

Salmon Run G.C. – Hole 4: Fish Passage & Wetland Restoration

Preliminary Project Design

June 5, 2014

Prepared By: Curry Soil and Water Conservation District, South Coast Watershed Council,
& Swanson Ecological Services, LLC

Project Location: Salmon Run Golf Course Hole 4
T41S, R13W, Section 32
Latitude 42.061739, Longitude -124.216329

Project Ownership: Salmon Run Golf Course; Brookings, Oregon

Project Objectives: (1) Restore fish passage into the Hole 4 wetland
(2) Improve winter rearing habitat within the Hole 4 wetland
(3) Improve riparian vegetation within and around the Hole 4 wetland
(4) Manage invasive plant species within and around the Hole 4 wetland
(5) Ensure project activities do not interfere with the long-term management objectives of Salmon Run Golf Course

Project Permits: A DSL/USACE Removal-Fill Permit is required

Implementation: Potential implementation in 2015

Funding: Salmon Run Golf Course
Supplemental Environmental Project (DEQ) – Contractor Mitigation Grant(s) - unidentified

PROJECT OVERVIEW

This project encompasses an approximately 2 acre wetland that is located between the Salmon Run Golf Course driveway and the green complex of Hole 4 and the tee complex of Hole 5. The hydrology in this wetland is dynamic:

- Two small streams feed the wetland, one of which appears to have perennial flow
- Multiple culverts contribute ditch runoff and groundwater (*springs and seeps*) from the South Bank Chetco River road and the golf course driveway
- A pond that surrounds the Hole 4 green is plumbed with an overflow culvert that drains to the wetland when the pond is at capacity
- A small (*wetland*) stream channel runs approximately 800 feet along the margin of the wetland and the toe of the golf course driveway fill slope; it is fed by the two incoming streams and one or more of the ditch relief culverts
- Beaver dams on the wetland stream channel impound water and reduce stream gradient
- The wetland stream channel connects to an overflow channel in the floodway of Jack Creek, but immediately upstream of this connection an orphaned road crossing culvert impedes flow and disrupts fish passage
- At flood stage Jack Creek backwaters the wetland to create nearly 2 acres of ponded habitat and, during extreme events, creates a fluvial connection with the Hole 4 pond

Vegetation within the wetland is a mix of native sedges and rushes, and non-native Himalayan blackberry and English ivy. Between the golf course driveway and the wetland, alder, willow, and other hardwoods provide some shading and filtration, but English ivy and Himalayan blackberry impair the function of this riparian buffer and jeopardize its long-term viability. Himalayan blackberry and turf grass comprise the vegetation where the golf course and wetland interface.

Within the Chetco River watershed, Jack Creek and its tributaries account for a significant percentage of the 'high intrinsic' habitat that is available for coho salmon. As such, the Hole 4 wetland represents an important opportunity to increase high quality winter rearing habitat for coho pre-smolts.

INVESTIGATIONS

- (1) **Macro-Invertebrate Study:** Concerns were raised regarding water quality in the golf course pond, and how that might be affecting the wetland, specifically with regard to its value as winter rearing habitat for native salmonids. In late February and early March, 2013, the Curry Watersheds Partnership's *Watershed and Outreach Program* conducted macro-invertebrate sampling in the pond with local 4th grade students as part of an Adopt-a-Stream project. The results of those samples found a range of macro-invertebrates living in the pond, including 2 species of Class 1 macros, which are highly sensitive to pollution; and 9 species of Class 2 macros. Based on the results of these samples, and the fact that the pond is hydrologically disconnected from the wetland except during extreme flood events, we concluded that the Hole 4 pond did not pose a risk to fish rearing in the wetland.
- (2) **Himalayan Blackberry Removal:** In preparation for our investigations, a contractor was hired to mow Himalayan blackberry on the perimeter and within the wetland, including the location of the orphaned road crossing, to facilitate a visual assessment and Total Station coordinate survey. Prior to this action the site was impenetrable, and the existing topography was blocked from view.
- (3) **Total Station Coordinate Survey:** On January 22 and January 31, 2014 the Curry SWCD's Project Manager and Data Management Specialist conducted a coordinate survey using a Total Station survey instrument. An arbitrary datum was used to survey longitudinal and cross-sectional profiles of the Hole 4 wetland, the wetland stream channel, and the orphaned road crossing; and spatial data was collected to develop a planview of the project area. The Data Management Specialist plotted the coordinate data using drafting software, and generated a longitudinal thalweg profile and channel cross-sections of the existing wetland stream channel, a planview map of the existing layout, and a planview of the proposed preliminary project design (*see attached drawings*).

PRELIMINARY DESIGN

Using the Total Station survey and input from the General Manager of Salmon Run Golf Course, the Curry SWCD generated a preliminary design that would:

- Remove the orphaned road stream crossing and a portion of the adjoining road fill
- Abandon approximately 530 feet of the wetland stream channel, where it runs along the base of the driveway fill slope, and construct approximately 745 feet of new stream channel that meanders through the center of the wetland
- Install wood structures within the wetland and the stream channel
- Restore native riparian vegetation around most of the wetland perimeter
- Manage invasive weeds

The preliminary design may fit within the US Army Corps of Engineer's Nationwide Permit and the SLOPES V Restoration criteria; and the design accommodates golf course management objectives for the area, including: the retention of a treeless corridor along the orphaned road alignment that provides a view of the course from the driveway entrance; the option to convert the orphaned road alignment into a cart path; and the retention of open space associated with the Hole 4 green and the Hole 5 tee complex.

The preliminary design will require additional development before it can be permitted and implemented. Specifically, further hydraulic analysis is needed to determine the geometry of the new stream channel; the proposed alignment of that channel must be reviewed and confirmed in the field; further investigation is needed to determine if the removal of the orphaned road crossing will require the use of grade-control wood structures to control the upstream gradient (*to prevent headcutting*); fill-removal volumes must be calculated; a strategy for abandoning the existing channel is needed; and a revegetation and invasive weed management plan needs to be developed. These tasks can be accomplished in-house by SWCD personnel.

The individual design components are as follows:

Removal of the Orphaned Road Crossing: The existing road-stream crossing culvert will be removed to restore a free-flowing stream channel through the orphaned road alignment, and excess fill will be excavated downstream of the road alignment to restore a broader confluence of the wetland tributary stream and the Jack Creek overflow channel. This will increase winter rearing habitat, and improve upstream migration through the lowest reach of the tributary stream by converting the existing, artificially confined and incised channel, into a wider, lower gradient channel that is inset within a functional floodway. Total excavation is estimated at 800 cubic yards. This material should be end-hauled off-site and disposed of outside the 100-yr floodplain of Jack Creek. The gradient of the restored tributary channel will be approximately 0.34% through the decommissioned crossing, and the floodway will be approximately 20 feet in width.

Removal of the existing road-stream crossing is predicated on the need to maintain a sufficient road footprint to facilitate a future stream crossing structure; should Salmon Run Golf Course decide to construct a new cart path along the existing road alignment. The proposed preliminary design would enable such a crossing to be constructed with a bridge structure measuring approximately 24 feet in length. This length of bridge would be relatively easy to install, and should be cost-effective relative to the overall cost of the new cart path.

New Wetland Stream Channel Construction & Abandonment of the Existing Channel: The existing wetland stream channel runs along the base of the golf course driveway fill slope for approximately 530 feet, in a straightened, possibly historic ditch channel that lacks habitat complexity. The alignment of this channel is negatively impacted by direct contributions of road runoff; and because it could threaten the stability of the driveway fill slope, the existing alignment prevents restoration measures such as wood placements and meanderbend construction that would otherwise be appropriate methods of restoring instream complexity.

In this preliminary design we propose to abandon the 530 feet of existing channel that run along the base of the driveway fill slope and replace it with 745 feet of constructed channel that meanders through the center of the wetland. The increase in channel length will drop the overall stream gradient from 0.47% to 0.34% within this reach, and the new alignment will eliminate the potential for the stream to incise through perched sediment that developed overtime in response to the

undersized road-stream crossing culvert. Additional analysis is needed to determine the geometry of the new channel, which will be designed to convey the 1-year return interval discharge; this will promote out-of-bank flow into the wetland and increase rearing habitat during minor flood events. Incoming coarse bedload from the two stream channels deposits immediately downstream of the road, so this material is not expected to influence the constructed channel; the bed and banks of the new channel will be comprised of silt and organic material.

Approximately 200 feet of the abandoned segment of channel will be filled at the upstream end of the existing alignment, to cut off the abandoned channel from the new stream alignment. The downstream 330 feet of the abandoned channel will be left intact to provide winter rearing habitat.

Wood Structures: In this preliminary project design we recommend placing wood structures within the constructed wetland stream channel, to promote pool development and cover for rearing fish; to increase habitat for macro-invertebrates; and to serve as grade-control on the channel slope. We also recommend placing wood structures throughout the wetland for wildlife habitat, particularly for amphibians; to benefit fish during flood events; and to serve as “nurse logs” for future tree and shrub establishment. Since the wetland is prone to backwater flooding from Jack Creek, the wood structures need to be secured in-place. The easiest method, with the least disturbance, will be to pin the logs in-place by driving smaller diameter logs vertically into the soil, akin to a piling. We presume the depth of organic matter and silty soil is sufficient to drive the “piling logs” with an excavator’s downward hydraulic pressure, and that ramming or vibration will not be required. Where wood structures are used as grade-control, placement will require the excavation of “keyway” trenches, in which the logs will be placed and then buried; this will allow the logs to be placed at a specific design elevation and function as a “sill log” that prevents headcutting in the new wetland stream channel.

Riparian Revegetation: Revegetation of the riparian perimeter of the wetland must balance the following objectives:

- Establish long-lived hardwood and conifer trees that provide shade and, where needed, slope stability; shrubs that provide cover, wildlife habitat and food, and filtration; and wetland herbaceous species that filter incoming runoff and enhance wildlife habitat
- Retain open corridors for views and golf course play
- Select species that are aesthetically pleasing and do not require excessive maintenance

The Curry SWCD or a third party should assume the long-term management of the riparian restoration to ensure that these objectives are met and the revegetation plan succeeds.

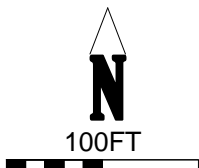
Invasive Weed Management: The management of invasive plants at Salmon Run Golf Course should be a priority of the restoration community given the importance of the greater Jack Creek stream network. This objective, however, would take a substantial effort up front, and require a long-term commitment. Management of invasive plants around the Hole 4 wetland would be a good starting point, and is necessary to achieving the objectives of this project. Specifically, herbicide treatment of English ivy and Himalayan blackberry should be a short-term strategy that is included in the riparian revegetation plan, and the development of competing vegetation should be a long-term strategy for continued suppression of the blackberry; long-term management of the English ivy will require diligent monitoring and continued use of herbicides since shade is not an effective suppression method for this species.

PRE-IMPLEMENTATION

There are multiple tasks that must be completed before this preliminary project design can be implemented.

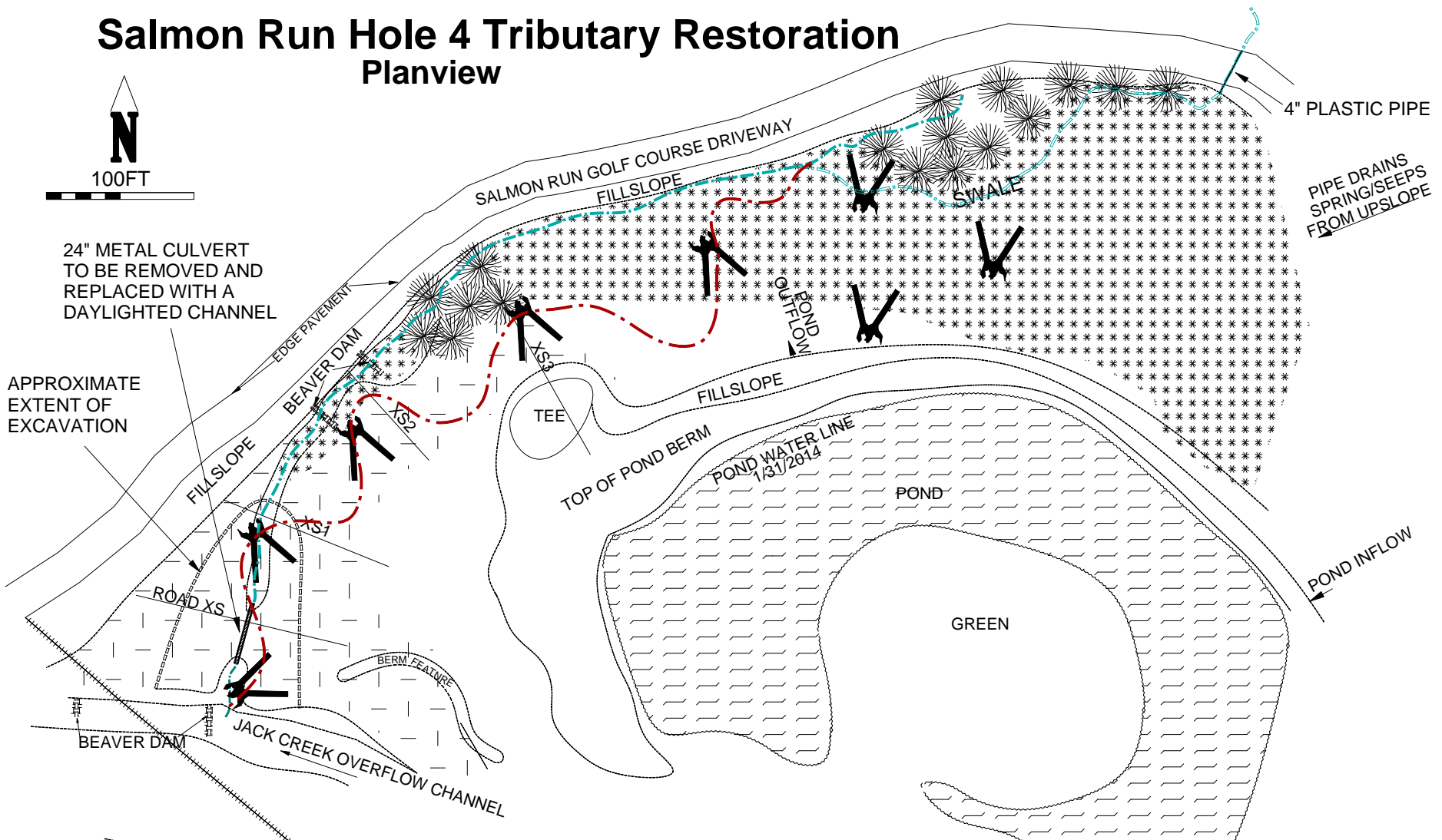
- (a) Request a pre-application consultation with Federal and State regulatory personnel (DEQ, Corps, DSL, NOAA) to (i) determine if the preliminary design can be processed through standard 'restoration' permits (i.e. GA, SLOPES V), and if not, identify what changes are needed; (ii) determine the caliber of engineering that is required (i.e. Is hydrologic modeling needed?); and (iii) determine if stormwater management is required
- (b) After regulatory feedback has been incorporated, confirm that the landowner is agreeable with the preliminary design, and negotiate a cost-share agreement
- (c) Finalize the preliminary design with (i) the geometry of the new channel; (ii) a coordinate layout of the channel alignment, location and elevation of grade control wood structures, and wood structures within the wetland; (iii) cut and fill volumes; (iv) a suitable spoils location, and (v) if necessary, a stormwater management plan
- (d) Develop a planting plan for the revegetation of the wetland perimeter, and the management of invasive species
- (e) Develop a monitoring plan
- (f) Prepare a removal-fill permit application for the DSL and Army Corps of Engineers
- (g) Develop an implementation and monitoring budget
- (h) Source wood for the instream structures
- (i) Develop an implementation timeline
- (j) Submit funding applications

Salmon Run Hole 4 Tributary Restoration Planview



24" METAL CULVERT TO BE REMOVED AND REPLACED WITH A DAYLIGHTED CHANNEL

APPROXIMATE EXTENT OF EXCAVATION



EXPLANATION

- THALWEG-TRIBUTARY
- THALWEG-SWALE
- PROPOSED NEW CHANNEL ALIGNMENT
- SLOPE BREAK
- ELK FENCE

- | XS | CROSS SECTION |
|----|----------------------------|
| | SEDGES & RUSHES |
| | AREA CLEARED OF BLACKBERRY |
| | BEAVER DAM |
| | OPEN WATER |

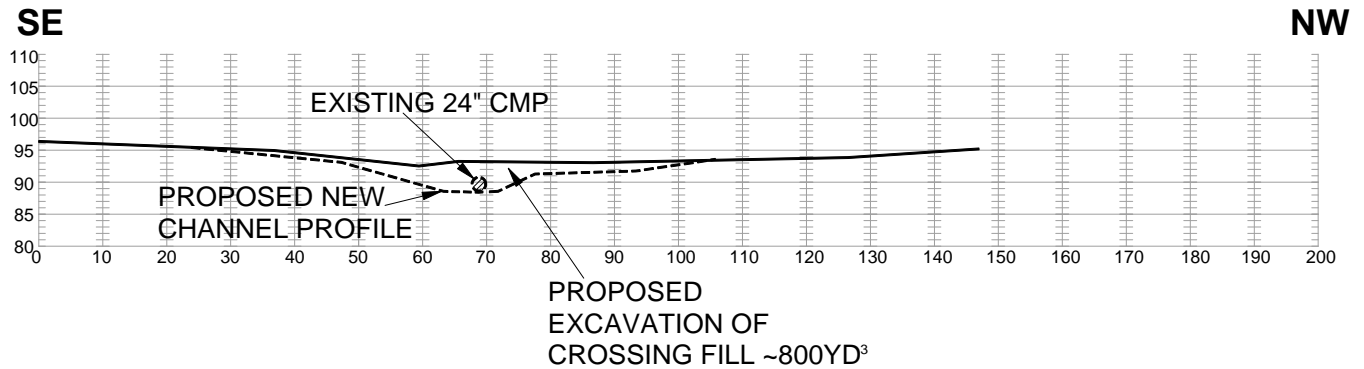
- WILLOWS
- PROPOSED LARGE WOOD PLACEMENT

ESTIMATED LENGTH OF NEW CHANNEL = 745FT. LENGTH OF CHANNEL TO BE ABANDONED = 530FT

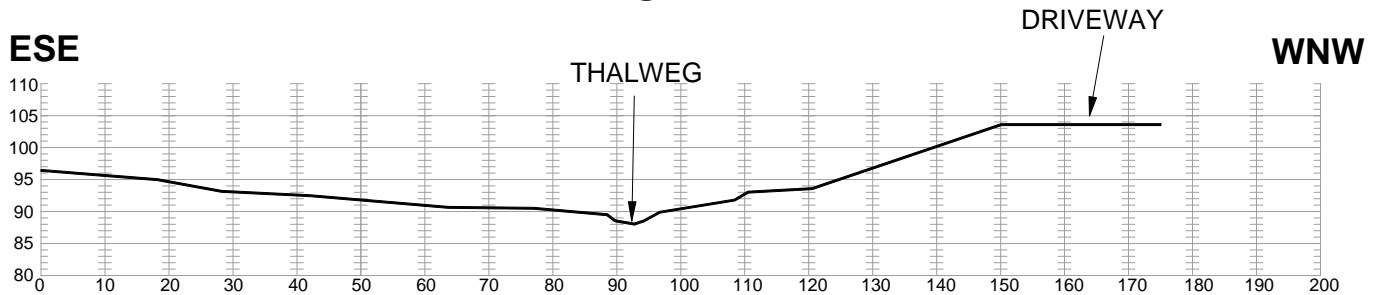
Prepared by Erin Minster, Curry SWCD 6/23/2014
 Surveyed 1/22&31/2014 using Nikon Total Station, not survey grade for planning only.

Salmon Run Hole 4 Tributary Restoration Cross Sections

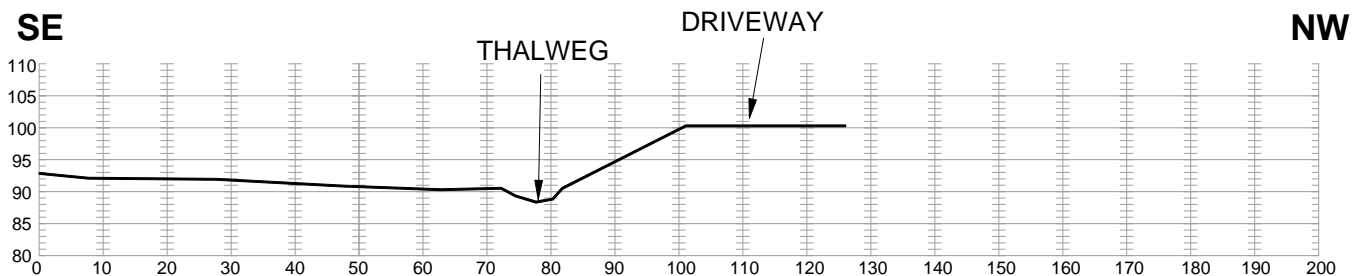
ROAD XS



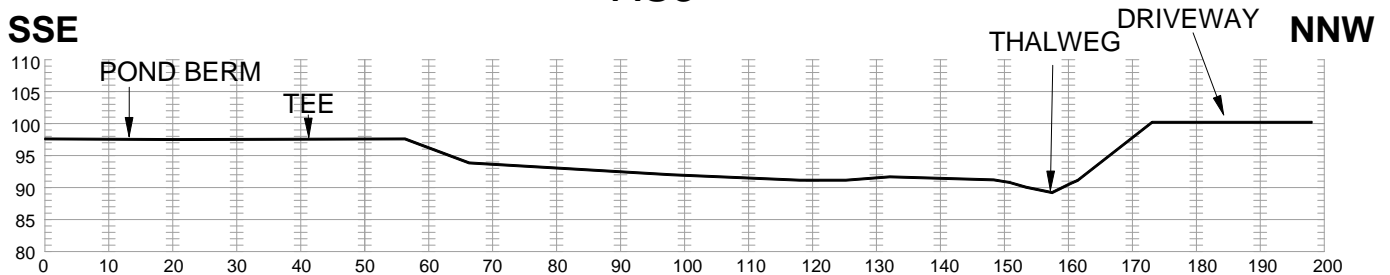
XS1



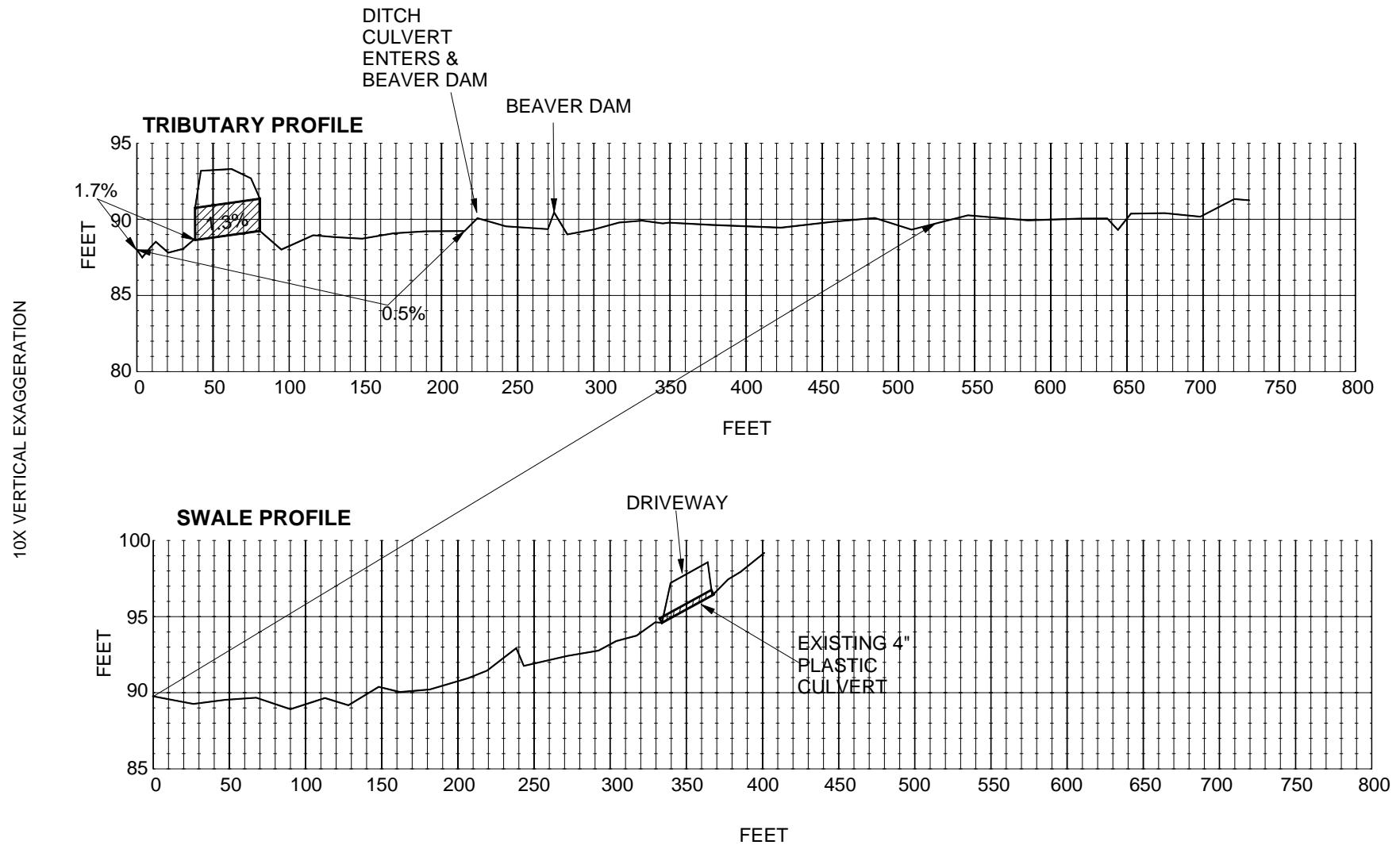
XS2



XS3



Salmon Run Hole 4 Tributary Restoration Thalweg Profile



Salmon Run Hole 4 Restoration: Top photo shows the greater Hole 4 wetland during a moderate flood event. Notice the extent of ponding in the wetland, which represents potential high quality wintering rearing habitat for coho salmon pre-smolts; also notice the golf course pond and other infrastructure to the right of the wetland. The bottom photo shows the wetland as it narrows immediately upstream of the orphaned road crossing.



Salmon Run Hole 4 Restoration: Top photo shows the orphaned road crossing, which is underwater in this photo, and the confluence of the wetland stream channel and the floodway of Jack Creek. Also notice the extent of Himalayan blackberry that was mowed to facilitate our investigations — some of this area would be regraded to restore backwater habitat. Bottom photo shows a close up of the confluence and a greater extent of the Jack Creek floodway.



Salmon Run Hole 4 Restoration: Both photos show the magnitude of Himalayan blackberry encroachment on the wetland and greater project area. In the top photo the contractor is mowing the orphaned road grade that leads to the road-stream crossing — some of this area will be regraded and restored to backwater habitat when the road crossing is removed. In the bottom photo the contractor is mowing the interface between the course and the wetland.

