

Completion Report Garden Creek and Gini Canal Crossing Project Upper Salmon Subbasin Salmon, Idaho



Prepared for:
Custer Soil and
Water Conservation District
Salmon, Idaho

Prepared by:
U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Snake River Area Office
Salmon Field Office



July 2007

Garden Creek rock ram area after project completion. (July 2007)

After project completion, showing the Gini Canal flowing through the concrete flume, with zero flow being spilled over the checkboards into Garden Creek. (July 2007)

This project was initiated and completed through the combined efforts of many entities, public and private. The purpose of the project was to provide for continued use of water while enhancing conditions for anadromous fish listed under the Endangered Species Act. The Bureau of Reclamation prepared this completion report in accordance with the 2004 National Marine Fisheries Service Federal Columbia River Power System Biological Opinion to describe the design and construction of this project.

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Attachment A: Construction Photographs

Attachment B: Final Design Drawings (including location map)

1. Introduction

Throughout the Salmon River subbasin, anadromous fish migrating up and down tributary streams encounter unscreened irrigation ditches at locations where the ditches and the streams co-mingle. This situation occurred where Gini Canal crossed Garden Creek near Challis, Idaho. In the winter of 2003/2004, a project was completed to separate the Gini Canal from Garden Creek. The primary purpose of the Gini Canal/Garden Creek crossing project was to allow migrating fish unrestricted access to Garden Creek.

The primary objective of this project was to implement actions to improve the passage of adult and juvenile steelhead, bull trout, and possibly salmon, in Garden Creek. Garden Creek and the Salmon River provide habitat for several species of fish listed as either threatened or endangered under the Endangered Species Act (ESA), as well as resident fish. Section 7(a)(2) of the ESA requires that all Federal agencies consult with the National Oceanic and Atmospheric Administrative Fisheries Services (NOAA Fisheries), and the U.S. Fish and Wildlife Service (USFWS), to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species, or result in adversely modifying their critical habitat. NOAA Fisheries oversees the implementation of the ESA for certain listed species including anadromous salmon and steelhead.

At the time of this project, there were 13 listed anadromous Evolutionarily Significant Units (ESU) within the Columbia River system. The upper Salmon subbasin ESUs include the Snake River steelhead and the Snake River spring/summer Chinook. Consultation with NOAA Fisheries was completed on these ESUs and a Biological Opinion (BiOp) was issued on December 21, 2000.¹ This consultation contained an Updated Proposed Action by the action agencies including a Tributary Habitat Program.²

The Bureau of Reclamation (Reclamation) implements the Tributary Habitat Program for the Salmon River subbasin, as set forth in the Updated Proposed Action, as a conservation measure to provide for early actions to assist with recovery of the ESUs within the Columbia River. Within these conservation measures, Reclamation addresses limiting factors such as instream flow, barriers, channel morphology, and entrainment. For this program, Reclamation works with willing partners to provide technical assistance and logistical help with implementation of habitat

¹ Biological Opinion Reinitiation of Consultation on Operation of the Federal Columbia River Power System, including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin, National Marine Fisheries Service, Northwest Region, December 21, 2000.

² Final Updated Proposed Action for the FCRPS Biological Opinion Remand, U.S. Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration, November 24, 2004.

projects leading to correction of tributary, spawning, and rearing deficiencies associated with these limiting factors. This project was completed as part of the Tributary Habitat Program.

1.1 Background

The Gini Canal, also known as the S-23 diversion, diverts water from the Salmon River approximately 4 miles upstream from Challis, Idaho. Several projects have been completed with the irrigators' cooperation and assistance to reduce the Gini Canal system's impacts on anadromous and native fish. A consolidation project was completed in 1999, which eliminated two points of diversion from the Salmon River and stabilized the Gini Canal diversion structure. A new headgate structure was included as part of this project. Idaho Department of Fish and Game (IDFG) Anadromous Fish Screen Shop (Screen Shop) built a new rotating drum fish screen to keep fish out of the canal system. Motors and electronic sensors have been added to the headgate to allow the gates to be either automatically or remotely controlled to allow for greater control of the amount of water diverted.

Garden Creek runs through the city of Challis. The lower reaches of Garden Creek often run dry during the summer months due to irrigation diversions. There is good fish habitat and dependable flows located in the upper reaches of the creek. Fish utilize the lower reaches mainly as a travel corridor when there are adequate flows.

Approximately 6 miles down from the Gini Canal diversion, near the end of the delivery system, Garden Creek used to flow into the Gini Canal. A large diversion structure at the downstream end of the canal delivers water to 6 ditches in the system, and any excess water is spilled back into Garden Creek. The co-mingling of the water created numerous problems for fish such as:

- The amount of water spilled into the creek downstream of the canal was usually more than creek flows upstream of the canal. The flows were unreliable, however, and sometimes only minor leakage was passed down into Garden Creek.
- Most of the juvenile fish migrating down Garden creek would enter the canal and stay in the canal, rather than find their way through the spillway and down Garden Creek.
- Depending on the conditions at the spillway, adult fish migrating upstream would either encounter an impassable barrier or would enter the canal, where they would sometimes stay instead of continuing up the creek.

The project was designed to eliminate the above listed problems by lowering the creek invert to flow under the canal so that the creek flows downstream of the canal were at least as high as the flows above the canal. The canal was transported over the creek in a concrete flume. The spillway from the canal into the creek was modified to eliminate fish passage from the creek into the canal. As a result of these efforts, fish can now migrate up and down the creek, and through the site without impedance.

1.2 Participation and Cooperation

Planning for the Garden Creek/Gini Canal Crossing project was initiated under the NOAA Fisheries Federal Columbia River Power System (FCRPS) 2000 BiOp and formation of the Tributary Habitat Program. Reclamation assistance for this project was funded under the direction of the Snake River Area Office (SRAO) Endangered Species Act (ESA) Program which provided coordination, environmental compliance, surveys, designs, inspection, and construction management services.

Funding for construction was provided by Bonneville Power Administration (BPA).³ Distribution of BPA funding and construction contract administration was provided by Custer Soil and Water Conservation Districts (Custer SWCD). Additional coordination and project review was provided by the Upper Salmon Model Watershed Program. The Gini Canal irrigators were instrumental in completing the project by providing design comments and site access.

1.3 Environmental Compliance

Reclamation staff in the Salmon Field Office provided local coordination assistance and completed the National Environmental Policy Act (NEPA) and Section 7 ESA compliance documents on behalf of BPA, Custer SWCD, and IDFG. The U.S. Army Corps of Engineers issued a permit letter authorizing the project on October 21, 2004. Idaho Fish and Game Department (IDFG) biologists were consulted to determine any necessary fish salvage operations. Best Management Practices were followed during all phases of construction to minimize disturbance to the Garden Creek channel.

1.4 Contract Specifications and Bidding

Reclamation's Pacific Northwest (PN) Region design office developed project drawings and specifications for construction of the consolidation project. Custer SWCD added the contract documents. Modifications for the fish screen metalwork were developed by the Screen Shop. The project was advertised for 2 weeks in the local newspapers in Salmon and Challis. A project walk-through with five local contractors was conducted prior to bidding. A total of three contractors bid on the job and the project was awarded to Crist Construction, Challis, Idaho.

³ Contract title 1994-017-00 PL Administration/Implementation Holistic Restoration, Contract # 0019780.

2. Project Description

The project is located on Garden Creek, a tributary to the Salmon River in central Idaho, approximately 1 mile south of the town of Challis, in Custer County (Drawing 1678-100-359). The intersection of Garden Creek and Gini Canal is located on private land. The project was designed to eliminate the co-mingling of Garden Creek and Gini Canal water, eliminate fish passage from the creek into the canal, and maintain the irrigators' ability to deliver water. See Attachment A for project photographs and Attachment B for project drawings.

2.1 Construction

Crist Construction began construction of the Garden Creek/Gini Canal crossing in December 2004 and completed the project in April 2005. Construction inspection and project management was provided by Reclamation. Custer SWCD provided all contract management. Close coordination between the irrigators, Custer SWCD, Reclamation, and the contractor was necessary to ensure successful completion of the project.

Construction for Garden Creek/Gini Canal crossing involved:

- Diverting Garden Creek around the project work area;
- Lowering the invert of Garden Creek upstream of the Gini Canal to allow the Creek to flow under the canal;
- Installing a rock ramp to stabilize Garden Creek and allow fish passage through the project site;
- Removing portions of the old spillway structure and modifying the remaining section with horizontal check boards, a control gate, and a sloping concrete floor on the downstream side;
- Installation of walkways and hand rails to allow safe access to the check structure and control gate on the spillway;
- Constructing a 10-foot-wide by 40-foot-long concrete flume to allow Gini Canal flows to pass over Garden Creek;
- Installing a hardened crossing upstream of the ramp to allow the local irrigator to access his fields without impeding fish passage or roiling sediment into Garden Creek;
- Re-contouring and re-vegetating all disturbed areas;
- Fencing to protect the re-vegetated areas.

2.2 Design Changes

Several items were changed after the final specifications were printed. Some of the items were merely typographical corrections or clarifications that were identified before the project went to bid. Some of these items were noticed by the designers, and some were the result of questions asked by the contractors, either during or following the pre-bid tour. These items were all relatively minor, and included:

- Clarification on the barbed wire fence specifications;
- Correction on the drawing showing the connection between the two piers and the concrete flume;
- Clarification on the number of handrails and allowable coatings for them;
- Clarification on the type of bedding required beneath the concrete footings;
- Clarification that the rock in the rock ramp would be placed at the direction of the field engineer, and not necessarily exactly as shown on the drawings;
- Clarification on what rock could be rounded, and what needed to be angular;
- Clarification on whether pre-cast concrete would be allowed.

There were also two change orders processed during the project to allow the project to accommodate on-site conditions, and irrigator or designer preferences. These changes included:

- Changing the spillway controls from 12 feet of horizontal boards supported by tip-up stanchions, to 8 feet of horizontal check boards and a 3-foot-wide control gate;
- Extending the length of the wingwall on the right downstream corner of the flume to provide a better connection with the canal bank;
- Increasing the wall thickness from 6 inches to 8 inches throughout the structure;
- Extending the length of the stainless steel plate on the top of the two piers to cover the entire pier length;
- Reinforcing the lower canal bank upstream of the flume to reduce chance of canal failure.

2.3 Site Monitoring and Long-Term Effectiveness

Multiple trips were made to the Garden Creek/Gini Canal Crossing project site since the completion of the project. Some of the items noted during these visits are described below.

- The rock ramp is stable with very little noticeable rock movement. There are no visible impediments to fish passage throughout the ramp over the entire range of flows;

- Revegetation of the site has been extremely successful, aided by timely rains after seeding and overspray from a nearby center pivot;
- The flume has adequate capacity to pass the required Gini Canal flows;
- The spillway structure appears to produce hydraulic conditions that would not allow fish passage into the canal;
- Icing conditions at the site do not prevent creek flow and have not caused the creek to leave the channel during extended winter cold spells;
- Irrigators and local biologists are pleased with the results of the project to date.

Additionally, Custer SWCD and the Model Watershed office have completed a Monitoring Report⁴ for BPA, which details the effects of construction and completion of the project.

3. Conclusions

The Garden Creek/Gini Canal Crossing project was a very successful project. Garden Creek no longer flows into the canal. There are no impediments to juvenile migration downstream or adult migration upstream throughout the project area. The irrigators have adapted to the new spillway system and have reported no problems. The new rock ramp is stable and functioning as designed.

⁴ Habitat Improvement Program Biological Opinion Implementation Monitoring Report, Gini Canal Flume, BPA Fish & Wildlife Project # 1994-017-00, July 19, 2005

**Completion Report
Garden Creek and Gini Canal Crossing Project**

**Upper Salmon Subbasin
Salmon, Idaho**

Attachment A

Construction Photographs

**Photographs by the Bureau of Reclamation
Pacific Northwest Region Design Group
Boise, Idaho
Salmon Field Office
Salmon, Idaho
and
Idaho Fish and Game Screen Shop
Salmon, Idaho**



Photograph 1. Old Gini Canal Spillway, shown during typical irrigation season operating conditions. Garden Creek flows into the canal in the upper right corner of this photo. Gini canal flow is from the top to the bottom of the picture.



Photograph 2. Looking upstream at the old Gini Canal spillway structure. Adult fish could migrate upstream into the canal when flows were spilling through the upper spillway structure, in the right of the photo. Juvenile fish that swam down the creek into the canal would often stay in the canal instead of continuing down the creek.



Photograph 3. Garden Creek flowing into the Gini Canal, prior to the project. The canal invert was lowered 4 feet in this area to allow the creek to pass beneath the canal. The creek was stabilized with a rock ramp.



Photograph 4. Garden Creek rock ramp area after project completion.



Photograph 5. Old Gini Canal spillway structure. The right side of the structure was removed, and the rest of the structure modified to prevent fish passage from the creek up into the canal.



Photograph 6. Modifications to the old spillway structure included changing from vertical to horizontal check boards, installation of a 3 foot wide control gate, and a walkway with handrails to allow the irrigators to safely operate the spillway.



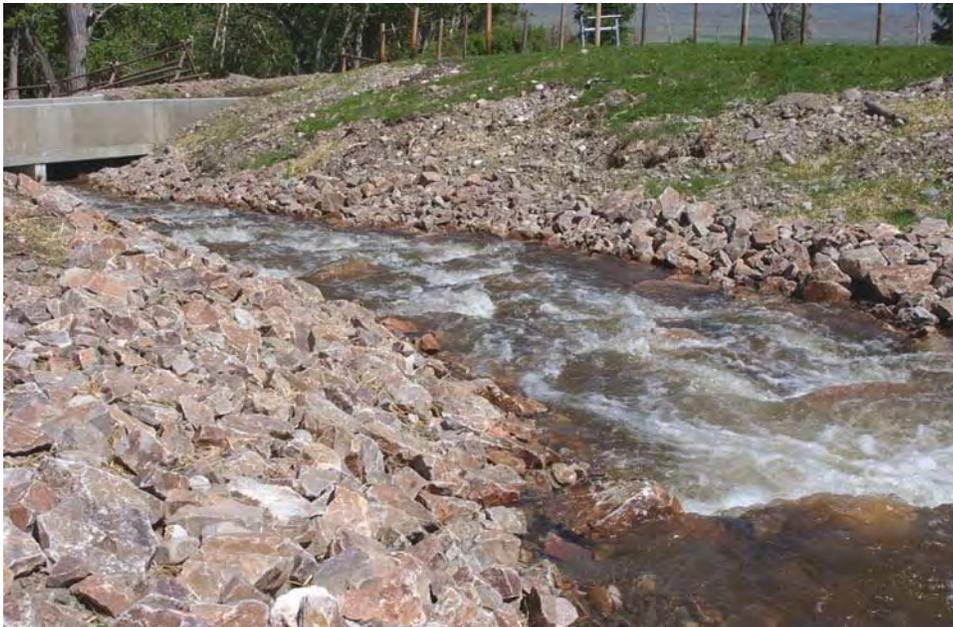
Photograph 7. A 5:1 sloping floor, 18 feet long, was added to the downstream side of the spillway to yield a shallow depth of water that would prevent fish from jumping over the checkboards during normal canal operations.



Photograph 8. Looking upstream at Garden Creek passing below Gini Canal, and the new spillway structure during typical summer operations.



Photograph 9. Looking downstream along the Garden Creek rock ramp at the new concrete flume. Large rocks were used to break up the velocity of the water and provide resting areas for migrating fish.



Photograph 10. Looking downstream along the rock ramp at relatively high spring flows.



Photograph 11. New concrete flume, 10 feet wide by 40 feet long, constructed to carry the Gini Canal over Garden Creek.



Photograph 12. After project completion, showing the Gini Canal flowing through the concrete flume, with zero flow being spilled over the checkboards into Garden Creek.



Photograph 13. Relatively high spring flows in Garden Creek passing under the new concrete flume for Gini Canal.



Photograph 14. Icing conditions at Garden Creek can be severe, as this photo taken before the project was constructed illustrates. The creek was completely out of its channel in this location due to an ice jam.



Photograph 15. Icing conditions during construction of the project. Photo shows the top of the two piers that will later support the flume. The rock ramp had been constructed prior to this photo.



Photograph 16. Typical icing conditions at the flume after the project completion.



Photograph 17. Hanging fence installed across the canal by the irrigators to keep cattle from entering the project site.

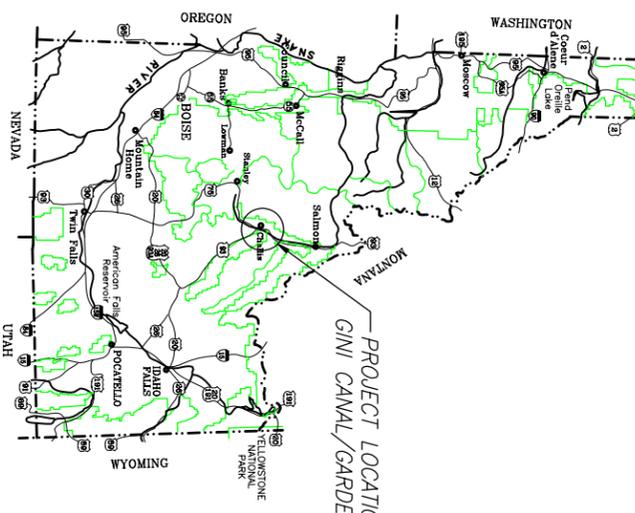


Photograph 18. Revegetation of the project was very successful. The barbed wire fence in the foreground was built to keep cattle out of the revegetated area. The Gini Canal flume is located just above the fence post on the left side of the photo, with the rock ramp to the right of that.

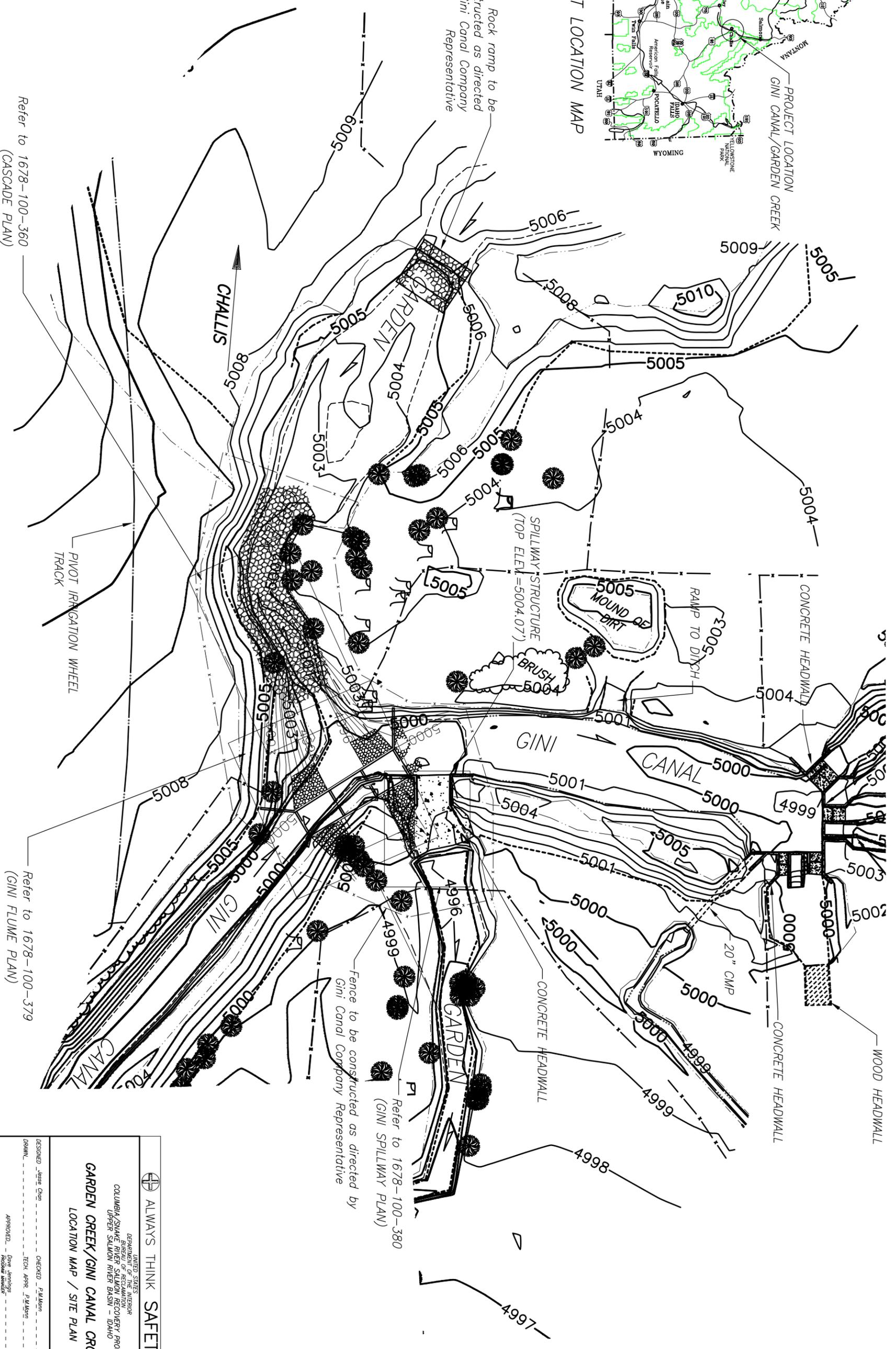
Attachment B
Final Design Drawings (includes location map)

Final Design Drawings Garden Creek/Gini Canal Crossing

1678-100-359	Location Map/Site Plan
1678-100-360	Ramp Plan and Section
1678-100-379	Flume Isometric, Plan, and Section
1678-100-380	Spillway Plan and Sections
1678-100-399	Profile and Cross Section Stations



Rock ramp to be
constructed as directed
by Gini Canal Company
Representative



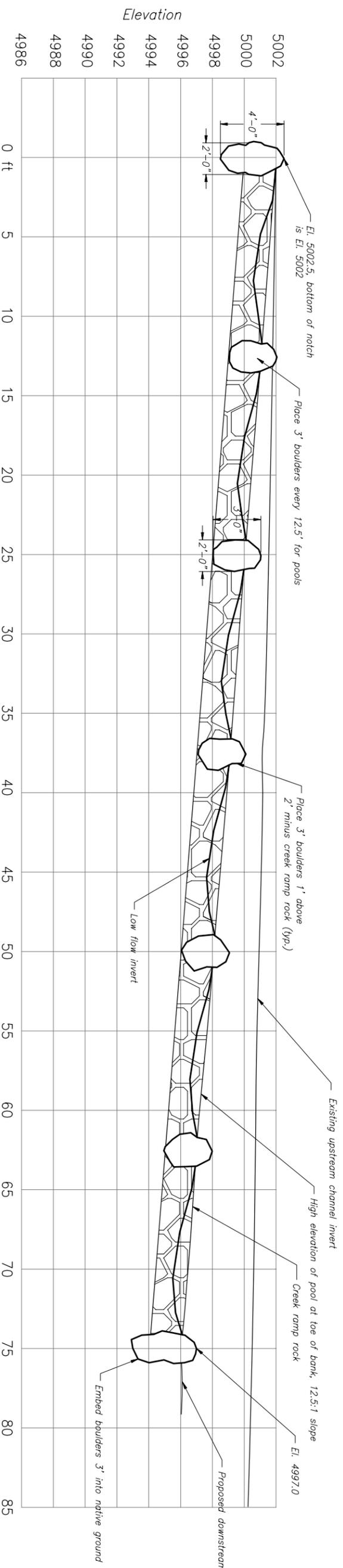
ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
UPPER SALMON RIVER BASIN - IDAHO

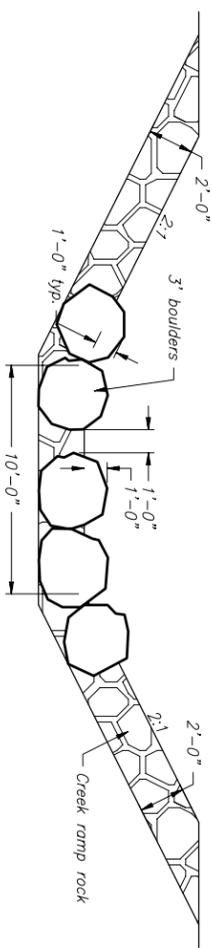
GARDEN CREEK/GINI CANAL CROSSING
LOCATION MAP / SITE PLAN

DESIGNED: Jesse Chin
DRAWN: _____
APPROVED: _____
TECH. APPR. P. Mallon
DATE: 2004-2-28
SHEET 1 OF 9

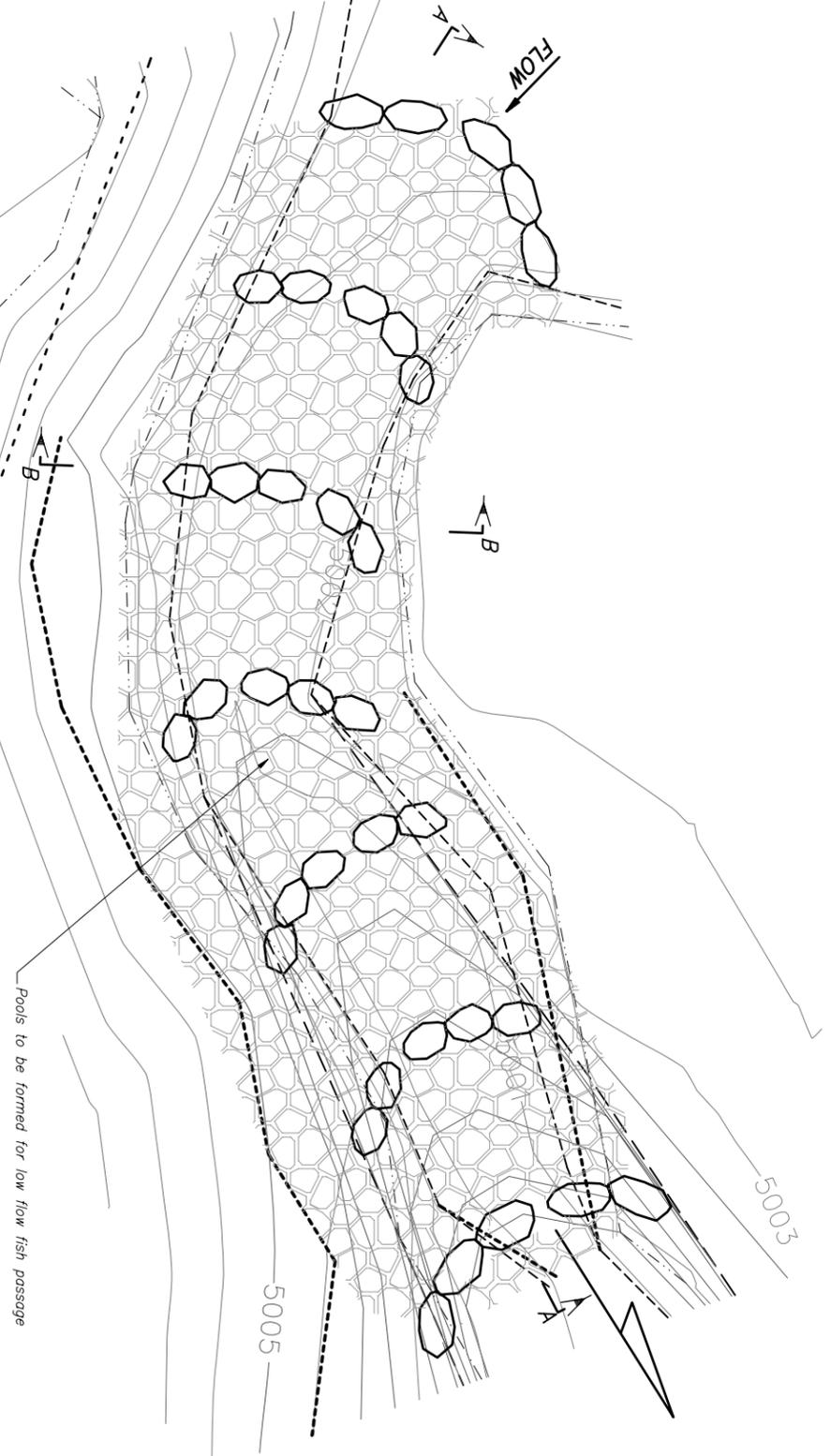
1678-100-359



SECTION A-A
PROFILE



SECTION B-B
TYPICAL

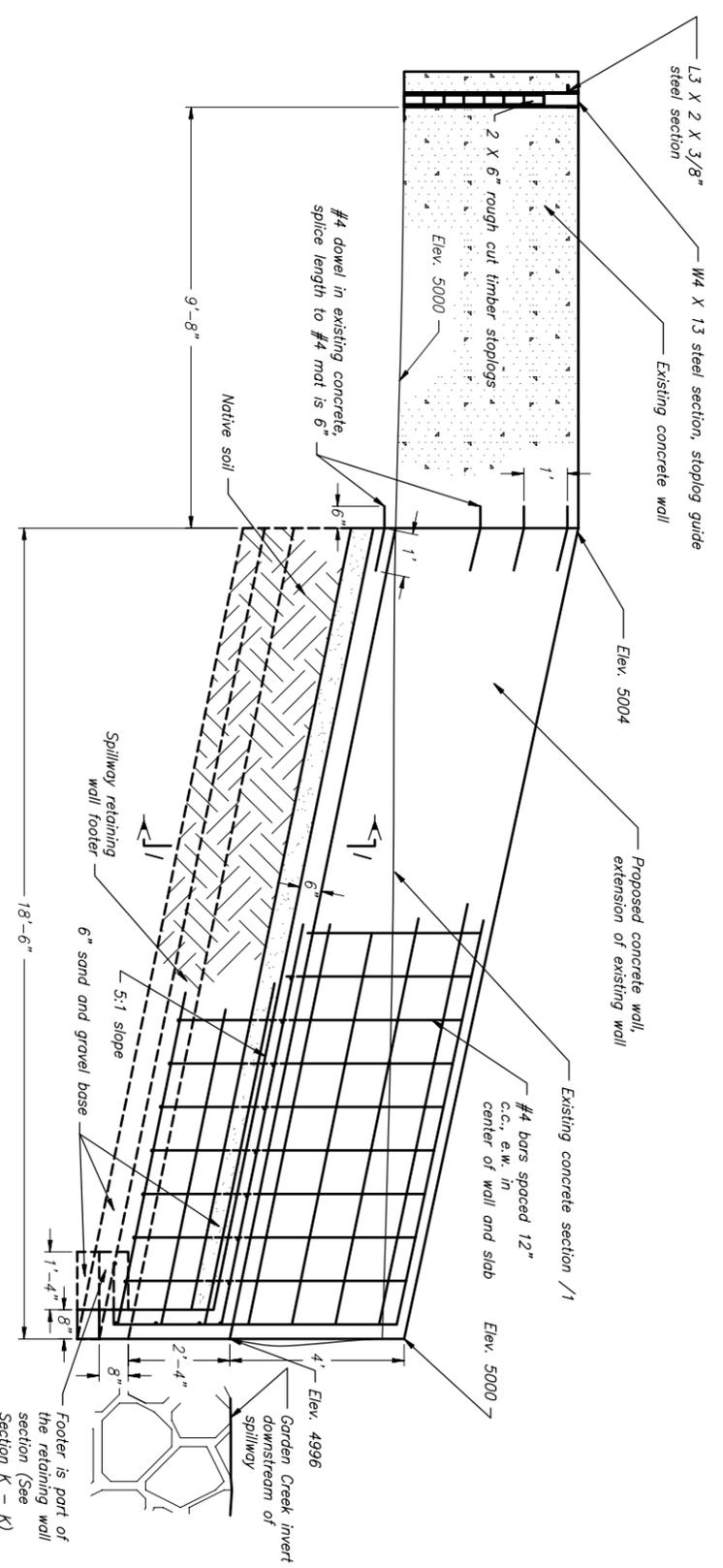


CASCADÉ PLAN

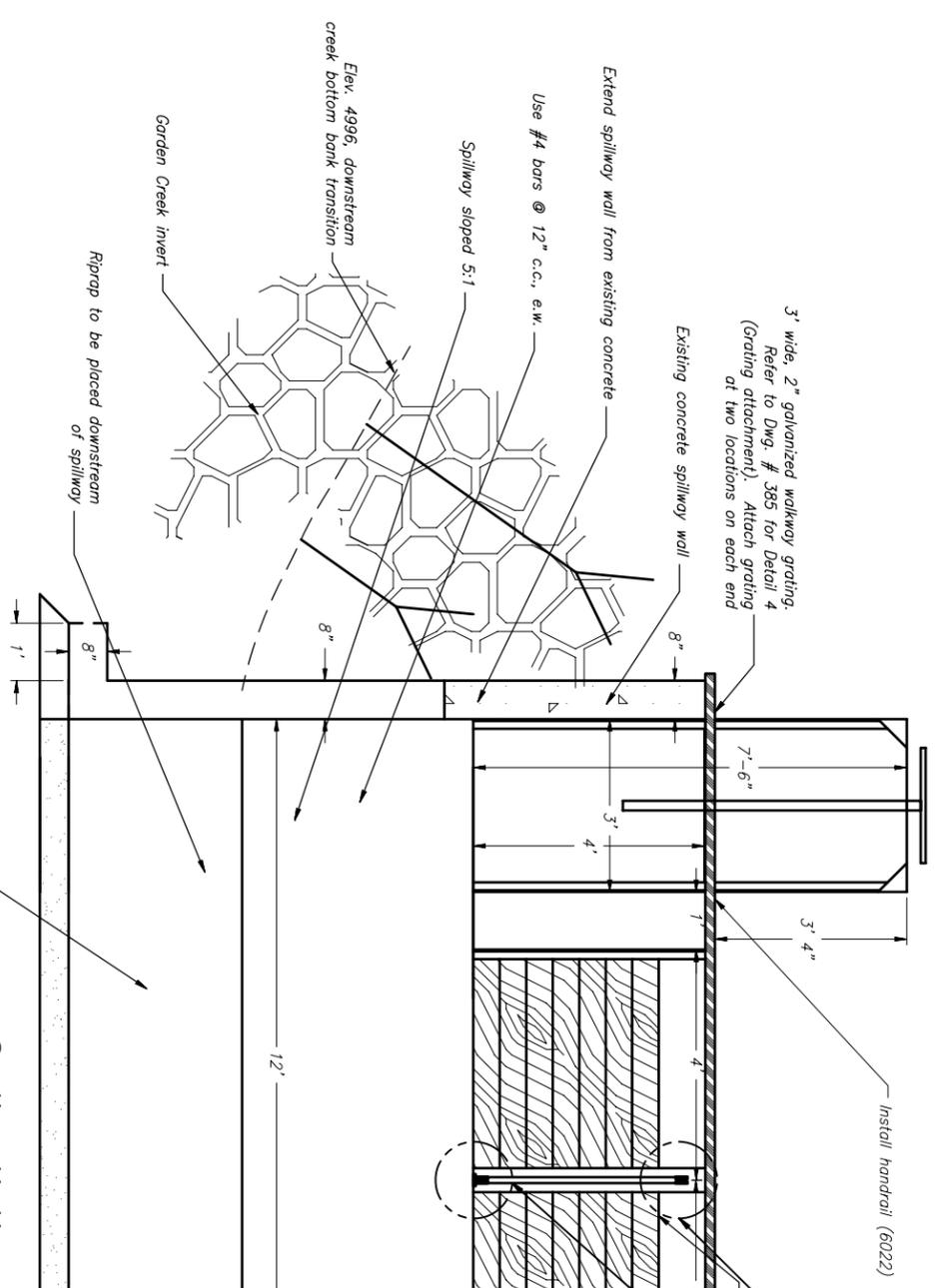
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UNITED STATES
DEPARTMENT OF THE INTERIOR
COLUMBIA ASWAKE RIVER SALMON RECOVERY PROJECT
UPPER SALMON RIVER BASIN - IDAHO
GARDEN CREEK/GINI CANAL CROSSING
RAMP PLAN AND SECTION

DESIGNED: Jesse Chin
DRAWN: _____
CHECKED: P. M. Kinn
TECH. APPR.: P. M. Kinn
APPROVED: _____
BOISE, IDAHO SHEET 2 OF 9
1678-100-360



Section F - F



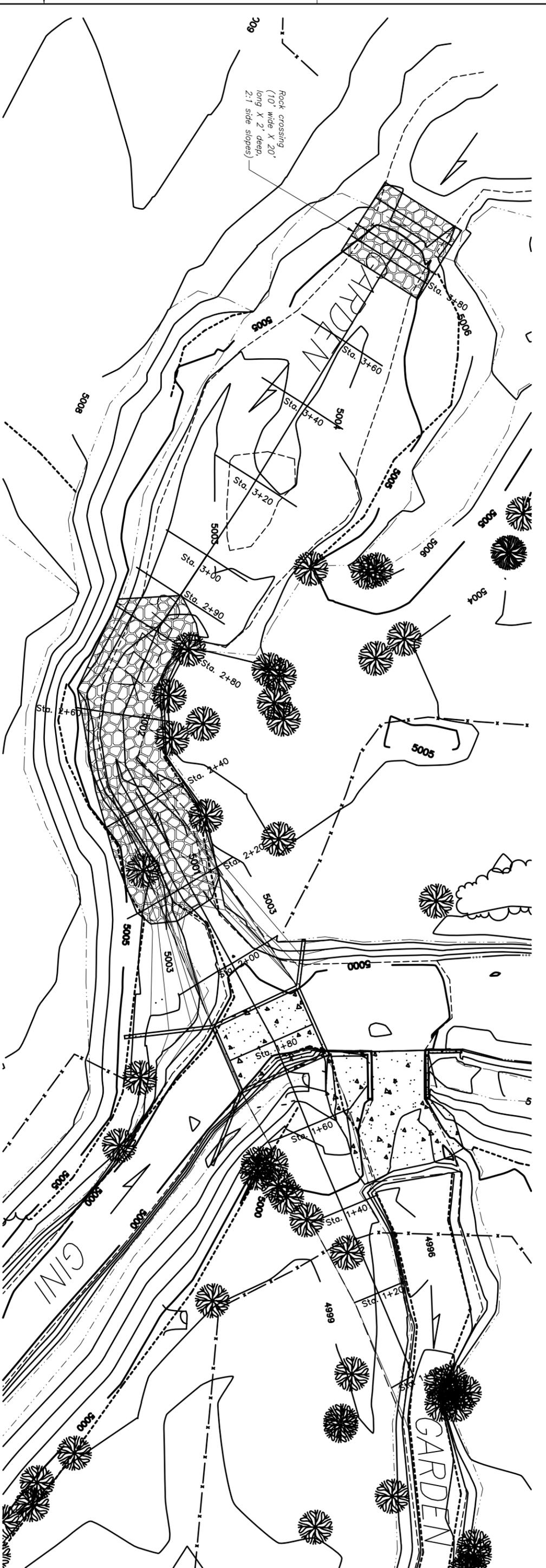
Section K-K

ALWAYS THINK SAFETY

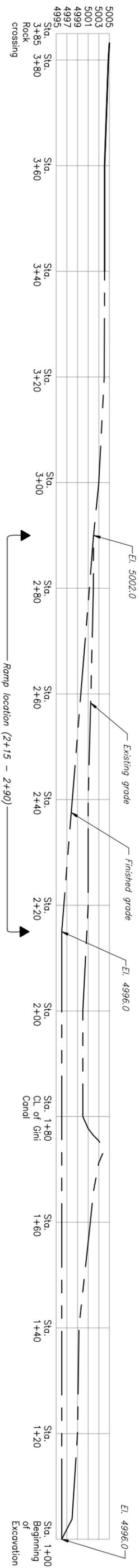
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

**GARDEN CREEK/GINI CANAL CROSSING
SPILLWAY PLAN AND SECTIONS**

DESIGNED: Jesse Chen DRAWN: _____ CHECKED: P.M. Mann TECH. APPROVAL: P.M. Mann CAD SYSTEM: AUTOCAD 2004 BOISE, IDAHO	FEBRUARY 26, 2004 1678-100-380.DWG SHEET 7 OF 9
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GARDEN CREEK PROFILE



GARDEN CREEK PROFILE

NOTES:

1. Reference Dwg. 398 for cross sections

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UNITED STATES
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BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
UPPER SALMON RIVER BASIN - IDAHO
GARDEN CREEK/GINI CANAL CROSSING
PROFILE AND CROSS SECTION STATIONS

DESIGNED - *Leslie Olson*
DRAWN - *_____*
CHECKED - *P. M. Mann*
TECH. APPR. - *P. M. Mann*
APPROVED - *_____*
DATE DRAWINGS REVISION NUMBER
BOISE, IDAHO SHEET 3 OF 9 2004-05-21 **1678-100-399**