**Fish Facility DDR Content at 30%, 60%, and 90% Milestones**

**30% DDR:**

1. Identify design criteria, references, loads, and assumptions
2. Biological:
	1. Identify species of concern, fish size and numbers, and run-timing
	2. Identify any other species that could be indirectly affected
	3. Identify sorting, anesthetic, and sampling criteria
	4. Identify water quality criteria
	5. Identify criteria (e.g. fish collection efficiency, survival and injury) for each feature (i.e. fish ladder, holding pools, etc)
	6. Identify handling/transport criteria
	7. Identify release site(s)
	8. Identify post-construction monitoring and evaluation and any RME equipment (e.g. PIT antennas) that could be installed as part of the construction
3. Geotechnical:
4. Site geology
5. Groundwater conditions
6. Remediation of subsurface contamination
7. Results of subsurface explorations
8. Hydrologic and Hydraulic:
	1. Identify pertinent data including constraints and general hydraulic characteristics
	2. Perform hydrologic analysis, if not done during EDR, and develop flow exceedance curves
	3. Establish the design high flow and low project outflows for fish collection operations
	4. Identify tailwater elevations
	5. Identify pertinent reservoir elevations
	6. Identify general hydraulic features
	7. Develop numerical model(s) of the system to inform the design
	8. Identify and initiate development of physical modeling (if not done during EDR), if determined necessary
	9. Identify flow requirements and preliminarily size each feature
	10. Identify potential impacts to operations, if applicable
9. Structural:
10. Develop structural load cases
11. Identify structural materials
12. Perform preliminary structural analysis to determine size of each feature or primary member
13. Preliminary 3D models and isometric views
14. Mechanical:
15. Identify mechanical systems, components, and operations
16. Identify list of mechanical drawings
17. Electrical:
18. Power sources identified
19. Overall plant control system identified
20. Prepare electrical SKM model
21. Prepare one line diagrams and block diagrams

**60% DDR:**

1. Update DDR text
2. Identify Appendices
3. Biological
	1. Update with any new information/address placeholders
4. Geotechnical:
	1. Identify borrow and disposal sites
	2. Identify design parameters (earth pressures, seismic parameters, soil/rock parameters)
	3. Excavation design
	4. Cofferdam/temporary retaining structures design
5. Hydrologic and Hydraulic:
	1. Continue sizing and configuration of the geometry of each component and checking for biological/hydraulic criteria compliance (iterative process)
	2. Perform numerical model(s) of the system to inform the design
	3. Complete development and perform physical modeling, if determined necessary
	4. Finalize component sizing
	5. Determine hydraulic loads as needed for structural/mechanical design
	6. Submit design calculations
6. Structural:
7. Finalize stability analysis or primary structures/components
8. Perform preliminary strength design
9. 3D models of structures, isometrics, concrete outlines, section views of primary structures
	1. Continue sizing and configuration of each component and checking for biological/hydraulic criteria compliance (iterative process)
	2. Identify structures that could be added later included in the design to address major risks identified for meeting the biological criteria.
10. Mechanical:
11. Develop mechanical systems, components, and operations plans
12. Preliminary list of electrical loads
13. Identify mechanical equipment
14. Preliminary drawings showing mechanical equipment layout
15. Electrical:
16. Control systems interface with existing project systems identified
17. Update load studies and vault studies
18. Update electrical SKM model
19. Conductor sizing calculations for major feeders and branch circuits
20. Voltage drop and grounding calculations completed
21. One line drawings and block diagrams for control and communications completed
22. Construction/Civil/Real Estate/Cost:
23. Identify staging areas and real estate needs.
24. Preliminary demo/construction sequencing
25. Draft construction schedule
26. Prepare cost estimate from draft list of DDR quantities

**90% DDR:**

1. Finalize DDR text
2. Finalize Appendices (explorations, calculations, site surveys, etc)
3. Biological:
	1. Develop fish salvage/rescue plan for use during construction
	2. Develop fish salvage/rescue plan for use when the facility is operational
4. Geotechnical:
	1. Ground improvement design
	2. Embankment design
	3. Foundation design (for each structure)
	4. Geotechnical retaining structures design
	5. Corrosion mitigation design
	6. Instrumentation requirements
	7. Drawings – Embankment and foundations
5. Hydrologic and Hydraulic:
	1. Continue coordination of biological/hydraulic criteria compliance (iterative process)
	2. Develop operational schemes/input to operations plans
	3. Develop emergency operations procedures/input to operations plans.
	4. Develop normal startup and shutdown procedures/input to operations plans.
6. Structural:
7. Finalize structural analysis of all structural features
	1. Continue sizing and configuration of each component and checking for biological/hydraulic criteria compliance (iterative process)
	2. Identify structures that could be added later included in the design to address major risks identified for meeting the biological criteria.
8. 3D models of structures, isometrics, construction/demo sequence drawings, plan views, section views, typical structural details
9. Mechanical:
10. Finalize mechanical systems, components, and operations plans
11. Finalize list of electrical loads
12. Finalize DDR drawings showing mechanical equipment layout and details
13. Electrical:
14. Finalize load and fault studies
15. Perform load analysis
16. Perform short circuit analysis
17. Equipment sizing calculations
18. Lighting calculations
19. Perform voltage drop/feeder size calculations
20. Grounding calculations
21. Electrical plans, demo drawings, one lines, panel schedules, block diagrams from control and communications
22. Construction/Civil/Real Estate/Cost:
23. Finalize staging and real estate needs
24. Finalize demo/construction sequencing
25. Finalize DDR construction schedule
26. Prepare cost estimate from final list of DDR quantities