selected.

- **Design Considerations and Preliminary Analyses:** A listing of specific design criteria that defines 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 meeting the overall project's 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 carried out and how the review comments from agencies and other stakeholders were addressed 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 a key step to producing a successful fish passage project. All design and restoration projects require preliminary design drawings. Please produce all 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 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 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)
- 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 and outputs, and other supporting documentation.

Design Review Comments (optional)

If important to document important stakeholder outreach that must be considered in the design process, sponsors may incorporate in the design report or attach a separate correspondence that documents 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.

Permit Applications (Optional at Preliminary Design Phase)

If applying for a permit at this stage, provide proof of permit receipt (e.g. copies of permits or permit numbers and issue dates) in the PRISM progress report under the "Permit" tab and project attachments. This step is optional at the preliminary design phase because, for some sponsors, this step is more practical during the final design phase.

It is encouraged that sponsors discuss timing of permit application with the WDFW habitat biologist. Sponsors who apply for permits at this stage may be required to apply for permit modifications should major design changes occur as a result of the TRT design review.

Appendix C-3: Final Design Deliverables

Project Deliverables	Project Type ¹⁰			
	Planning	Design-build	Planning and Construction	Construction
Alternatives Analysis or Correction Analysis Form	✓	✓	Due at Application	Due at Application
Conceptual Design Report	Optional	Optional	Optional	Optional
Preliminary Design Report and Drawings	✓	✓	Due at Application	Due at Application
Land Ownership Certification Form		✓	✓	✓
Final Design Report and Drawings	✓	✓	✓	Due at Application
Technical Specifications	✓	✓	✓	Due at Application
Construction Quantities and Costs	✓	✓	✓	Due at Application
Bidding Documents	Optional	Optional	Optional	Optional
Permits	Optional	Optional	Optional	Optional
Cultural Resources Compliance	1	1	1	✓
Control and Tenure Documents		✓	✓	✓
As-Built Drawings		✓	✓	✓
✓ Project Deliverable				
1 Cultural resources compliance is required before a sponsor disturbs the ground.				

This appendix describes the project deliverables for final design. This guidance intends to ensure that everyone has the same expectations for grant agreement deliverables.

¹⁰See [Eligible Project Types](#) in Section 2

Final Project Design

The final project design will incorporate comments provided by stakeholders, the TRT, and permit agencies about the preliminary design report and on-site review. The final design process must resolve all substantial issues raised in the previous design stages, 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.

Final design deliverables must be completed and stamped by a licensed professional engineer.

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 outdoor grants manager must accept these required deliverables and the TRT must approve final designs before construction.

- Design review comments
- Final design report and drawings (refer to Appendix C-2 for a list of items to include in the design report as they are the same)
- Technical specifications
- Final construction quantities and costs
- Contract bidding documents and general contract conditions (unless the project will be built by the sponsor's crew)
- Construction permits (optional)

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

Design Review Comments

The design review memo may be included in the final design report or submitted as a separate document.

The sponsor must 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 design should define the project elements considered essential to meet projects' 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

Construction quantities and costs may be included in the final design report or as a separate document.

A detailed list of work items and quantities must be part of the final project design; 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

Contract bidding documents and contract conditions may be included in the final design report or as a separate document.

If using the sponsor's construction crew, this subsection is not applicable; 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).

Contractor selection for projects must use 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. Sponsors must follow any applicable state and/or required federal procurement procedures.

Construction Permits (Optional at the Final Design Phase)

The sponsor shall 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 reports under the "Permit" tab. This step is optional at the final design phase because, for some sponsors, this step is more practical during the construction phase. Sponsors are required to meet the deliverables outlined in the grant agreements.

Appendix C-4: Construction Deliverables

Project Deliverables	Project Type ¹¹			
	Planning	Design-build	Planning and Construction	Construction
Alternatives Analysis or Correction Analysis Form	✓	✓	Due at Application	Due at Application
Conceptual Design Report	Optional	Optional	Optional	Optional
Preliminary Design Report and Drawings	✓	✓	Due at Application	Due at Application
Land Ownership Certification Form		✓	✓	✓
Final Design Report and Drawings	✓	✓	✓	Due at Application
Technical Specifications	✓	✓	✓	Due at Application
Construction Quantities and Costs	✓	✓	✓	Due at Application
Bidding Documents	Optional	Optional	Optional	Optional
Permits	Optional	Optional	Optional	Optional
Cultural Resources Compliance	1	1	1	✓
Control and Tenure Documents		✓	✓	✓
As-Built Drawings		✓	✓	✓
✓ Project Deliverable				
1	Cultural resources compliance is required before a sponsor disturbs the ground.			

¹¹See [Eligible Project Types](#) in Section 2

This appendix describes the project deliverables for all fish passage projects where the sponsor intends to construct the project. This guidance intends to ensure that everyone has the same expectations for grant agreement deliverables.

Construction Phase

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

Pre-Construction Deliverables

- **Control and tenure documentation.** Before construction, provide control and tenure documentation of the property being restored. Typically, this includes a landowner agreement for property not owned by the project sponsor, temporary access easements, and Department of Natural Resources right of entry permit. For more information, see Section 3: Control and Tenure.
- **Cultural resources review.** Real property restored through RCO funding is subject to [Governor’s Executive Order 21-02](#) 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, see [Section 3: Cultural Resources](#).
- **Proof of permits.** Before construction, the sponsor must secure all permits and submit proof of permit receipt (e.g. copies of permits or permit numbers and issue dates) to the RCO outdoor grants manager or in the PRISM progress reports under the “Permit” tab. A sponsor may have completed this pre-construction task in an earlier design phase.

Construction Management

To minimize unintended errors introduced during construction, FBRB highly recommends that the project designer has direct, on-site involvement during all phases of construction. Some project sponsors may have extensive construction experience and knowledge, and may perform daily construction supervision. FBRB recommends that the sponsor and the designer agree to some sharing of construction supervision responsibilities with mutual confidence required of both entities. The designer/engineer should be confident that the on-site construction inspector will recognize any problems before construction is complete and ensure that there is daily communication between the construction inspector and designer/engineer. The project designer/engineer should review and approve substantial changes during construction before implementation. Substantial changes in design also may need FBRB approval as well as approval from regulatory agencies.

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/designer after completion of construction to document the completed project. Prepare as-built drawings if changes were made to the final design during construction. Submit these drawings to the RCO grants manager after project completion.

Instead of the conventional as-built drawings described above, FBRB may allow 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.
- A design memo from the designer/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.