CATHERINE CREEK/STATE DIVERSION FISH PASSAGE

Completion Report

Performance Period
June 1, 2007 to December 31, 2007

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Introduction

Catherine Creek is one of the major Snake River spring chinook and summer steelhead systems in the Grande Ronde Subbasin. The Catherine Creek spring chinook is one of six distinct populations in the subbasin. The Catherine Creek population is severely depressed. It is estimated to be only 16 percent of the historic run (Grande Ronde Subbasin Plan, 2004). Catherine Creek steelhead are part of the Upper Grande Ronde steelhead population. This population is estimated to be at 29 percent of historic numbers (Grande Ronde Subbasin Plan, 2004). Meeting fish passage standards in the Catherine Creek watershed is a high priority for restoration of the Catherine Creek Chinook and the Upper Grande Ronde steelhead populations.

The State Diversion structure is one of six major irrigation diversions on Catherine Creek. There has been a concentrated effort to improve passage on the structures by the Grande Ronde Model Watershed Program and others over the last 14 years. BPA has provided much of the funding. Most of the other structures have been reconstructed or modified to improve fish passage. The State Diversion and two other diversions (both scheduled for reconstruction in 2009) are the final major diversions in upper Catherine Creek to be addressed.

The Catherine Creek watershed has been a high priority area for all types of restoration work. In addition to fish passage at diversion structures there have been 66 other restoration projects completed in Catherine Creek since 1986. These include channel reconstruction, road obliteration, irrigation improvement, dike relocation, wetland enhancement, streambank stabilization, riparian fencing, off-channel livestock watering, culvert replacements, riparian planting and large wood placement projects.

Project cooperators are the Grande Ronde Model Watershed, Oregon Department of Fish and Wildlife and the State Ditch irrigators.

Location

The Catherine Creek State Diversion Fish Passage project is located on Catherine Creek, River Mile 20, about two miles above the City of Union. The project legal description is T.4S., R. 39E., Sec. 29, NE¼ of NE 1/4. (Figure 1).

Existing Condition

The State Ditch provides irrigation water to several irrigators. There has been an irrigation diversion structure at this location since the time of the most senior water rights, about 1863. Early diversions were likely facilitated by gravel push-up dams followed by wooden and concrete structures. The last improvements, resulting in the current diversion structure were done in the 1960's. There have been more recent modifications to the ditch headgate facilities.

The State Diversion structure is a full channel-spanning concrete wall with about a two-foot drop when check boards are not in place (appendix pre-construction pictures). Check boards are used during low flow to divert water into the irrigation ditch, creating a three to three and a half foot drop. The structure does not affect adult steelhead migration (occurs prior to board placement) but may impede the latter part of the adult chinook migration, depending on when the boards are placed, the timing of the run and stream flow. The structure does not meet ODFW fish passage standards (6"drop) and is a complete impediment (upstream) to juvenile steelhead and chinook, resident rainbow, bull trout and most native species when irrigation check boards are in place.

Project Description

The State Diversion Fish Passage project was sponsored by the Grande Ronde Model Watershed Foundation (GRMWF). The GRMWF conducted all phases of project management including planning, coordination, ESA consultation, permitting, construction subcontracting and fiscal management. Construction funding was provided by BPA under the Fish and Wildlife Mitigation Program, and by the Oregon Watershed Enhancement Board.

The preliminary design and cost estimate were provided by professional engineering staff of the Oregon Department of Fish and Wildlife Fish Screening and Passage Program in Salem. The project engineer was Joel Watts, P.E. S.E. An off-channel vertical-slot concrete ladder design (Figures 2 and 3) was selected to best meet fish passage criteria while minimizing impacts to the stream channel. An in-channel structure was considered but was determined to be prone to block ice flows and potentially cause flooding. The design team briefly discussed metal fabrication of a fish ladder, as a least cost alternative to concrete, but felt concrete would be much more durable and a better long-term value.

The project objectives were:

- To provide season-long passage for all life stages of all native aquatic species.
- Continue to meet legal water diversion rights.
- Minimize adverse impacts to the channel.
- Minimize risk of flooding caused by ice or debris damning.

Planned project tasks were:

- De-water and isolate the in-channel work area (upstream and downstream ends of the proposed off-channel fishway)
- Conduct fish salvage as necessary.
- Excavate for fish ladder.
- Construct fish ladder (form, install rebar, pour concrete, install safety rails).
- Install riprap around ladder inlet and outlet.
- Implement erosion control and site rehab (shaping and seeding).

Methods, Results & Discussion

Construction

The construction contract was awarded to Mike Becker General Contracting on June 28, 2007. The low bid was $167,820, approximately $2,000 more than the engineering estimate. The GRMWF subcontracted with Anderson-Perry & Associates to perform technical construction inspection. Lyle Kuchenbecker performed additional inspections and managed the project.

The Notice to Proceed was issued on July 16. Construction began on July 17 with removal of large cottonwood trees and out-of-channel excavation. The ladder inlet and outlet areas were hand sandbagged on July 24. Isolation areas were very small and were checked for stranded fish. There were none. ODFW installed a denile (temporary portable fish ladder) on the north side of channel to maintain fish passage over the existing diversion structure throughout the construction period.

Base crushed rock placement, base forming and rebar installation was completed by August 1. The contractor poured the base on August 2. The GRMWF conducted a construction inspection with Joel Watts on August 8. Two additional concrete pours for the vertical walls were done between August 13 and August 28. All concrete finishing work was completed by September 4. Backfilling, grading, contouring and riprap placement was completed by September 6, completing the major structural construction work.

Walkway, safety rails and staff gauge installation were completed by October 12, Brett Moore (Anderson Perry) and Lyle Kuchenbecker conducted the final inspection on October 15, 2007.

The GRMWF contracted with Judy construction to complete miscellaneous final site cleanup. This was completed by the end of December. All contracted project work was completed by December 31, 2007. The landowner purchased and applied erosion seeding in April 2008.

Financial

Work Element	Source	Actual $$	Budgeted $$
Final design, specifications, bid package	ODFW (in-kind)	$15,000	$15,000
ESA consultation, permitting	GRMW(in-kind)	$8,500	$8,500
Project management	GRMW(in-kind)	$4,800	$4,800
Cultural resource survey & report	BPA	$2,500	$2,500
Construction, const inspec, contingency	BPA	$86,720	$86,000
Construction (contracted services)	OWEB	$87,000	$87,000
Fiscal administration	OWEB	$1,800	$1,800
Post-implementation status reporting	OWEB	$1,920	$1,920
Project certification report	OWEB	0	$1,600
	Total	$208,240	$209,120

Results

Structure construction was completed as per final design. Preliminary design called for the installation of brackets on the existing cross-channel concrete wall to facilitate easier placement of check boards. The irrigator, and owner, of the structure did not agree to this component of the project feeling that his prior method of placing boards was satisfactory. The brackets were not included in the final design.

Construction was delayed two weeks from the scheduled start work due to a delay in receiving permits. The in-water work window for Catherine Creek is July 1 to August 15. Initial out-of-channel work did not begin until July 16 and in-water work was delayed to July 24. The GRMWF requested and received an in-water work extension to September 8 to cover expected additional time needed for construction. All in water activities were completed by September 6.

There were two minor construction modifications to the engineering designs. One involved a minor change to the safety rails and walkways which was agreed to and approved by the engineers. The second, also approved by the engineers, was to install steps in each of the fish ladder pools as a safety measure. The ladder walls were eight feet high and in the event that someone fell into one of the pools, and could not exit through the one-foot openings between the pools, they would be able to climb out of the structure.

The vertical slot fish ladder is a state-of-the-art structure promoted and designed by the Oregon Department of Fish & Wildlife. The structure meets ODFW fish passage criteria and appeared to function well at low flows during the fall of 2007. Water continued to flow through the ladder after the irrigation season ended and the check boards were removed from the channel-spanning concrete wall. The designed placement of the check boards at the inlet and outlet of the vertical slot fish ladder enables the adjustment of flow through the ladder to compensate for changes in stream flow. The construction of the vertical slot fish ladder met objectives by providing juvenile fish, as well as adults, unconstrained movement in this reach of Catherine creek at all flow levels throughout the year.

Discussion

Once started construction progressed well, and as expected. The construction contract was awarded to an experienced, well equipped contractor. The subcontract for construction inspection to a local experienced engineering firm assured high quality construction to design specifications.

The construction cost, $167,820, is relatively expensive and the actual benefit to fish survival and productivity almost impossible to measure. However it is well documented that survival and growth of juvenile salmonids are affected greatly by water temperature. This reach of Catherine Creek is the area where high summer air temperatures combined with reduced stream flow causes water temperatures to increase and substantially affect salmonid productivity (> 68 degrees F), and in particularly low flow years perhaps reach lethal limits. The installation of the ladder is an immediate benefit by allowing juvenile fish access to cooler water upstream of the site.

Adult Chinook can normally jump a 3 to 3.5 foot barrier if there is adequate pool depth beneath the barrier. However adult Chinook, especially late migrants, often get to this reach of Catherine Creek in poor condition. The successful passage of even a handful of adults, that would not otherwise continue upstream to spawn, could be a substantial benefit to the run since the number of adult Chinook over the last decade has averaged less than 100 per year.

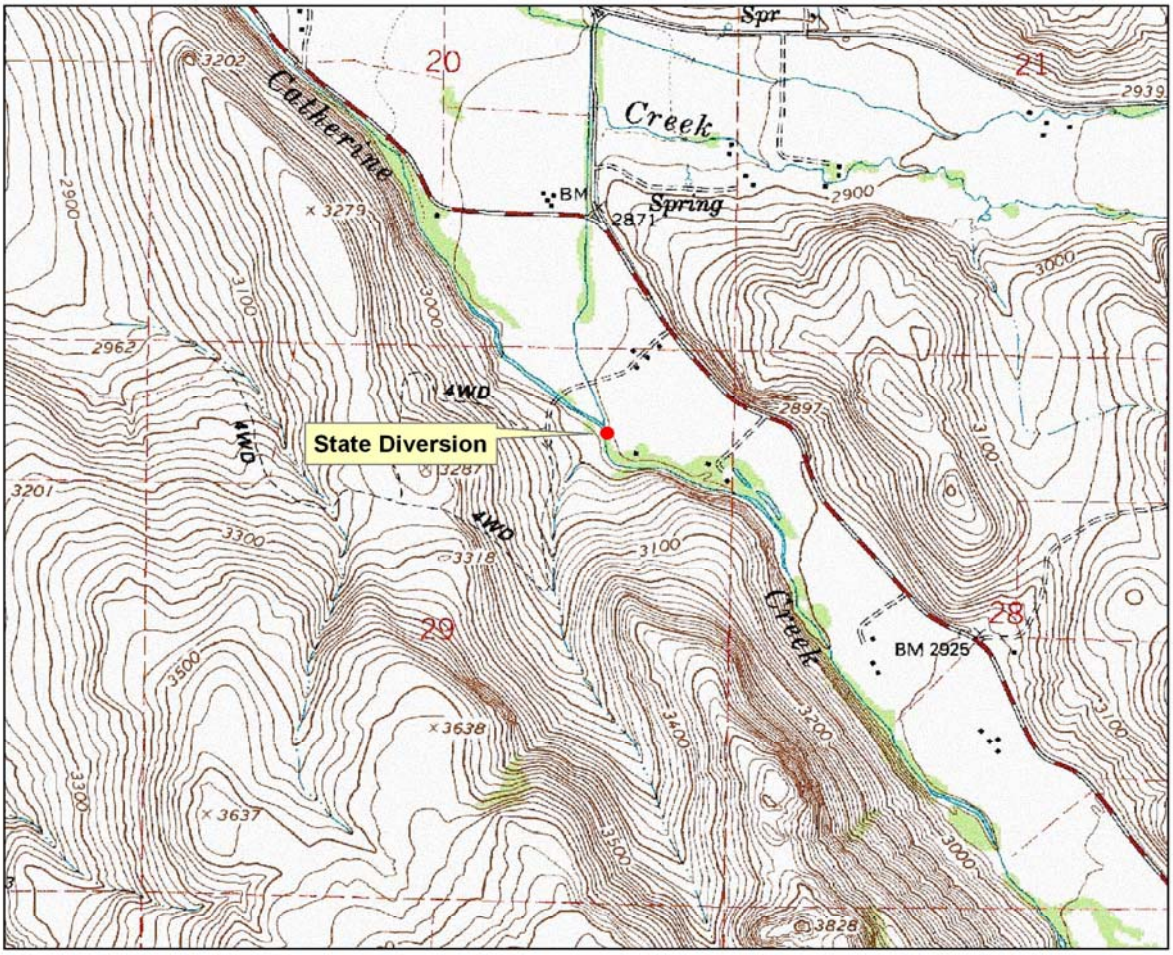
Monitoring will occur throughout the low flow period when irrigation check boards are in place in the stream channel. The primary monitoring will be periodic checks of flow through the ladder. If there is adequate flow, and the fish have access to it, we have seen that both adults and juveniles successfully find the flow source and move through the reach. Presence/absence surveys below the ladder of both adults and juveniles will also periodically be conducted through the migration and low-flow period.

Appendix

Figure 1 Vcinity map
Figure 2 Site Plan
Figure 3 Foundation Plan
Pre-project pictures
Construction pictures
Post-project pictures

Figure 1 Vicinity Map

Catherine Creek State Diversion Fish Passage
T.4S, R39E, Section 29, NE ¼ of NE 1/4



Map Location in Grande Ronde Basin

Scale 1:16,241
Miles
0 0.1 0.2

N

Figure 2 Site Plan

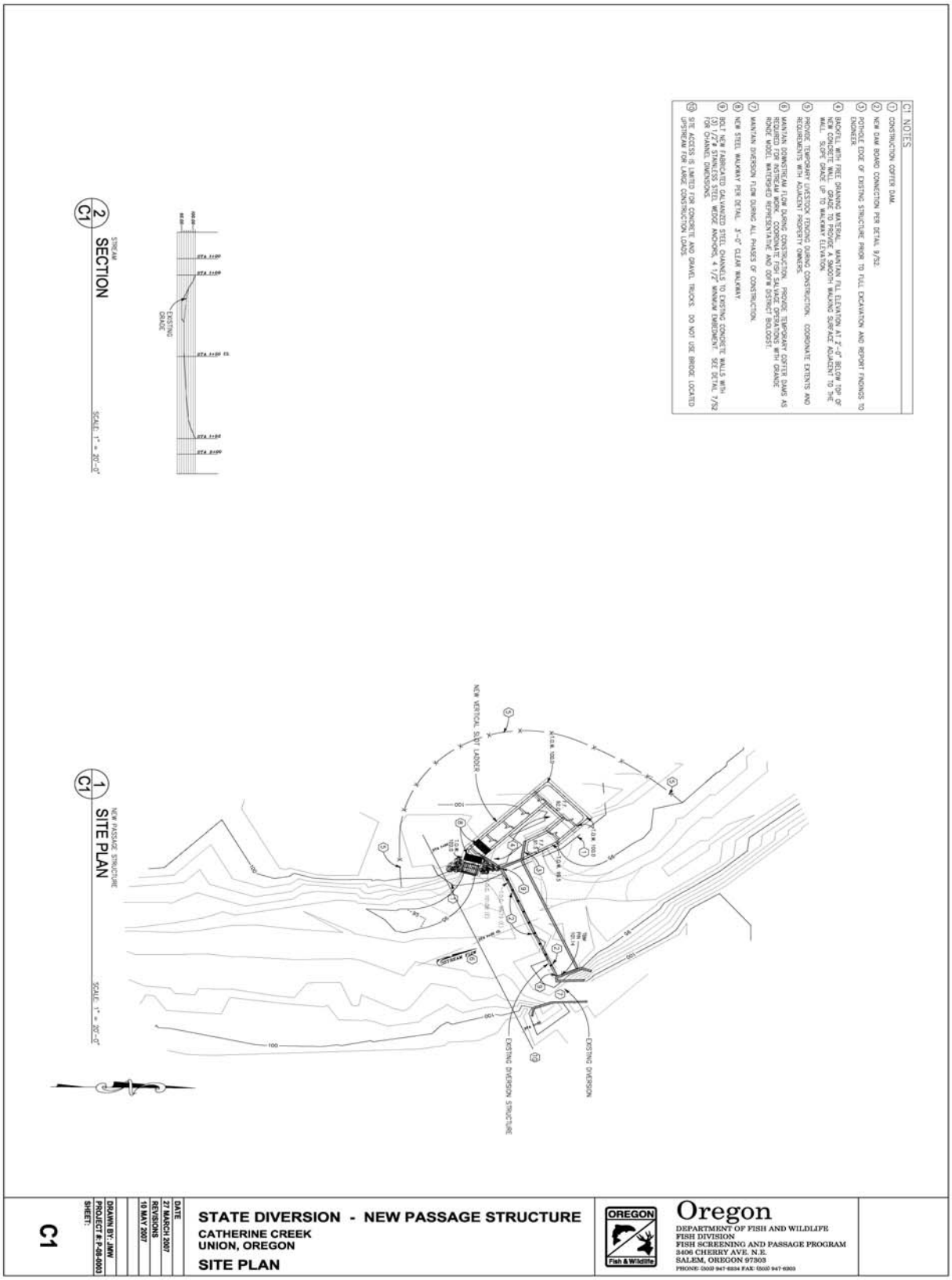
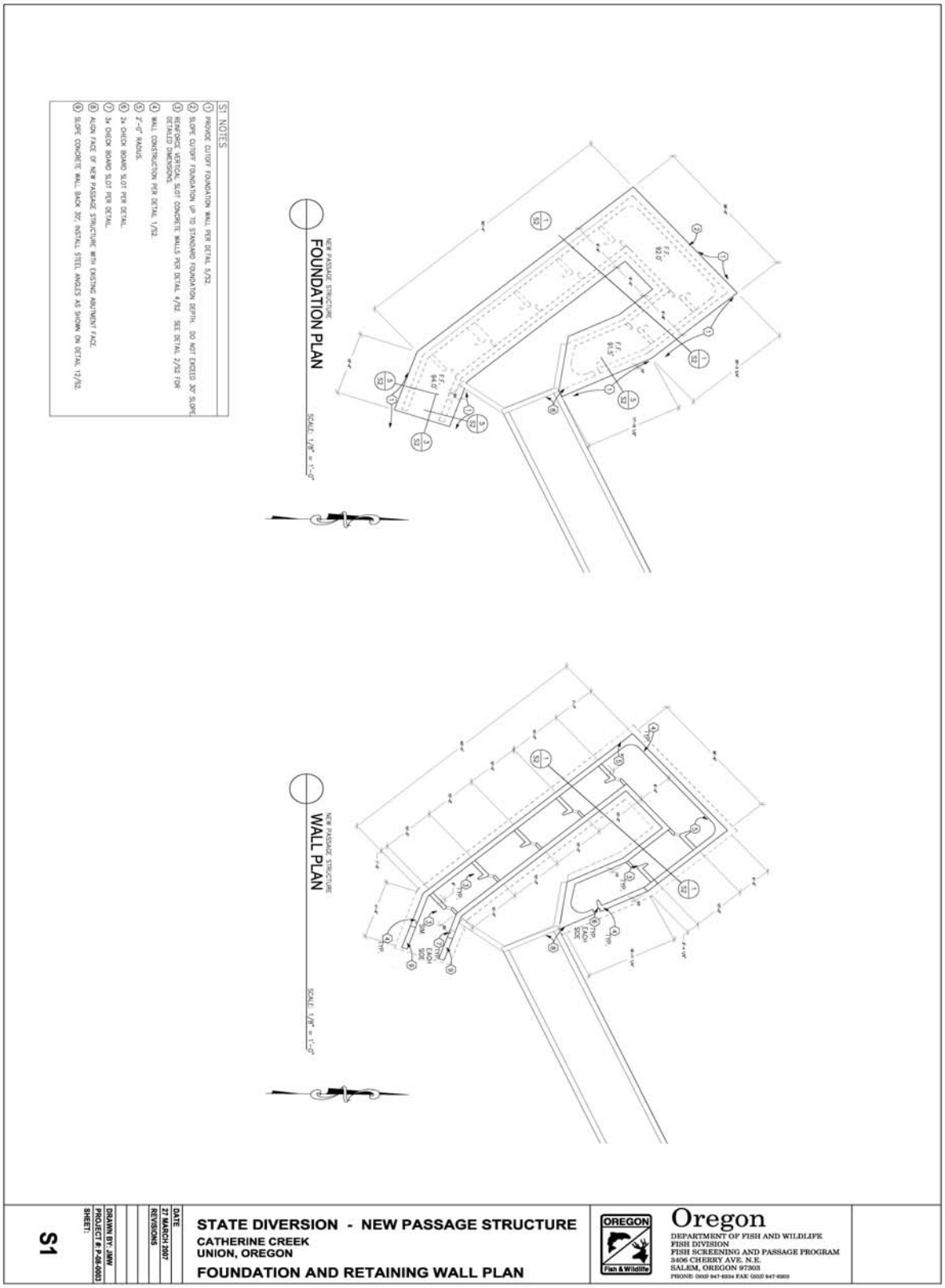


Figure 3 Foundation Plan



Pictures Pre-During-Post Construction

Pre-Project 2006

July 20, 2006

Check boards were placed on top of the concrete wall to elevate water level during the irrigation season, approximately mid-June through early October. This created a 3 to 3 1/2 foot drop which restricted migration of adult Chinook during the latter part of the run. The barrier was impassable to juvenile steelhead and Chinook, bull trout, resident rainbow and all other native species.

Note:
Post construction check boards are still placed on the concrete wall, as they were prior to the project, but fish now have an alternate route around the structure.

Pre-Project 2006

March, 2006

During the fall, winter and spring check boards were removed. The concrete wall without boards created a two foot jump which, although not a barrier to adult anadromous fish, still likely impeded upstream movement of Chinook and steelhead juveniles, bull trout and some other native species.

A denile was temporarily placed on the north side of the channel to maintain fish passage over the diversion wall during construction

Off-channel excavation for the vertical slot fish ladder

Construction July-September 2007

Pouring concrete for the base of the ladder

Forms constructed for the vertical walls

Post Construction

October 2007
Completed fish ladder – downstream view

October 2007
Completed fish ladder – side view

Post Construction

December 2007
Escape steps were installed in each pool

June 2008
Completed fish ladder prior to placing check boards in the channel for the 2008 irrigation season